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**A COMPARATIVE STUDY OF  
IRISH AND SCOTTISH LOGBOATS**

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**THESIS SUBMITTED FOR THE DEGREE OF  
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**ABSTRACT OF THESIS** (Regulation

3.5.13)

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*Title of Thesis* A Comparative Study of Irish and Scottish Logboats

*No. of words in the main text of Thesis* Seventy Thousand Words

This thesis examines Irish logboats and compares them in detail to Scottish logboats. It catalogues extant and recorded Irish Logboats, and includes drawings and photographic records. All aspects of both countries' boats, such as their dimensions, form, and evidence for propulsion are examined and interpreted. Those logboats that have dating evidence are also examined and compared to literary and other sources.

The distributions of the boats are compared to their geographical and archaeological contexts and emerging patterns explored in detail. The results of this study are investigated on a national and regional basis.

The native tree species of Ireland and Scotland are considered with particular reference to those used to make the logboats as well as their availability during the demise of logboat use. In keeping with this, evidence for construction techniques is studied, as are their applications in logboat reconstructions. The logboat reconstructions are used with aspects of naval architecture to determine and compare the operational capabilities of logboats under differing load and propulsive conditions.

Where applicable, the data which is discerned from the logboats' contexts, forms, dimensions and functional features are combined with aspects of the wood science and naval architecture to determine their original operational uses. Finally, this data is incorporated into an ongoing computer programme which enables the performance capabilities of other logboats, as yet undiscovered, to be determined.

## DEDICATION

To my father, Brian, who is entirely responsible for introducing me to boats and in particular, sailing. I hope you get as much enjoyment from reading this thesis as you did discussing it.



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## CONTENTS OF VOLUME 1

|   |                       |
|---|-----------------------|
| <b>TITLE</b>  | <b>i</b>              |
| <b>DECLARATION</b>  | <b>ii</b>             |
| <b>ABSTRACT</b>   | <b>iii</b>            |
| <b>DEDICATION</b>   | <b>v</b>              |
| <b>ACKNOWLEDGEMENTS</b>   | <b>vi</b>             |
| <b>CONTENTS OF VOLUME ONE</b>   | <b>vii</b>            |
| <b>CONTENTS OF VOLUME TWO</b>   | <b>xvi</b>            |
| <b>CONTENTS OF VOLUME THREE</b>   | <b>xvii</b>           |
| <b>INDEX OF FIGURES</b>   | <b>xviii</b>          |
| <b>INDEX OF PLATES</b>  | <b>xxi</b>            |
| <b>INDEX OF TABLES</b>  | <b>xxii</b>           |
| <b>ONGOING LOGBOAT NAVAL ARCHITECTURAL PROGRAMME<br/>(Computer Disc in Microsoft Excel)</b> | <b>Back<br/>Cover</b> |

## VOLUME ONE

|   |    |
|---|----|
| <b>CHAPTER ONE: INTRODUCTION</b>            | 1  |
| 1.1 INTRODUCTION                            | 1  |
| 1.2 SUMMARY OF PREVIOUS WORK                | 3  |
| 1.3 AIMS OF THE THESIS                      | 8  |
| 1.3.1 Methodology                           | 9  |
| 1.4 DOCUMENTARY SEARCH                      | 10 |
| 1.5 FIELDWORK                               | 13 |
| 1.6 RECORDING                               | 14 |
| <br>  |    |
| <b>CHAPTER TWO: THE LOGBOAT</b>             | 16 |
| 2.1 THE LOGBOAT                             | 16 |
| <br>  |    |
| <b>CHAPTER THREE: LITERARY EVIDENCE</b>     | 21 |
| 3.1 INTRODUCTION                            | 21 |
| 3.2 LITERARY EVIDENCE                       | 21 |
| 3.2.1 Literary Evidence of Period of Use    | 22 |
| 3.3 LITERARY ACCOUNTS OF LOGBOAT USES       | 24 |
| 3.3.1 Acts of Aggression                    | 25 |
| 3.3.2 Other Circumstances                   | 26 |
| 3.4 NON-LITERARY SOURCES                    | 27 |
| 3.5 LOGBOAT DISTRIBUTION AND OTHER EVIDENCE | 33 |
| 3.5 SUMMARY                                 | 37 |

|  |           |
|--|-----------|
| <b>CHAPTER FOUR: LOGBOAT DATES</b>                       | <b>40</b> |
| 4.1 INTRODUCTION   | 40        |
| 4.2 ABSOLUTE DATING METHODS                              | 40        |
| 4.2.1 Dendrochronology                                   | 40        |
| 4.2.2 Radiocarbon-Dating                                 | 41        |
| 4.2.3 Association to Sites                               | 43        |
| 4.2.4 Synthesis of Absolute Dates                        | 45        |
| 4.3 RELATIVE DATING METHODS                              | 47        |
| 4.3.1 Artefactual Association                            | 47        |
| 4.3.2 Association with an Archaeological Settlement Site | 47        |
| 4.3.3 Geological Dating                                  | 51        |
| 4.3.4 Dating by Pollen Analysis                          | 52        |
| 4.4 DATING BY FEATURES                                   | 52        |
| 4.4.1 Dating by Tool Marks                               | 52        |
| 4.4.2 Dating by 'Modern' Features                        | 53        |
| 4.4.3 Metal Fixtures                                     | 54        |
| 4.5 PERIOD OF USE OF LOGBOATS                            | 55        |
| 4.6 THE CESSATION OF LOGBOAT USE                         | 55        |
| <br>   |           |
| <b>CHAPTER FIVE: LOGBOAT CONSTRUCTION</b>                | <b>58</b> |
| 5.1 LOGBOAT BUILDING                                     | 58        |
| 5.2 LOGBOAT BUILDING SEQUENCE                            | 59        |
| 5.2.1 Tree Selection                                     | 59        |
| 5.2.2 Preparation of the Log                             | 60        |
| 5.2.3 External Shaping                                   | 61        |
| 5.2.4 Tools  | 63        |
| 5.2.5 Hollowing  | 63        |
| 5.2.6 Intermediate Stage                                 | 65        |
| 5.2.7 Preservation                                       | 66        |

|  |                                      |        |
|--|--------------------------------------|--------|
| 5.2.8  | Time Taken                           | 66     |
| 5.3  | EVIDENCE FOR CONSTRUCTION TECHNIQUES | 67     |
| 5.3.1  | Archaeological Evidence              | 68     |
| 5.3.2  | Evidence from Logboat Reconstruction | 70     |
| 5.4  | CONSTRUCTIONAL FEATURES              | 72     |
| 5.4.1  | Thickness Gauges                     | 72     |
| 5.4.2  | Fitted Transoms                      | 77     |
| 5.4.3  | Side Extensions                      | 78     |
| 5.4.4  | Caulking                             | 79     |
| 5.5  | SUMMARY                              | 80     |
| <br><b>CHAPTER SIX: LOGBOAT FORMS</b>        |                                      | <br>82 |
| 6.1  | INTRODUCTION                         | 82     |
| 6.2  | LOGBOAT FORMS                        | 82     |
| 6.2.1  | Box-Shaped Logboat                   | 83     |
| 6.2.2  | Barge Logboat                        | 83     |
| 6.2.3  | Canoe Logboat                        | 84     |
| 6.2.4  | Dissimilar-ended Logboats            | 84     |
| 6.2.5  | Punt Logboats                        | 85     |
| 6.2.6  | Tapered Logboats                     | 85     |
| 6.3  | COMPARISON OF LOGBOAT FORMS          | 86     |
| 6.4  | LOGBOAT FORM AND DATING EVIDENCE     | 88     |
| 6.5  | CONCLUSION                           | 89     |
| <br><b>CHAPTER SEVEN: LOGBOAT DIMENSIONS</b> |                                      | <br>91 |
| 7.1  | INTRODUCTION                         | 91     |
| 7.2  | LOGBOAT LENGTHS                      | 91     |
| 7.3  | LOGBOAT WIDTHS                       | 94     |
| 7.4  | LOGBOAT HEIGHTS                      | 95     |

|  |  |     |
|--|--|-----|
| 7.5  | FLOOR THICKNESS  | 96  |
| 7.6  | COEFFICIENTS   | 97  |
|  | 7.6.1 Slenderness Coefficients   | 97  |
|  | 7.6.2 Broadness Coefficients   | 99  |
|  | 7.6.3 Thickness Coefficients   | 100 |
| 7.7  | LOGBOAT DIMENSIONS, DATING EVIDENCE, ENVIRONMENT AND<br>NAVAL ARCHITECTURE | 101 |
| <br><b>CHAPTER EIGHT: LOGBOAT FEATURES</b> |  | 103 |
| 8.1  | INTRODUCTION   | 103 |
| 8.2  | DUCK-BILL PROJECTIONS  | 103 |
| 8.3  | FALSE KEELS AND BOW EXTENSIONS   | 104 |
| 8.4  | FIGUREHEADS  | 105 |
| 8.5  | MOORING HOLES  | 106 |
| 8.6  | NAILS  | 106 |
| 8.7  | RAISED BOWS  | 107 |
| 8.8  | REPAIRS  | 107 |
| 8.9  | RIBS   | 111 |
|  | 8.9.1 Integral Ribs  | 111 |
|  | 8.9.2 Fitted Ribs  | 112 |
|  | 8.9.3 The Archaeological Evidence  | 113 |
| 8.10                                       | SEATS  | 114 |
| 8.11                                       | STRAKES  | 116 |
|  | 8.11.1 Washstrakes   | 116 |
|  | 8.11.2 Running Strakes   | 116 |
| 8.12                                       | CONCLUSION   | 116 |

|  |     |
|--|-----|
| <b>CHAPTER NINE: PROPULSION</b>                        | 118 |
| 9.1 INTRODUCTION                                       | 118 |
| 9.2 ROWING   | 118 |
| 9.2.1 Thwart Rests                                     | 119 |
| 9.2.2 Footrests  | 120 |
| 9.2.3 Thole Pin Holes                                  | 120 |
| 9.2.4 Literary Evidence for Rowing                     | 120 |
| 9.2.5 Archaeological Evidence                          | 121 |
| 9.3 SAILING  | 127 |
| 9.4 PADDLING AND PUNTING                               | 130 |
| 9.5 SCULLING   | 131 |
| 9.6 SYNTHESIS OF PROPULSION METHODS                    | 132 |
| <br>   |     |
| <b>CHAPTER 10: LOGBOAT DISTRIBUTION</b>                | 134 |
| 10.1 INTRODUCTION                                      | 134 |
| 10.2 REGIONAL BOUNDARIES                               | 134 |
| 10.3 REGIONAL BOUNDARIES IN IRELAND                    | 134 |
| 10.3.1 Region 1: The Foyle Basin and Donegal Highlands | 135 |
| 10.3.2 Region 2: North-East Basalt, Lagan-Glyde Region | 135 |
| 10.3.3 Region 3: West Ireland                          | 136 |
| 10.3.4 Region 4: Erne Basin and West Midlands          | 137 |
| 10.3.5 Region 5: The East Midlands-East Coast          | 137 |
| 10.3.6 Region 6: South West Munster                    | 138 |
| 10.4 REGIONAL BOUNDARIES IN SCOTLAND                   | 139 |
| 10.4.1 Region 1: Northern Scotland                     | 139 |
| 10.4.2 Region 2: West Scotland                         | 141 |
| 10.4.3 Region 3: North-East Scotland                   | 142 |
| 10.4.4 Region 4: Tay-Forth                             | 142 |
| 10.4.5 Region 5: Clyde Region                          | 142 |
| 10.4.6 Region 6: Dumfries, Galloway and Ayrshire       | 143 |

|   |   |            |
|---|---|------------|
| 10.5  | NATIONAL DISTRIBUTIONS                              | 143        |
| 10.6  | REGIONAL DISTRIBUTION                               | 146        |
| 10.7  | SOCIAL CONTEXTS                                     | 159        |
| <b>CHAPTER ELEVEN: TIMBER SUPPLY</b>          |   | <b>162</b> |
| 11.1  | INTRODUCTION  | 162        |
| 11.2  | SPECIES OF WOOD USED IN IRISH AND SCOTTISH LOGBOATS | 162        |
| 11.3  | PROPERTIES OF IRISH AND SCOTTISH WOOD               | 163        |
| 11.4  | SUITABLE WOOD SPECIES FOR LOGBOATS                  | 166        |
| 11.5  | WOODLAND AND LOGBOAT DISTRIBUTION                   | 168        |
| <b>CHAPTER TWELVE: LOGBOAT RECONSTRUCTION</b> |   | <b>172</b> |
| 12.1  | INTRODUCTION  | 172        |
| 12.2  | RECONSTRUCTED LOGBOATS                              | 173        |
| 12.3  | DANISH RECONSTRUCTIONS                              | 174        |
|   | 12.3.1 Construction Techniques                      | 175        |
|   | 12.3.2 Displacement                                 | 176        |
|   | 12.3.3 Stability                                    | 176        |
|   | 12.3.4 Performance under Propulsion                 | 176        |
| 12.4  | CRUIMGHLINN   | 177        |
|   | 12.4.1 Construction Techniques                      | 177        |
|   | 12.4.2 Displacement                                 | 177        |
|   | 12.4.3 Stability                                    | 178        |
|   | 12.4.4 Performance under Propulsion                 | 178        |
| 12.5  | RAVENSBOURNE  | 178        |
|   | 12.5.1 Construction Techniques                      | 179        |
|   | 12.5.2 Displacement                                 | 179        |
|   | 12.5.3 Stability                                    | 180        |



|   |                              |     |
|---|------------------------------|-----|
| 12.5.4  | Performance under Propulsion | 180 |
| 12.6  | LOCH DOON 1                  | 180 |
| 12.6.1  | Construction Techniques      | 181 |
| 12.6.2  | Displacement                 | 183 |
| 12.6.3  | Stability                    | 183 |
| 12.6.4  | Performance under Propulsion | 184 |
| 12.6.5  | Manoeuvrability              | 184 |
| 12.7  | LLANGORSE                    | 184 |
| 12.8  | BLÁTHIN                      | 184 |
| 12.8.1  | Construction Techniques      | 185 |
| 12.8.2  | Displacement                 | 186 |
| 12.8.3  | Stability                    | 188 |
| 12.8.4  | Performance under Propulsion | 188 |
| 12.8.5  | Manoeuvrability              | 189 |
| 12.9  | DAIRE                        | 189 |
| 12.9.1  | Construction Techniques      | 190 |
| 12.9.2  | Displacement                 | 192 |
| 12.9.3  | Stability                    | 193 |
| 12.9.4  | Performance under Propulsion | 193 |
| 12.9.5  | Manoeuvrability              | 196 |
| <br><b>CHAPTER THIRTEEN: APPLIED NAVAL ARCHITECTURE</b> |                              | 198 |
| 13.1  | INTRODUCTION                 | 198 |
| 13.2  | DISPLACEMENT                 | 200 |
| 13.2.1  | Weight                       | 201 |
| 13.2.2  | Volume                       | 201 |
| 13.2.2.1  | Method 1                     | 203 |
| 13.2.2.2  | Method 2                     | 207 |
| 13.2.3  | Density                      | 208 |
| 13.2.4  | Case Study                   | 209 |

|       |   |     |
|-------|---|-----|
|       | 13.2.4.1 Daire  | 209 |
|       | 13.2.4.2 Bláthin  | 214 |
| 13.3  | DRAUGHT   | 212 |
|       | 13.3.1 Daire  | 212 |
|       | 13.3.2 Bláthin  | 214 |
| 13.4  | THE WATERLINE   | 215 |
|       | 13.4.1 Waterline Length                                     | 215 |
|       | 13.4.1.1 Case Study   | 224 |
|       | 13.4.2 Waterline Width                                      | 223 |
|       | 13.4.2.1 Case Study   | 224 |
| 13.5  | THE LOADED LOGBOAT  | 225 |
|       | 13.5.1 Loaded Displacement                                  | 225 |
|       | 13.5.1.1 Case Study   | 227 |
| 13.6  | LOADED DRAUGHT  | 229 |
| 13.7  | THE WATERLINE OF THE LOADED LOGBOAT                         | 231 |
|       | 13.7.1 The Waterline Length of Daire with Minimum Freeboard | 231 |
|       | 13.7.2 The Waterline Width of Daire with Minimum Freeboard  | 231 |
| 13.8  | STABILITY   | 233 |
|       | 13.8.1 Position of the Centre of Buoyancy                   | 237 |
|       | 13.8.1.1 Case Study   | 238 |
|       | 13.8.2 Position of the Centre of Gravity                    | 239 |
|       | 13.8.2.1 Case Study   | 241 |
|       | 13.8.3 The Metacentric Height                               | 242 |
| 13.9  | RESISTANCE  | 244 |
|       | 13.9.1 Frictional Resistance                                | 245 |
|       | 13.9.1.1 Wetted Surface Area                                | 246 |
|       | 13.9.1.2 Speed  | 246 |
| 13.10 | APPLICATIONS OF THE ARCHAEOLOGICAL EVIDENCE                 | 250 |
|       | 13.10.1 Synthesis of the Results                            | 250 |

|  |       |
|--|-------|
| <b>CHAPTER FOURTEEN: SUMMARY</b>                     | 254   |
| 14.1 PERIOD OF USE                                   | 254   |
| 14.2 DISTRIBUTION                                    | 254   |
| 14.3 FORM AND SIZE                                   | 256   |
| 14.4 WOOD SPECIES                                    | 257   |
| 14.5 CONSTRUCTION                                    | 257   |
| 14.6 FEATURES  | 258   |
| 14.7 PROPULSION                                      | 259   |
| 14.8 NAVAL ARCHITECTURE AND EXPERIMENTAL ARCHAEOLOGY | 259   |
| 14.9 CONCLUSION                                      | 260   |
| <br>   |       |
| <b>ABBREVIATIONS OF JOURNAL TITLES</b>               | A1-A2 |
| <b>BIBLIOGRAPHY</b>                                  | B1-B8 |

**CONTENTS OF VOLUME TWO**

**APPENDIX 1: CATALOGUE OF IRISH LOGBOATS**

262

## CONTENTS OF VOLUME THREE

|  |     |
|--|-----|
| <b>APPENDIX 1 (CONTINUED): CATALOGUE OF IRISH LOGBOATS</b>   | 441 |
| <b>APPENDIX 2: ARTEFACTS PREVIOUSLY MISTAKEN AS LOGBOATS</b> | 559 |
| <b>APPENDIX 3: CATALOGUE OF SCOTTISH LOGBOATS EXAMINED</b>   | 566 |
| <b>APPENDIX 4: LIST OF LOGBOAT FEATURES</b>                  | 590 |
| <b>APPENDIX 5: LIST OF LOGBOAT FORMS</b>                     | 595 |
| <b>APPENDIX 6: LIST OF LOGBOAT LENGTH RANGES</b>             | 597 |
| <b>APPENDIX 7: LIST OF LOGBOAT WIDTH RANGES</b>              | 600 |
| <b>APPENDIX 8: LIST OF LOGBOAT HEIGHT RANGES</b>             | 603 |
| <b>APPENDIX 9: LIST OF LOGBOAT SLENDERNESS RATIOS</b>        | 605 |
| <b>APPENDIX 10: LIST OF LOGBOAT BROADNESS RATIOS</b>         | 608 |
| <b>APPENDIX 11: LIST OF LOGBOAT THICKNESS RATIOS</b>         | 609 |
| <b>APPENDIX 12: LIST OF LOGBOATS AND THEIR REGIONS</b>       | 610 |
| <b>APPENDIX 13: LIST OF SYMBOLS USED IN CHAPTER 13</b>       | 613 |
| <b>APPENDIX 14: GLOSSARY OF BOAT AND NAUTICAL TERMS</b>      | 615 |

## INDEX OF FIGURES

|             |   |     |
|-------------|---|-----|
| Figure 1.1  | Kilraughts, Co. Antrim  | 3   |
| Figure 1.2  | Cahore 1, Co. Wexford   | 4   |
| Figure 1.3  | Fox' Classification   | 6   |
| Figure 1.4  | Beltoy 1, Co. Antrim  | 12  |
| Figure 1.5  | Beltoy 2, Co. Antrim  | 12  |
| Figure 2.1  | A section of the Monk's boat  | 16  |
| Figure 2.2  | Corry 1, Co. Letrim   | 17  |
| Figure 2.3  | River Quoile, Co. Down  | 18  |
| Figure 3.1  | Map of Ireland depicting the logboat distributions and locations to which the literary accounts refer | 34  |
| Figure 4.1  | Logboats which have absolute dates  | 46  |
| Figure 5.1  | Altdrumman  | 62  |
| Figure 5.2  | Mullynascarty   | 62  |
| Figure 5.3  | Callow  | 74  |
| Figure 5.4  | Crevinish 1   | 77  |
| Figure 5.5  | Detail of Eskragh 1's stern   | 78  |
| Figure 6.1  | Co. Tyrone  | 83  |
| Figure 6.2  | Ballybeg  | 84  |
| Figure 6.3  | Lurgan  | 85  |
| Figure 10.1 | Map of Ireland with its regional boundaries   | 135 |
| Figure 10.2 | Map of Scotland with its regional boundaries  | 140 |
| Figure 10.3 | Map of the Irish logboat distribution   | 144 |
| Figure 10.4 | Map of the Scottish logboat distribution  | 145 |
| Figure 10.5 | Region 3's distribution (Ireland)   | 148 |
| Figure 10.6 | Region 1's distribution (Ireland)   | 149 |
| Figure 10.7 | Region 2's distribution (Ireland)   | 150 |
| Figure 10.8 | Region 4's distribution (Ireland)   | 151 |
| Figure 10.9 | Region 5's distribution (Ireland)   | 152 |

|              |  |     |
|--------------|--|-----|
| Figure 10.10 | Region 6's distribution (Ireland)  | 153 |
| Figure 10.11 | Region 1's distribution (Scotland)   | 154 |
| Figure 10.12 | Region 2's distribution (Scotland)   | 155 |
| Figure 10.13 | Region 3's distribution (Scotland)   | 156 |
| Figure 10.14 | Region 4's distribution (Scotland)   | 157 |
| Figure 10.15 | Region 5's distribution (Scotland)   | 158 |
| Figure 10.16 | Region 6's distribution (Scotland)   | 159 |
| Figure 11.1  | Pollen frequencies <i>circa</i> 5000BC   | 167 |
| Figure 11.2  | Irish woodland boundaries in 1600AD  | 168 |
| Figure 13.1  | The forces of gravity and buoyancy exerted on a stationary vessel,<br>in transverse section                              | 199 |
| Figure 13.2  | Drawing of Blathin (an experimental logboat) with 19 stations at<br>20cm intervals                                       | 202 |
| Figure 13.3  | Cross-section area of a square- or rectangular-shaped hull   | 204 |
| Figure 13.4  | Cross-section area of a semi-circular shaped hull  | 204 |
| Figure 13.5  | Cross-section area of a flared hull, where the width at the top of<br>each side is the same as that at the side's bottom | 204 |
| Figure 13.6  | Cross-section area of a flared hull, where the sides are of unequal<br>proportion  | 205 |
| Figure 13.7  | Cross-section area of the hull where sections X and Y are rectangles<br>and Z and N are round                            | 205 |
| Figure 13.8  | Cross-section area of a hull   | 206 |
| Figure 13.9  | Net volume of a rounded end  | 206 |
| Figure 13.10 | Net volume of a triangular or pointed end  | 207 |
| Figure 13.11 | Net volume of a flared end on all three planes   | 207 |
| Figure 13.12 | Daire with her waterline length and division between the bow and<br>main body  | 215 |
| Figure 13.13 | Detail of an inverted logboat's end section  | 216 |
| Figure 13.14 | Schematic detail of Figure 13.13   | 217 |
| Figure 13.15 | Schematic cross-section of a logboat   | 223 |
| Figure 13.16 | Cross-section of a loaded and unloaded logboat at rest (in equilibrium)  | 226 |

|              |   |     |
|--------------|---|-----|
| Figure 13.17 | The new draught for a logboat with a given load                               | 228 |
| Figure 13.18 | The forces of gravity and buoyancy affect transverse stability                | 234 |
| Figure 13.19 | Cross-section of a logboat to establish its centre of buoyancy                | 237 |
| Figure 13.20 | Cross-section of a logboat to establish the location of its centre of gravity | 239 |
| Figure 13.21 | Cross-section of a logboat shown as a trapezium                               | 240 |
| Figure 13.22 | Position of the final centre of gravity                                       | 242 |



## INDEX OF PLATES

|             |  |     |
|-------------|--|-----|
| Plate 1.1   | Ballylig, Co. Down   | 2   |
| Plate 2.1   | Daire, an experimental logboat under sail without keel or leeboard                         | 19  |
| Figure 3.1  | Painting of the Seige of Enniskillen   | 31  |
| Plate 5.1   | Loch Doon 1 Replica under construction   | 64  |
| Plate 5.2   | Lurgan   | 69  |
| Plate 5.3   | An unsuccessful attempt to hollow the Loch Doon 1 Replica with fire                        | 71  |
| Plate 5.4   | A plugged thickness gauge on Altdrumman  | 73  |
| Plate 8.1   | West Ward 2. The boat's bow supports a duck-billed projection                              | 103 |
| Plate 8.2   | View of Eadarloch's end in which the cross-sectional profile of its false keel can be seen | 104 |
| Plate 8.3   | River Clyde. Detail of a previously repaired knot hole surrounded by small nail holes      | 108 |
| Plate 8.4   | Lough Ennell 2. Detail of a fitted rib repair and dowel hole                               | 108 |
| Plate 8.5   | Mullynascarty. Detail of its repaired stern  | 109 |
| Plate 9.1   | An attempt at sculling Daire   | 131 |
| Plate 12.1  | An attempted elm logboat   | 172 |
| Plate 12.2  | Loch Doon 1  | 180 |
| Plate 12.3  | Removing excess external wood  | 182 |
| Plate 12.4  | Paring the inside  | 182 |
| Plate 12.6  | Loch Doon 1 Replica undergoing trials  | 183 |
| Plate 12.7  | Load condition tests   | 186 |
| Plate 12.8  | Bláthin's draught recorded at 30% and 40% freeboard  | 187 |
| Plate 12.9  | Bláthin undergoing open-water trials   | 188 |
| Plate 12.10 | Daire undergoing tank tests  | 192 |
| Plate 12.11 | Daire being paddled unladen  | 194 |
| Plate 12.12 | Daire being paddled fully laden  | 194 |
| Plate 12.13 | Daire being punted   | 195 |

## INDEX OF TABLES

|           |   |     |
|-----------|---|-----|
| Table 1.1 | Summary of Irish logboat classifications                                    | 5   |
| Table 3.1 | List of logboats from locations to which literary sources refer             | 36  |
| Table 4.1 | List of dendrochronologically-dated logboats                                | 41  |
| Table 4.2 | List of radiocarbon-dated logboats  | 42  |
| Table 4.3 | Logboats found within the structure of a site                               | 44  |
| Table 4.4 | Logboats within 1km of a dated site   | 48  |
| Table 4.5 | Logboats found on or adjacent to dated sites                                | 50  |
| Table 4.6 | List of features cited as being 'modern' and accompanying independent dates | 53  |
| Table 5.1 | Logboats with thickness gauges  | 75  |
| Table 5.2 | Average logboat length to number of thickness gauges                        | 76  |
| Table 6.1 | Recorded logboat forms in Ireland and Scotland                              | 87  |
| Table 6.2 | Number of dated logboats of known form                                      | 88  |
| Table 6.3 | Date ranges of known logboat forms  | 89  |
| Table 7.1 | Irish and Scottish logboat lengths  | 92  |
| Table 7.2 | Irish and Scottish logboats with recorded lengths and dates                 | 93  |
| Table 7.3 | Irish and Scottish logboat widths   | 95  |
| Table 7.4 | Irish and Scottish logboat heights  | 96  |
| Table 7.5 | Irish and Scottish logboat slenderness coefficients                         | 98  |
| Table 7.6 | Irish and Scottish logboat broadness coefficients                           | 99  |
| Table 7.7 | Irish and Scottish logboat thickness coefficients                           | 100 |
| Table 8.1 | Methods of repair   | 110 |
| Table 8.2 | Average Irish and Scottish logboat lengths and number of ribs               | 114 |
| Table 9.1 | Dated logboats with rowed features  | 119 |
| Table 9.2 | List of logboats with thwart rests, footrests and thole pin holes           | 121 |
| Table 9.3 | Number of recorded rowing positions in Irish and Scottish logboats          | 124 |
| Table 9.4 | Number of rowing positions and average logboat lengths                      | 125 |
| Table 9.5 | Known rowed logboat forms   | 125 |

|            |  |     |
|------------|--|-----|
| Table 9.6  | Recorded and unrecorded propulsion methods                           | 132 |
| Table 9.7  | Irish and Scottish propulsion methods                                | 132 |
| Table 10.1 | Logboat find contexts  | 143 |
| Table 10.2 | Find contexts of Irish logboats on a regional basis                  | 147 |
| Table 10.3 | Find contexts of Scottish logboats on a regional basis               | 147 |
| Table 10.4 | Number of Irish logboats within 1km of a site on a regional basis    | 159 |
| Table 10.5 | Number of Scottish logboats within 1km of a site on a regional basis | 160 |
| Table 11.1 | Recorded species of wood used to make Irish and Scottish logboats    | 163 |
| Table 11.2 | Irish and Scottish native wood species and their suitability         | 167 |
| Table 12.1 | Recently made logboats   | 173 |
| Table 12.2 | Dimensions of sailed logboats  | 189 |
| Table 12.3 | Results of different propulsion methods                              | 193 |
| Table 13.1 | Table used to obtain Daire's LWL                                     | 219 |
| Table 13.2 | Speed-length ratios measured in km/h and knots                       | 251 |
| Table 13.3 | Synthesis of results applied to Irish and Scottish logboats          | 261 |

## CHAPTER ONE

### INTRODUCTION

#### 1.1 INTRODUCTION

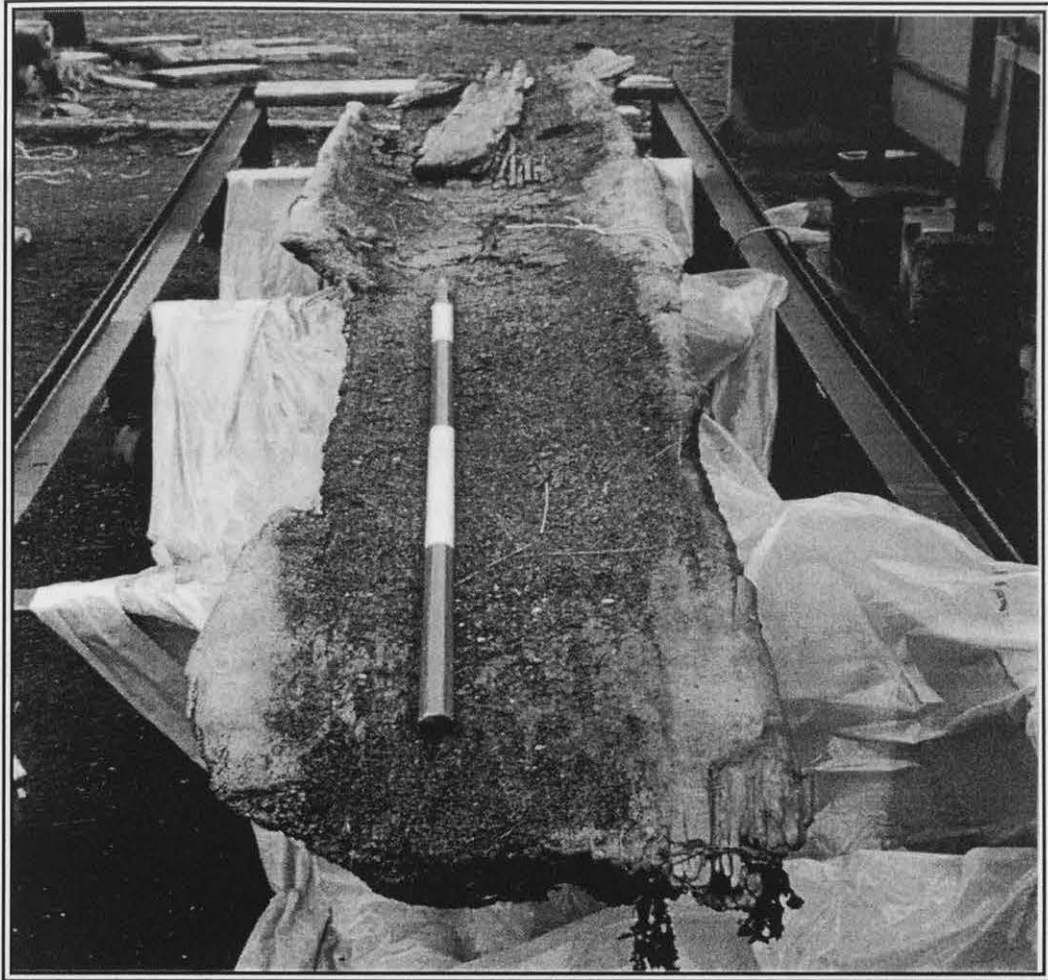
In prehistoric times overland transport and communications would have been very difficult. This led to extensive use of the available water routes, both river and lake. Boats and their use were essential to community activities, both commercial and social. Inland water systems would have been supplemented by coastal routes.

A wide range of boats were used, such as logboats, rafts, skin, reed, and plank-built boats. Some of these were in use until early this century (Hornell, 1970: 133-148). Due to the composite nature of most of these boats' construction, little remains in the archaeological record by which they can be readily identified. The most numerous discoveries of both prehistoric and historic craft are of logboats because of their non-composite nature. At least four hundred and four Irish and one hundred and fifty-one Scottish logboats have been discovered to date. As there would have been many non-surviving types of boat in use at the same time, the number of surviving logboats (only one type) indicates the large extent to which waterways were used. This is further confirmed by historical records (Section 3.5 Para 2-11). The second most frequently discovered type of boat is the plank-built, of which only a few examples have been recovered in Britain or Ireland, such as the Monk's Boat from Lough Lene (Brindley and Lanting, 1990: 10-11), and the Brigg raft (McGrail, 1975: 5-13).

In most instances, logboats consisted of a hollowed-out log and were defined by the shape and size of the parent log, the functional design of the boat, and its intended use. When compared to other contemporary types of boat, this non-composite design has a low rate of decay which facilitates its examination by the archaeologist.

Logboats have been reliably dated to *circa* 5400 BC in Ireland (Brookend, Co. Tyrone; UB-4066) and *circa* 180 BC in Scotland (Catherinefield, Dumfrieshire; SRR-326). In Ireland, recent dating

evidence from Ballylig (Co. Down), and Carrigdirty (Co. Limerick), (Section 4.2.4 Para 4) have established that these are not isolated dates. The earliest dated logboat in Europe is from Pesse, Netherlands, dated to *circa* 6000 BC (Johnstone, P. 1980: 46)



*Plate 1.1: Ballylig 1, County Down*

Contemporary accounts of their use have been recorded up to the middle of the eighteenth century AD in Scotland (Joass, 1881: 179-180), and possibly to the end of the 18th century in Ireland (Fry, 1995: 4). For such an extensive period of use few have been reliably dated. However, a recent radiocarbon-dating programme of Irish and Scottish logboats by Brindley and Lanting corrects this deficiency.

## 1.2 SUMMARY OF PREVIOUS WORK

Early records of boats date from the seventeenth century (Burrell, A. 1642, and Leigh, 1700). However, it was not until the nineteenth century that logboats were examined in detail. Like Keller's work on lake dwellings (1866), many accounts did little more than mention logboats found in association with archaeological sites.

Munro (1890) included logboats in his work on European lake dwellings. He noted that crude methods in their construction did not necessarily indicate great antiquity. He considered that there did not appear to be any chronological or structural order to their different forms.

In Europe, Wilde (1857), in an unpublished manuscript in the Royal Irish Academy, was the first to compile a comprehensive catalogue solely on logboats. His work on Irish logboats includes a classification scheme in which he groups them into three categories. These were primarily based on length with little consideration given to shape. Group 1 was 'small trough-shaped', 8 to 12ft long, with squared ends, which had projecting handles 'apparently for the purpose of transporting it from place to place'. The example he cites is from Rossory, County Fermanagh. This is, in fact, a chute for a horizontal-wheel mill. All of this class are chutes for horizontal wheel-mills. Another example is Kilraughts, County Antrim, which also has been frequently mistaken for a logboat (Figure 1.1).

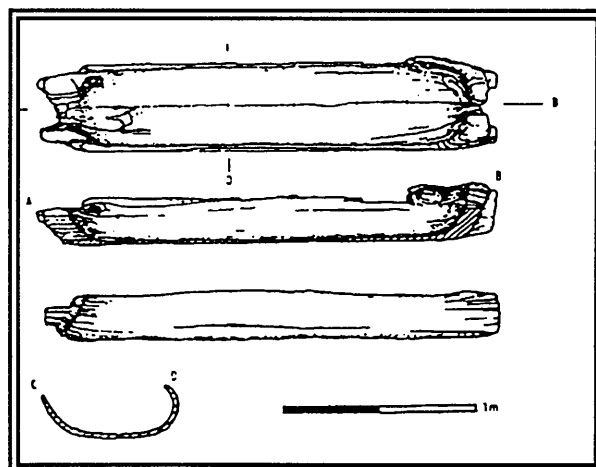
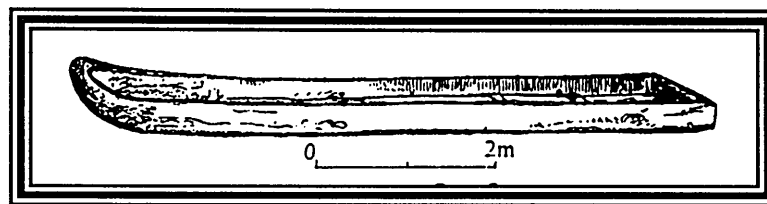


Figure 1.1: Kilraughts, County Antrim (after MacDowell, 1983)

Group 2 is approximately 20ft long and 2ft wide, flat-bottomed, with a rounded bow and a square Stern. His example, Cahore 1, County Wexford has a fitted transom (Figure 1.2).

Group 3 is 'sharp at both ends', approximately 21ft long and 'quite narrow', for which he cites Ardagh. Like Wilde, Wood-Martin confuses chutes for horizontal wheel-mills with logboats. Both Wood-Martin (1886) and Day (1888) based their classification schemes of Irish logboats on Wilde's work. In the intervening period more boats had been discovered, and both realised the necessity of modifying Wilde's classification.



*Figure 1.2: Cahore 1, County Wexford (after Wilde, 1857)*

Wood-Martin's classifications (1886, 1895) are also divided into three groups. Group 1 is either sharp or rounded at both ends, and is approximately 20 ft long and 2 ft wide. Some of the boats were flat-bottomed, and others rounded in cross-section.

Group 2 is between 20 and 40 ft long with a rounded bow and a square stern. He includes boats with fitted transoms in this group. Group 3 is 'trough-shaped', 8 to 12 ft long, with square ends and a rounded cross-section. At either end there are also projecting handles 'apparently for the convenience of carrying it from lake to lake'. Again these were chutes for horizontal wheel mills and not logboats.

The main difference between Wilde's and Wood-Martin's classifications is that Wood-Martin includes boats of greater length. Wilde's Group 1 and Wood-Martin's Group 3 are the same, being chutes for horizontal-wheel mills. Wood-Martin's example is from Ardagh. However, he does suggest that logboats were not necessarily of great antiquity, unless otherwise indicated by direct association with either artefacts or lake dwellings.

Day (1888) used a group of seventeen logboats from County Fermanagh to develop his classification, which he divided into four groups. These differ from his two predecessors in classification of length. Group 1 is 10 to 15ft long with handles projecting from square ends. Again, all of these are chutes for horizontal-wheel mills. Group 2 is 15 to 20ft long with tapered ends. Group 3 is 20 to 30ft long and has a fitted transom. Group 4 is 30 to 35ft long.

*Table 1.1: Summary of Irish Logboat Classifications (including missclassified mill chutes)*

| Boat Type  | (Wilde<br>1857) | Wood-Martin<br>(1866) | Day (1888)                            |
|--|-----------------|-----------------------|---------------------------------------|
| Trough-shaped, square ends with handles<br>8 to 15ft long, i.e. horizontal mill chutes | Group 1         | Group 3               | Group 1                               |
| Round bow, square stern, 20 to 40ft long   | Group 2         | Group 2               | Groups 3 & 4<br>(Group 4: 30 to 35ft) |
| Pointed or round ends, 15 to 20ft long   | Group 3         | Group 1               | Group 2                               |

It was not until 1926 when Fox examined sixty-two English and Welsh logboats that a more satisfactory classification scheme was developed. He believed thirty of them were sufficiently well recorded to classify. His scheme was based, primarily, on the shape of the boats, with lengths of secondary importance. He established five groups, some of which were further sub-divided as variants of each group (Figure 1.3). Group 1 are ‘punt or trough-like’ with square cross-sections and ends, e.g. Kew Bridge and Ellesmere. Group 2’s sterns are either squared or held a fitted transom, and have a rounded or pointed bow, e.g. Brigg and Clydey. Group 3 are ‘long in proportion to breadth’, and are either rounded or pointed at each end ‘both in plan and profile’. Longitudinally they had flat bottoms and angular cross-sections, e.g. North Stoke, Glastonbury. Group 4 are small and ‘spoon-shaped’ with a ‘half-round cross-section’. Their bows are also ‘beaked’. In length they are approximately 9 to 16ft, and 2 to 3ft wide, e.g. Barton and Irlam. Group 5 are ‘placed dinghies’ which were ‘more modern’ than the previous groups. They are square-sterned with angular cross-sections and are widest amidships i.e. containing a fitted transom, such as Derwenthaugh and Preston 15. Fox also mentions additional features such as ribs, beaked bows, holes and thwart rests in a general discussion on the logboats.



Paret (1930: 76-116) classified logboats from the Federsee, Germany, and made comparisons with boats found in other European countries. Perhaps his most notable achievement was his realisation that, on account of shrinkage from boats' drying, measurements and drawings taken some time after discovery may not have corresponded to those when either built or found.

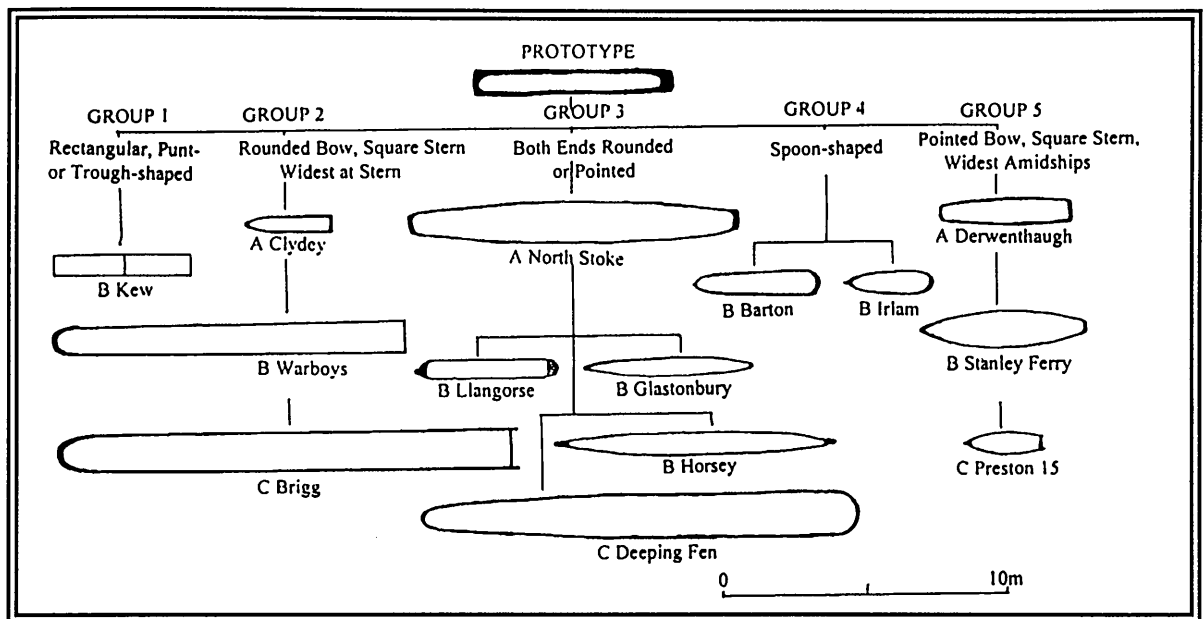


Figure 1.3: Fox's Classification (after Fox, 1926)

Mowat (1996: 1) notes that in the early 1950's Grant, a M.A. student of the University of Edinburgh, 'collated' the 'published discoveries' and 'the surviving remains...[were]...drawn for a lecture delivered to the Society of Antiquaries of Scotland...in 1952'. Prior to this Stuart catalogued the Scottish logboats (Stuart; 1886: 114-178). Raftery (1952: 182-3) published a list of 17 logboats recovered from the shores of Lough Gara, County Roscommon. He has unpublished work including details of other logboats discovered before 1952. He appears to have listed and numbered them in the order in which he examined them, and not in any chronological or typological sequence. In many cases he drew them. Timmerman (1956: 130-8; 1957-8: 109-112), referring to German boats, was aware of the potential value of naval architecture. He was also sceptical of basing a chronological sequence on typology.

Seaby's 1960s unpublished work lists approximately seventy logboats from Northern Ireland. In 1973 (unpublished) he discusses the rowing logboats as a separate class in which the three main indicators were thwart rests, thole-pin holes, and foot rests. He does not use their size or form in classifying them. Since then Bourke and Fry have been continuously updating Seaby's extensive survey work, much of which remains unpublished. An important contribution to the study of logboats was made by Lucas (1963) when he assembled literary evidence on Irish logboats, from numerous documentary sources, into a single publication. He not only records uses to which the boats were put, but also their distribution in the archaeological record. He indicates, through the sources he researched, such as Ware (1705), that logboats were in use until the beginning of the 18th century.

Mowat (1996: 1) notes that Graham, in an unpublished undergraduate dissertation (1966), compiled a catalogue of four hundred logboats from Britain and Ireland, of which one hundred and seventy are Irish. This catalogue included approximately one hundred and twenty drawings.

McGrail (1978) published his research on the English and Welsh logboats, of which he catalogued one hundred and seventy-two. As well as analysing them, he classified them into five groups based on form; canoe, box, barge, punt and dissimilar-ended. He recorded variants of each form. He used comparative, ethnographic and literary evidence in his analysis of European, in particular Irish, examples. He also incorporated the boats' features and characteristics and considered their various functions. This publication used aspects of wood science and naval architecture to build up a comparative record of date, form, and construction techniques. Subsequent studies of logboats base their classifications on McGrail's.

McGrail used wood science to determine the size of the parent log, the quantity of surplus wood and methods of construction of the boats. The naval architecture involved a study of boat form, size, methods of propulsion and potential speed. He did not extend his work to comparing all the above factors with each other, nor analyse their possible social environments. His use of naval architecture was theoretically based.

Since then, MacDowell (1983) wrote a thesis on Irish logboats, and Mowat's work (1996) on Scottish logboats has recently been published. MacDowell compiled a definitive catalogue of two hundred and eighty-three boats, which she compared to McGrail's English and Welsh boats in distribution, length and form. However, this analysis, and her discussion on individual boat features, was quite general. Her work is the most comprehensive and effective classification of Irish logboats.

Mowat, who very generously made his publication available, records one hundred and fifty-four Scottish logboats (Mowat, 1996). In his appendices he also records artefacts found in the vicinity of the boats, and archaeological sites with which the boats were either directly or tentatively associated. His work includes an analysis of their distribution, measurements, form, features, and aspects of wood science. Mowat's comparison of distribution, form and measurements of the Scottish boats with those of McGrail's English and Welsh is comprehensive. His publication incorporates the first definitive classification of Scottish logboats.

### **1.3 AIMS OF THE THESIS**

The aims of the current thesis are:

- a) To update MacDowell's catalogue of all extant and recorded Irish logboats and, where practicable, to supplement it with drawings and photographic records.
- b) To interpret all surviving aspects of the boats' dimensions, form, features and dating evidence, and compare them to the archaeological record and literary evidence.
- c) These results are compared in detail to the Scottish boats.
- d) Where applicable, emerging patterns are interpreted in the light of aspects of naval architecture and wood science to determine and compare the operational capabilities of individual boats.
- e) The logboats' provenances are examined in their geographical and archaeological context. It is hoped to combine operational use, form, features, dates and dimensions within their social environment.

f) Where applicable, a comparative analysis is performed on the results of McGrail's 1978 research.

### 1.3.1 Methodology

The methods employed are:

- a) Compilation of documentary records of logboats in Ireland and Scotland.
- b) Examination, drawing, and photography of the surviving remains of logboats.
- c) Evaluation of the documentary and survey evidence.
- d) Compilation of a catalogue.
- e) Examination of the appropriate documentary evidence on the history of Irish and Scottish forests and wood science in relation to the logboats.
- f) Examination of the documentary evidence of archaeological sites in the vicinity of logboat finds.
- g) Presentation of the results on the examination of the above.

While aspects of naval architecture are generally similar to McGrail (1978), they were developed independently in this study and vary from his in the extent of their applications. They are also used as an aid to placing the boats in their social and environmental contexts. It has been noted that the shapes and sizes of logboats reflect the nature of their geographical location and the particular functions to which they were intended. In addition, they are supplemented by experimental archaeology reconstructional techniques and applied naval architecture. An Excel computer programme which is based on this work is submitted with the thesis.

McGrail used wood science to determine the size of the parent log and the quantity of surplus wood from the boat's construction. Its application in this thesis is used to consider the species of wood favoured by boat builders, and questions the absence of references to other wood species, which were also suitable for building boats of this nature, in the archaeological record. MacDowell's catalogue was used as a starting point for the present study. Since 1983, a further

one hundred and twenty-one boats have been recorded, bringing the present total of Irish logboats up to four hundred and four at the time of the data analysis. The format of the catalogue used is similar to the National Museum of Ireland (NMI) *Topographical Files*, in which the boats are identified firstly by the townlands in which they were discovered and secondly by the body of water with which they were associated (if known). It was found that the concise layout of this method facilitated easy perusal and quick reference to other records of the boats. It differs from the *Topographical Files* in that the counties are not used as a primary reference point. The use of text is kept to a minimum in order to make the information more presentable.

Most of the drawings of the Irish boats were taken from MacDowell's thesis and Seaby's unpublished files, which have been added to by Bourke and Fry. Drawings of accessible but previously undrawn logboats have been included in this study. Radiocarbon dates, which have been submitted for publication in a forthcoming issue of *Journal of Irish Archaeology*, were made available by Brindley and Lanting. Fry's and Seaby's survey files were another source of such data.

Mowat's catalogue was used to develop a comparison between the Irish and Scottish boats. In MacDowell's catalogue a number of recordings were not logboats. These items are catalogued in the attached appendices. In addition, this section was also used to list other objects which had been mistakenly identified elsewhere as logboats, and which were not in either catalogue. This was done to prevent the possibility of misleading information.

#### **1.4 THE DOCUMENTARY SEARCH**

As well as consulting the researches of previous writers, such as MacDowell, McGrail and Mowat, a detailed search was performed in archaeological and historical journals. In Ireland and Scotland records from the National Museum of Ireland, Office of Public Works, Department of the Environment and Royal Commission on the Ancient and Historic Monuments of Scotland were examined. Varying standards of reporting resulted in the quantity and quality of the information ranging from a mere mention of the discovery of a boat to detailed accounts. This lack of

uniformity sometimes led to frustrating research. It has proved difficult on occasion to ascertain the true nature of the boats from accounts without drawings or photographic records.

Most logboats do not survive in their complete form (the most frequently discovered part of a boat is its base - being the most robust). This has not facilitated identification and has resulted in part of the archaeological record being inaccurate through ignorance. Accordingly, there have been problems in evaluating the documentary accounts, for example, establishing whether the material describes a logboat or another artefact.

The criteria for identifying the fragmentary remains of logboats have been adopted from McGrail (1978, i: 19), i.e. that it satisfies two or more of the following:

- a) it was found in or near a (former) watercourse, or body of water.
- b) it is associated with other nautical artefacts: anchors, paddles, punt-poles, etc.
- c) the surviving remains resemble logboat shapes,
- d) it has features which are normally associated with boats, for example, thwarts, ribs, stabilisers, sternboards etc,
- e) it has a minimum length of 1.5m.

References to boats' locations vary from precise co-ordinates to general descriptions, such as Belturbet 1 which is referred to as found 'near Belturbet' (Milligan 1893: 337). Other accounts gave different names to the same boat. When this is combined with what is, at best, vague information, there was a very real risk of duplicated records. An example of this is Beltoy 1 and 2 (Gray, 1884: 271-2), which was also noted as 'Lough Mourne' (Munro, 1890: 386-9 and Wood-Martin, 1886: 50, 171-2). Other boats were named after the geographical location in which they were discovered, and not by townland. This could have caused confusion and, without detailed examination, would have resulted in double recording

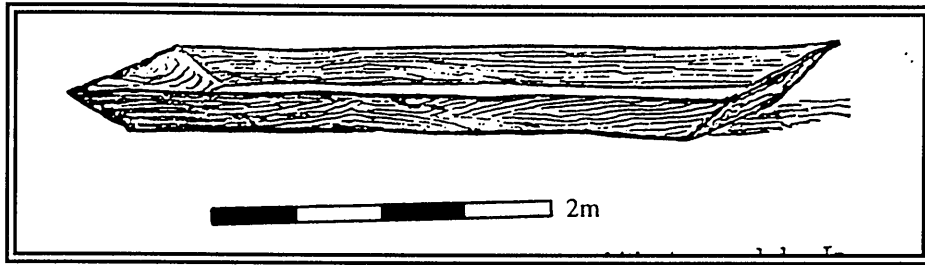


Figure 1.4: Beltoy 1, County Antrim (after Gray, 1884)

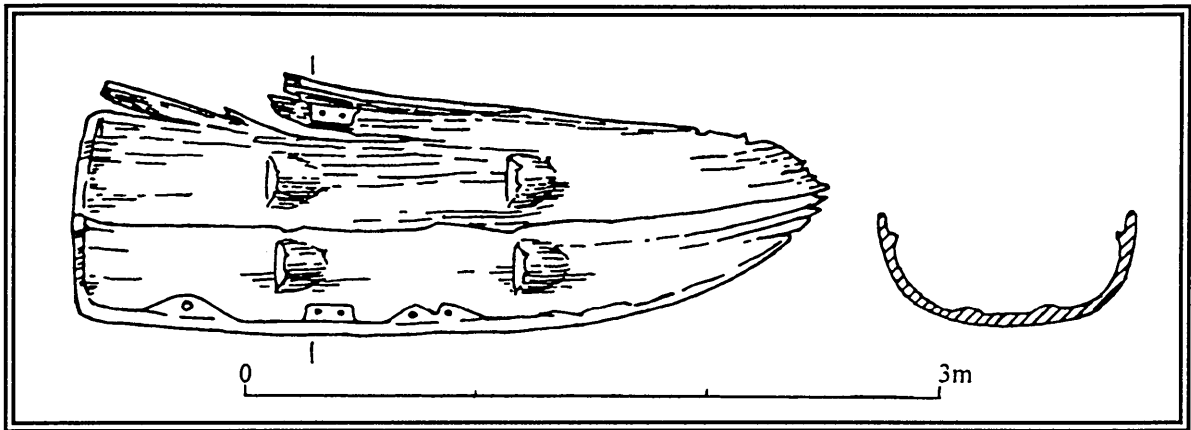


Figure 1.5: Beltoy 2, County Antrim (after Milligan, 1893)

Logboats have been referred to by different terms, from single-tree boats and dugout canoes to cots. McGrail has standardised the term to logboat. He suggested that the word canoe had connotations of birch bark canoes or modern racing canoes. He also mentioned that a similar term to logboat is used in the Scandinavian and German languages i.e. ‘bad einbaum’ (McGrail 1978: 2). The French word is ‘pirogue’. It is believed, by the author, that the most appropriate term is ‘dugout boat’, since the process of its manufacture is to hollow or dig out a tree trunk after preliminary external shaping (Sections 5.2.5 para 1-4 and 12.6.1 para 2-3). In addition it is believed that the term ‘logboat’ could denote a craft made from more than one log which may have been shaped but not hollowed, or even a raft. However, in this study the term ‘logboat’ is adopted since it is currently most frequently used within the academic field, even though it may be confusing elsewhere.

It was apparent from the descriptions of the boats that some writers had only a vague knowledge of them. Measurements were often insufficiently detailed. Frequently only a few measurements

were given. Often, it was not stated whether the measurements were internal or external. The most common single measurement was the vessel's length, such as Ardakillin 2 which was noted as a 'dug-out canoe' found 'on the bottom of Ardakillin Lake' and measured 14ft in length (Wood-Martin, 1886:237).

Other boats examined had features described as rowlocks or mooring holes, which upon examination of the actual artefact proved to be knot holes. This lack of knowledge of the nature of wood is reflected in the numerous accounts which do not note whether the pith of the log is present (and its location), the direction of knots and knot holes, the species of timber, or the root end of the log. Such incomplete records lead to inconclusive knowledge of the boat. The location and direction of drilled holes are often also omitted. Holes have necessary functions. Imprecise descriptions of them can be not only tantalising evasive, but even completely useless.

Shrinkage of the wood and distortion through warping led, in some instances, to conflicting measurements being given by different writers for the same vessel. When this occurred, it was assumed that the earliest account was the closest to the boats' original dimensions. Some writers noted drilled oval-shaped holes. This probably indicated the evidence of shrinkage. However it could also have resulted from erosion of the wood around the hole.

The earliest and/or most accurate and reliable records were used in the catalogue. All imperial measurements were converted to metric. Whenever possible the records were used to determine national grid references, and the geographical and topographical nature of their environments. National Monument records were then consulted to assess all archaeological sites in the vicinity of the logboats' find spots. This was to ascertain (by using the dates of both logboats and sites) their social environments through possible association.

## **1.5 FIELDWORK**

Out of a total of four hundred and four Irish and one hundred and fifty-one Scottish recorded logboats, forty-four Irish and twenty-two Scottish boats could be examined. The small percentage



of boats examined was primarily due to their low survival rates. Often they were left in situ after their initial examination and the information was derived from their records. In Northern Ireland logboats that were found in a poor condition and were in danger of being disturbed, were removed from their find locations and interred at a site in Market Hill. It was not practicable to disinter them during the course of the study. It was also noted that one Scottish and twelve Irish recorded artefacts had mistakenly been identified as logboats.

Several problems were encountered during examination of the boats. Because of their large size, and sometimes poor state of preservation, many of them were stored in situations which made access difficult. This sometimes precluded a complete examination, where usually one side, and more often the bottom, of the boats could not be seen. These difficulties included having to stand on a narrow plank supported by two stepladders at a height of three metres to examine the remains of a wall-mounted boat. In one location boats were piled on top of each other among other large wooden artefacts, and brambles that had invaded their roofed shelter had to be cut away to uncover the boats.

In Scotland, attempts were made to relocate boats that had been found previously and left *in situ*. The intention was to provide as accurate a record of them as possible, since in most cases little more was noted than the fact that they were logboats. This was not feasible in Ireland due to time constraints and restrictive licensing regulations. When this work was undertaken, certain criteria were used to decide which boats to relocate and survey:

- a) the boats' findspots were reasonably well recorded within an easily identifiable area on an O.S. map,
- b) the boats could be surveyed in a non-disturbance manner.

## **1.6 RECORDING**

All logboats that were examined were recorded in a standard format. Firstly, a general description, including their present condition, was noted to enable comparison with earlier records (if

available). Then dimensions were measured and recorded on a sketch of the boat. The boat was then divided into three sections, bow, stern and mid-section, for more detailed examination and measurement. All features noted, such as thwart rests, ribs, thickness gauges, tool marks etc, as well as large knots, knot holes and splits, were described, measured and their locations determined by measurement from the boats' longitudinal axis and externally from one end, the bow if possible. If the boat had not been drawn previously this was then done to scale. If any of the boats examined were in sufficiently good condition, in so far as they remained true to their original form, very detailed recordings of their dimensions were taken internally and externally to enable aspects of naval architecture to be applied (Chapter 13). Whenever practicable the boats were either turned over or raised so that their bases could be examined. Boats and their relevant features were photographed when possible.

All boats were given a separate file and entry number, and were named after the townlands in which they were found. Where previous records name the boats after their topographical locations, e.g. Lough-na-Shade, their townlands were identified and used first, and then their topographical locations. It is believed that possible confusion and potential duplication of records was eliminated by providing a complete record compatible with previous records. Each earlier reference is also cited.

## CHAPTER TWO

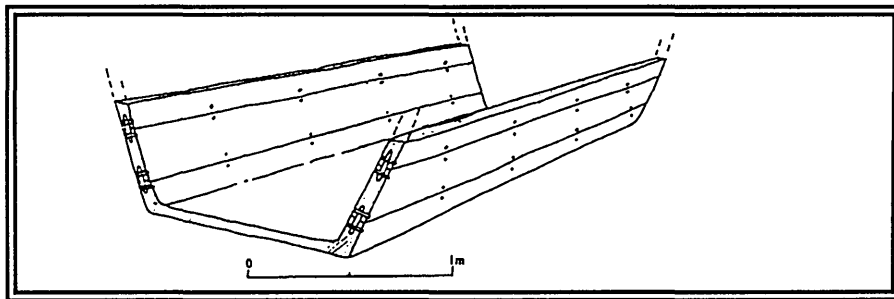
### THE LOGBOAT

#### 2.1 THE LOGBOAT

Within a European perspective, logboats can be broadly allocated to three categories; the simple hollowed-out boat, the extended boat, and the expanded boat.

Archaeological evidence shows that the simple logboat was restricted by the size of the parent log from which it was made. It was hollowed out using a process of scoring in which an axe was used to cut deep V-shaped grooves or scores across the grain of the log, terminating a few centimetres from either edge. The areas of excess wood between the scores were removed by chopping along the grain of the log in line with the outer edges of the scores. This enabled the maximum quantity of surplus wood to be removed with the minimum of effort.

The extended boat is a simple boat with washstrakes added to raise its sides, thereby providing a higher freeboard. In certain instances, it may be mistaken for a plank-built boat since it has a hollowed-out log base to which planks are secured, such as the Monk's Boat, Co. Westmeath (Brindley and Lanting, 1990: 10-11). Extended boats may also use internal fitted ribs to secure the planks in place.



*Figure 2.1: A section of the Monk's Boat (after Brindley and Lanting, 1990)*

During construction, the expanded boat had higher sheer lines or sides along the central portion of the hull, which were forced outwards to provide increased stability and internal space. This boat's shape was then maintained by adding fitted ribs across the floor extending up both sides. With its increased stability, it is the most sea-worthy of all logboats. Although there is one literary reference to a logboat used at sea (Section 3.3.1 para 9), no such boats have been found in either Britain or Ireland. The literary account refers to a former Prior of Kilkenny who used a logboat to escape Cromwellian forces. He recounts his fear of the boat swamping and his imminent drowning, not due to weather conditions but because he was in a logboat. (O'Morain, 1957: 51). This account shows that logboats at sea were not a common occurrence.

Another variety of logboat is the paired or multi-hulled boat in which two or more simple logboats are secured together. This provides a much greater degree of stability, and increased cargo-carrying capacity. There are only two known possible examples of this in Ireland. Two identical boats (Corry 1 and 2) were recovered in Lough Allen, County Leitrim. They were found beside each other and had exactly the same shape and dimensions, although no arrangements for securing them together were noted. Because of their identical size, shape, and their positions relative to each other, they may have been intended to be a paired logboat.



Figure 2.2: Corry 1 (after Tohall, 1945)

Another boat (Inch 2) from the River Quoile, Co. Down, has an unusual shape despite the fact it had not been completed. Its external cross-section is perfectly rounded and most of the hull has been finished. Its port side is perfectly straight in plan and was designed to remain so, while the starboard side curves gently to both the stern and the bow. It is 3.06m long, 45cm wide and only 20cm in external height - its intended final height. If this craft was completed it would have been inherently unstable and liable to swamping. However, if a second hull, a mirror image of the one found, was secured to its port side, the paired result would have been large enough to support at least one person without swamping and would have been very stable (Section 13.8).

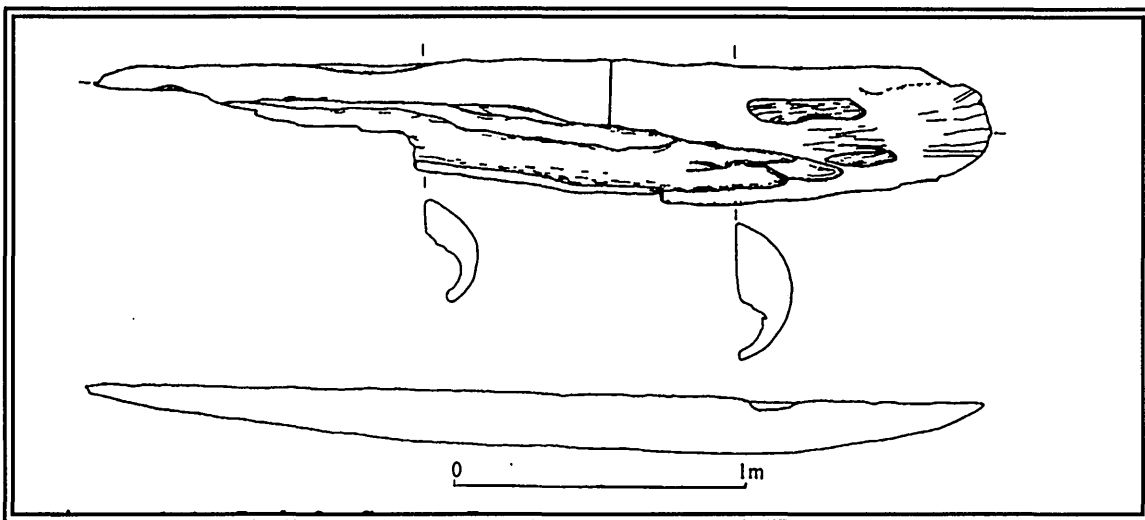


Figure 2.3: River Quoile, Co. Down.

There is no evidence for logboats with outriggers in Europe. No Irish logboats found with mast steps (Section 9.3) had any sign of outriggers having been secured to them. Pacific boats with their very narrow beams have used outriggers to counteract excess heel and maintain stability. Although several of the Irish logboats contain mast steps, such as Crevinish 1, only these boats' bases remain. Neither leeboards nor outriggers appear to have been used to maintain stability nor would their use have been necessary (Section 12.9.3 para 4). In experimental work for this thesis the wood used was dense enough for the boats to be stable without requiring ballast. The slenderness of the hull provided directional stability even when the logboat was sailing on a reach. There are no recorded discoveries of logboats with mast steps in Britain.



*Plate 2.1: Daire, an experimental logboat, under sail without keel or leeboard.*

The available evidence shows that logboats built of hard and soft woods were used in Scandinavia only (Eskerod, 1956:57-87). Soft woods were used to produce expanded boats since the fibres are much more pliable than those of hard wood. The available evidence shows that all Irish and British boats were made from hard wood, with the exception of a poplar, an alder and a possible second alder boat from Ireland (Section 11.2 para 1). Softwood logboats have been retrieved in other European countries, such as Pesse (the Netherlands), which dates to *circa* 6000BC (Johnstone, 1980: 46). Of the four hundred and four recorded Irish logboat discoveries, two (and a possible third) boats were noted as being made from softwood. If softwood logboats such as Pesse survive elsewhere, it is reasonable to assume, that if they were more frequent in Ireland, their remains would have been found by now.

While the principal methods of logboat construction in Britain and Ireland were the same, a wide range of differing additional features were found. Features such as integral and fitted ribs, keels, fitted transoms, mooring holes, mast-steps and thole-pin holes are incorporated either singly or simultaneously into the boats. Their purposes were either functional or skeuomorphic, i.e. integral ribs and keels appear to be skeuomorphic features which would have been adopted from plank-built boat design. If the grain of the ribs were perpendicular to the grain of the hull, they would

provide strengthening characteristics and prevent the boat from splitting. Since the grain of integral ribs is in line with that of the hull, they will split with the rest of the boat. Keels provide no strength and do not affect directional stability. The available evidence would suggest that these features copy plank-built boats to improve their appearance.

The shape of the boat's hull can have different forms, i.e. canoe, barge, punt, dissimilar-ended, box-shaped, tapered, or variations of all of the above. Their forms are determined by their intended use and constrained by the size of the parent log. The form of the boat was not determined by the chronological period in which it was employed (Section 6.4 para 3).

The majority of logboat discoveries constitute stray finds and were often found by accident. Because of this, the significance of an unknown number of them was not recognised at the time, and they were left to decay or put to practical use, such as being cut for fencing posts, door lintels and roofing material by farmers, or even firewood. Another problem was that other artefacts had been mistakenly identified as logboats. The Rossory (Wakeman, 1872; 16-7) and Kilraughts (Figure 1.1; Wood-Martin, 1886: 49) chutes for horizontal-wheel mills are two examples which were mistaken for logboats because of the similar manner in which they are made. Coffins, troughs, and a component of a possible Bronze Age fish weir (Gregory, forthcoming) have all been mistaken as logboats. The primary feature that the above share with the logboat is that they were all hollowed out of a single tree trunk. This has led to an understandable confusion in identification.

## **CHAPTER 3**

### **LITERARY EVIDENCE**

#### **3.1 INTRODUCTION**

Contemporary accounts of logboats have been recorded from as early as the seventh century AD in Scotland (Mowat, 1996: 128-9), and since 1087 AD in Ireland (Lucas, 1963: 58). In general, they supplement the archaeological record of logboat finds as well as providing an indication of the context in which they were used. In several instances these accounts indicate areas where logboats were used. No boats have, however, been discovered in those locations. The literary evidence shows that their period of use was more extensive than that indicated by dating of finds.

This chapter is divided into several parts. Firstly, examining the literary evidence for the period of use of logboats; the locations of recorded boat finds are examined, to compare them with the archaeological evidence for the distribution of the boats in Section 10.5; Section 3.3 uses the literary evidence to establish the uses to which they were put; Section 3.4 examines evidence from other, non-literary, sources; and finally, the evidence is compared to the distribution of found logboats.

#### **3.2 LITERARY EVIDENCE**

There are numerous ethnographic sources recording the use of logboats well into the last century in continental Europe, and in some countries into the first quarter of this century. These accounts have been compiled by McGrail (1978: 5-9). He refers to Boczar (1966), Itkonen (1941), Manninen (1927), Nikkila (1947) and Traeger (1904). These authors record logboats used within living memory or document their construction and use within a contemporary context

The majority of historical references of logboats are derived from Irish sources. The Irish literary sources use a number of terms by which logboats were known. These include ammir, coite, cot,



cott, crand lestra, one tree boat, and trough (in the context of boats). The cots referred to are not to be mistaken for the plank-built variety, which inherited the title after the demise of the logboat (Evans, 1957: 242; Leslie, 1932: 24, 36, 65; Lucas, 1963: 57-65; McCracken, 1990: 545)

### 3.2.1 Literary Evidence of Period of Use

The earliest of three Scottish sources note that timber was transported to Iona by logboat in the seventh century (Mowat, 1996: 129). The Irish accounts refer to the use of logboats from 1087AD in rivers and lakes throughout the country (Lucas, 1963: 57). One reference dates to 1153 (Lucas, 1963: 58), three references are from the fourteenth century (Leslie, 1932: 39; Lucas, 1963: 58), and seven from the fifteenth century (Leslie, 1932: 39; Lucas, 1963: 59-60; Seymour, 1918: 56).

There are fifteen sixteenth century references (Leslie, 1932: 64; Lucas, 1963: 60-3; Perrott, 1933: 78). Six accounts refer to logboats used in the seventeenth century (Boate, 1652: 59, 111-2; Lucas, 1963: 63-5; MacLysaght, 1950: 234; Ware, 1658: 232). Unfortunately, most of these accounts refer to unusual circumstances such as warfare, raiding, or natural and civil disasters, and do not reflect the frequency or nature of everyday use.

From the seventeenth century, references to logboats were less frequent and were usually found in records of commerce or river navigability. In 1652, Boate noted that they were 'very common throughout all Ireland...not only on shallow waters...but even upon great rivers and loughs' (Boate, 1652: 59). They were so common on the River Shannon in 1667 that the Duke of Ormond ordered their seizure because they facilitated illegal activities (Lucas, 1963: 64). Lucas (1963: 64-5) notes that this passage refers to 'all boats and cots' which demonstrates a distinction between logboats and all other boats. A more ambiguous reference is to coting in Lough Ennell in 1698 (Lucas, 1963: 65; MacLysaght, 1950: 234). No description is given of these cots, nor is any distinction made between them and other boats.

Ware notes that logboats were still a feature of waterways in 1705;

*'... the ancient Irish made use of another kind of boat in their rivers and lakes formed out of an oak wrought hollow, which is yet in use in some places, and called in Irish coiti, in English a cott'. (Ware, 1705: 180-1)*

Graces cites a company of cot-men in 1707, which 'tends to show that a large traffic was at the time carried on by the transit of goods...[on the River Nore]...by means of small boats called cots', who were subject to the rules and regulations of their own 'trades guild'. Any infringement of those rules was subject to some form of punishment (Graces, 1856: 89). Graces may however be referring to a guild which used the plank-built descendants of the logboats rather than logboats themselves. Hornell (1938: 81) notes that in the Brehon Laws logboats were 'ignored in the rates of payment' prescribed by the laws of the master craftsman who constructed them 'because of the little technical skill' required to make them. If such little skill was required compared to that in the manufacture of other boats, they must have been quite numerous. A high degree of knowledge and craftsmanship is necessary to make plank-built boats, whereas it would have been easier to make ones own logboat.

An advertisement in Faulkner's Dublin Journal, in 1753, was noted by McCracken (1971: 63), 'for the sale of timber from Monasterevan deerpark', from which she quotes the 'timber may be carried away by cots and other boats'. Since the advertisement distinguishes between cots and boats, it is safe to assume that the term cots refer to logboats. If so, then this reference is one of the most recent literary accounts for logboats in Ireland. However, Fry (1995: 4) notes the use of two logboats in Lough Aughlish, County Tyrone, where their use 'is independently recorded as having taken place in 1796'.

In Scotland, Joass records a letter written by Dr. J. Bethune from Dornoch, Ross-shire, dated 22 May 1798, in which he refers to an '*ammir*' which 'was nothing more than the hollowed trunk of a great tree' which was 'now...laid aside'. Bethune also recalls having been a passenger ferried across a river in one (Joass, 1881: 179-80). However, he does not state when he witnessed their use. McGrail (1978 i: 109) appears to infer from this account that the logboats were in use up to

1760. If a long time span for Bethune's 'recollections' is considered, the event could date to between 1730 and 1740.

Mowat cites Pococke (1887, i) about 'what is probably an account of a pair of conjoined logboats...[which]...date from 1760 when Pococke passed through Annandale and saw a double kind of boat, like two troughs...joined...each of which would hold any beast to be carried over' (Mowat, 1996: 129).

Fox (1926: 128) notes that a 'Mr. H. S. Cowper reported in 1888 on a flat-bottomed dug-out...found in...Westmorland'. He says that Mr. Cowper 'quoted the remark of a villager that it had been in use some forty or fifty years previously'. If this account is accurate, it would suggest use as recently as about 1840. This account is based on hearsay and consequently may be of questionable validity.

From the literary evidence, it can be seen that there was a long tradition of logboats. It is safe to assume from the above accounts that logboats survived until within the first half of the eighteenth century in Scotland and to the end of the same century in Ireland.

### **3.3 LITERARY ACCOUNTS OF LOGBOAT USES**

Most accounts of logboat use are concerned with warfare, tragedy, or unusual events - accounts which warrant contemporary recording in the annals. Unfortunately they tend to be biased towards unusual events and do not describe everyday uses of the boats. The following accounts which are listed firstly as 'acts of aggression' and related events, and secondly as 'other circumstances', are from or compiled by: Evans, 1957: 241; Hornell, 1938: 80; Joass, 1880: 180; Leslie, 1932: 24, 36, 65; Lucas, 1963: 58-65; Mowat, 1996: 128-9; Murphy, 1896: 184; O'Donovan, 1848: 907; O'Morain, 1957: 51; Seymour, 1918: 56, 83-4; Shirley, 1845: 94).

### 3.3.1 Acts of Aggression

The following accounts are listed chronologically. In 1087 Munstermen raided and took spoils from island churches on the River Shannon and Lough Ree.

Clonmacnoise was raided in 1153 with the use of logboats; on this occasion the spoils consisted of pigs.

In 1390 Manus O'Rourke was slain as he came ashore in a cot in Lough Oughter.

In 1436 the O'Neills made cots to raid a crannog. In 1463, the MacRagnails attacked and burned Baile Tumna Uisce and retreated in logboats. In 1472 Rory MacQuillin was killed as he came ashore at the mouth of the River Bann.

O'Neill sent men across the River Bann in 1564 to occupy a friary. In 1570, an English document complains of the large number of boats, including logboats, used in raiding. In 1583 an English force surprised the Earl of Desmond, who successfully escaped in a logboat. Two cots are noted as used in 1588 in a night raid on the River Bann. An unsuccessful attempt at escaping from a crannog in Co. Roscommon was made in 1590. In 1593, the Earl of Tyrone was unable to capture islands in Lough Erne, while using logboats. In 1593 also, the Sheriff of Cavan supplied logboats for the English army to attack O'Connor Roe.

Again in 1593, English forces found and used six logboats while pursuing Maguire in Lower Lough Erne. The pursuit appears to have been unsuccessful, because the following year the English forces seized Maguire's logboats on Lower Lough Erne to curtail his cattle raiding. They either failed, or Maguire had more boats available or built, since an account from 1600 proposed the seizure of Maguire's logboats on Lower Lough Erne. A picture-map painted by an English soldier depicts the Siege of Maguire's Castle at Enniskillen in 1593 in which logboats were used (Section 3.4 para 13-21 and Plate 3.1).

In 1595, when Connaught rebels prepared to cross the River Shannon, the Duke of Ormond ordered the seizure of all boats and logboats on that river.

In 1600, an embargo was placed on logboats (and other craft) to curtail the anti-social behaviour of Irish rebels on the Munster Blackwater. In 1607, cattle-raiders escaped from an unsuccessful raid in logboats, in Co. Cavan.

A logboat was used by a former Prior of Kilkenny to escape Cromwellian forces at Burrishoole Convent (Co. Mayo), to Clare Island, a distance of at least three miles by sea. O'Morain (1957; 51) quotes the Prior as saying 'by the grace of God, everyone thought I would be certainly drowned in that little canoe made of one single tree trunk'. This account would suggest that logboats in general, and this one in particular, were not usually used as sea-going craft.

### **3.3.2 Other Circumstances**

The following accounts are listed geographically in chronological order.

There is an account from 1397 in which Dermot O'Beirne was being conveyed to his house on Lough Erne when fever-induced delirium caused him to jump overboard and drown. In 1397, 1411 and 1517, logboats were used to ferry people to St. Patrick's Purgatory, Lough Derg.

In 1418, a logboat was used to cross Lough Sheelin. In 1475, while travelling along the River Bann, Naghtan O'Donnell was drowned at the river mouth. In 1487 a storm destroyed logboats as well as other boats.

In 1505 eighteen people from one logboat drowned in Lower Lough Erne. In 1537, an account concerning fishing weirs on the Barrow, Nore and Suir Rivers, mentions both logboats as well as other boats which were used in the traffic of goods. A 1548 account notes a logboat used for fishing in Lough Foyle.

In a local legend, cots were used in 1698 in seeing the roof-tops of buildings of a submerged village in Lough Ennell. There is a seventeenth century Scottish account of large logboats used to transport timber to Iona.

In Ross-shire logboats were used for spear-fishing around 1730-40 (Joass, 1881: 179-80). In 1753 logboats may have been used to carry timber from Monasterevan (Section 3.2.1 para 6). In 1796 two logboats were used to gain access to an island in Lough Aughlish, Co. Tyrone, to plant trees on it. (Fry; 1995: 4).

There is also an account of a man travelling down the Munster Blackwater in a logboat.

### **3.4 NON-LITERARY SOURCES**

Non-literary sources exist which portray images of boats used at various times. Johnstone (1980: 29, 43, 65, 102, 104-6, 109, 111, 134, 118-9, 125-6, 128-9, 142, 159, 173, 180, 199, 205) has compiled and analysed these sources for boats throughout the world. The sources consist of rock art and carvings, mosaics, engravings, seals, coins, clay models, beaten silver, gold, and lead. Their dates range from the Neolithic period to the sixteenth century AD, and portray all forms of boat. However, few of them are definitive representations of logboats.

Johnstone's accounts show that there often appears to be some uncertainty as to which type of boat is represented, especially in the case of rock art. For example, he cites two rock carvings, one from Vyg (Northern Russia) and the other from Namforsen (Sweden) (Johnstone, 1980: 113). Both show a boat supporting an animal head at the bow. He cites Hallstrom's (1960) views that they were not skin boats, since such boats could not support the weight of an elk's head. Hallstrom believes that these boats were rafts, while Johnstone does not discount the possibility that they were logboats.

In Ireland there are several examples of boats carved in relief on stone. Most of them are situated on crosses and portray Noah's Ark, such as on the cross at Killary, Camus, and on the broken cross

at Kells (Porter, 1979: 106-7). Porter cites the Viking style of iconography and ascribes a tenth century date to them. Johnstone (1980: 128) refers to the fact that the Scandinavian influences went further than style and that the 'monastic sculptors...used Viking long-ships as models' to depict the ark.

Other Irish boat iconography is found on the eighth century Bantry Pillar which is carved in low relief (Henry, 1940: 108; Johnstone, 1980: 128-9). Johnstone says that the 'curve of the sheer and long lifting bow' resembles skin boats of a type similar to the Kerry navog. However, Farrell and Penny (1975: 22) suggest that this is an assumption, since the carving is so weathered, and that doubt must remain as to the identity of the boat's true form. They do not suggest an alternative boat form. Johnstone (1980: 128) states that the boat can be seen on a photograph taken in 1964 with artificial lighting.

On the basis of this photograph (Johnstone 1980: 129, fig.10.10) the boat's raised bow and stern do not correlate with the archaeological evidence of Irish logboats. It is believed here that this is a skin boat due to the raised ends and, as Johnstone (1980: 128) points out, the boat 'seems to be riding high on the water'. It is likely that a logboat would be depicted much lower in the water (Section 13.3).

Excavations in Viking Dublin have uncovered two sketches of boats on reused ship timbers, in late eleventh and early twelfth century levels (O'Riordain, 1971: 77, 84; O'Riordain, 1975: 15-16; Wilson and Hurst, 1970: 186). O'Riordain (1975: 15, pl.3) also shows a photograph of a thirteenth century 36cm long model of a boat. It is carved in the solid and has a raised bow and stern with a hole 'for attachment of a steering oar'. It does not appear to be a model of a logboat since the bow curves up to between three and four times the height of the remainder of the boat. The stern is incomplete, but it may have originally been at the same height. None of the available evidence corroborates this as a logboat design. Its cross-section appears to be more flared, and a keelson runs along the model's length and up both ends. The model probably represents a plank-built boat of Viking design.

The Broighter boat, a first century BC beaten gold model boat (Cochrane, 1902: 211-5, 223; Evans, 1897: 390-3; Flanagan, 1975: 5; Johnstone, 1980: 127-8), was found with thwarts, oars, a mast, a yard and a steering oar, amongst other nautical implements. Its overall length is 18.4cm. Cochrane believed it represented a skin boat, whereas Evans (1897: 393) saw the 'miniature reproduction as a rough representation of the votive class'. Johnstone says the model 'could be a representation of a skin boat' but he also points out that Farrell and Penny are not convinced of this (1980: 128). Lethbridge (1950: 76) remains open to the possibility that it portrays either a skin or plank boat. The model was damaged by the plough-share which uncovered it. Accordingly, it is difficult to determine the type of boat represented. It was later repaired by a goldsmith who may have had no knowledge of boats. The goldsmith was 'probably a man with only a limited structural knowledge of the craft he remodelled' (Farrell and Penny, 1975: 19). However, Farrell and Penny suggest that the fittings 'may also be a tolerably accurate representation of a type to be found in Irish waters in the first centuries BC/AD' (1975: 19). They believe that too much emphasis has been given to the possibility of this being a skin boat, and not enough attention paid to other boat forms (1975: 19-20). One of their arguments is that there is no evidence for a skeleton framework or rib system. But Evans (1897: 392) draws attention to 'some faint punch marks...roughly arranged in vertical lines' on the model's underside'. He says they may indicate ribs, or could be 'the result of methodical hammering of the plate into shape'.

Farrell and Penny (1975: 21) point out that 'if one accepts that this is a tolerably accurate model of an original type, then there is no reason why it could not be a representation of a distended dugout'.

It is believed, by the author, that the Broighter model never represented a logboat. If it is a 'tolerably accurate model' as Farrell and Penny suggest, the shape of the hull is not consistent with the evidence from Irish logboats. It may indeed represent an expanded or distended logboat, but the fact that no such boat has ever been recovered from Irish or British waters would tend to discount this theory. The mast is held in place by a hole through one of the thwarts, a feature for which there is no evidence from Irish sailed logboats. The Irish logboats' masts rested in holes through the boats' bottoms surrounded by a raised area (Section 9.3 para 1-2). No such feature is evident in the Broighter model. The model's oars are held by twists or rings of wire through holes



in its gunwales. The evidence from Ireland's rowed logboats shows that the oars were mounted by means of thole pins only (Section 9.2.3 para 1). Finally, the steering oar is mounted on the model's starboard side. There is no direct evidence for the use of steering oars on Irish logboats. Experiments in logboat propulsion (Section 12.9.4 para 4) show that the optimum location for a logboat's steering oar is directly over the stern.

A pine model of what has been described as a logboat was recovered at Roos Carr, Yorkshire. It is carved from wood and has four men standing on it, one of them holding a shield. Johnstone (1980: 114) believes it is a logboat since its animal-head shaped bow is similar to the Loch Arthur logboat's bow. It has been dated to 606-509 BC (Coles, 1990: 326; OxA-1718). Coles discusses the boat and figures along with other wooden models. His interpretation does not extend beyond that it is 'an animal-like boat' whose head has 'two raised ears, eye sockets, nostrils, mouth and heavy jaw', and that it has a slightly upturned, spatulate stern' (Coles, 1990: 316, 319). The model may represent a stylistic logboat. However none of the available logboat evidence shows any indication of a 'spatulate' stern.

The only definite logboat model is from Germany. It probably dates to the Bronze Age and was excavated from a Linear Pottery settlement, near Wiesbaden. It is made of 'a clay tempered fine silt' (Peschel, 1985: 265-6). Its incomplete length measures 6.7cm, which 'represents more than half of the original model' (Peschel, 1985: 266).

Perhaps the most informative representation of logboats is in a painting of the Siege of Maguire's Castle at Enniskillen, in 1593 (Plate 3.1). It was painted by John Thomas, an English soldier who obviously had time for more leisurely activities than warfare. He has drawn the painting from the east, from where he could overlook the six day siege.

The painting was done in the form of a map which includes the castle, the English positions, and the surrounding landscape. There are also four large plank-built boats, as well as eleven 'cotts'. The cotts are clearly logboats, since Thomas distinguishes between them and the plank-built boats by drawing horizontal lines on the latter, representing the planks. The difference in shading from

light to dark brown on the hulls of all the boats probably depicts the waterlines, where the darker portion was submerged and the lighter above the water.

The two larger logboats hold eight and ten men respectively, including the two men in each boat who are holding paddles at the sterns. Underneath them Thomas has written 'Two Cotts, with 30 men for scale'. From this it is safe to assume that Thomas was unable to draw the full complement of men in each boat, and that he is attempting to depict the scene as clearly as possible by omitting certain details. Some of the soldiers are shooting what appear to be muskets, or a similar form of weapon, from the logboats.

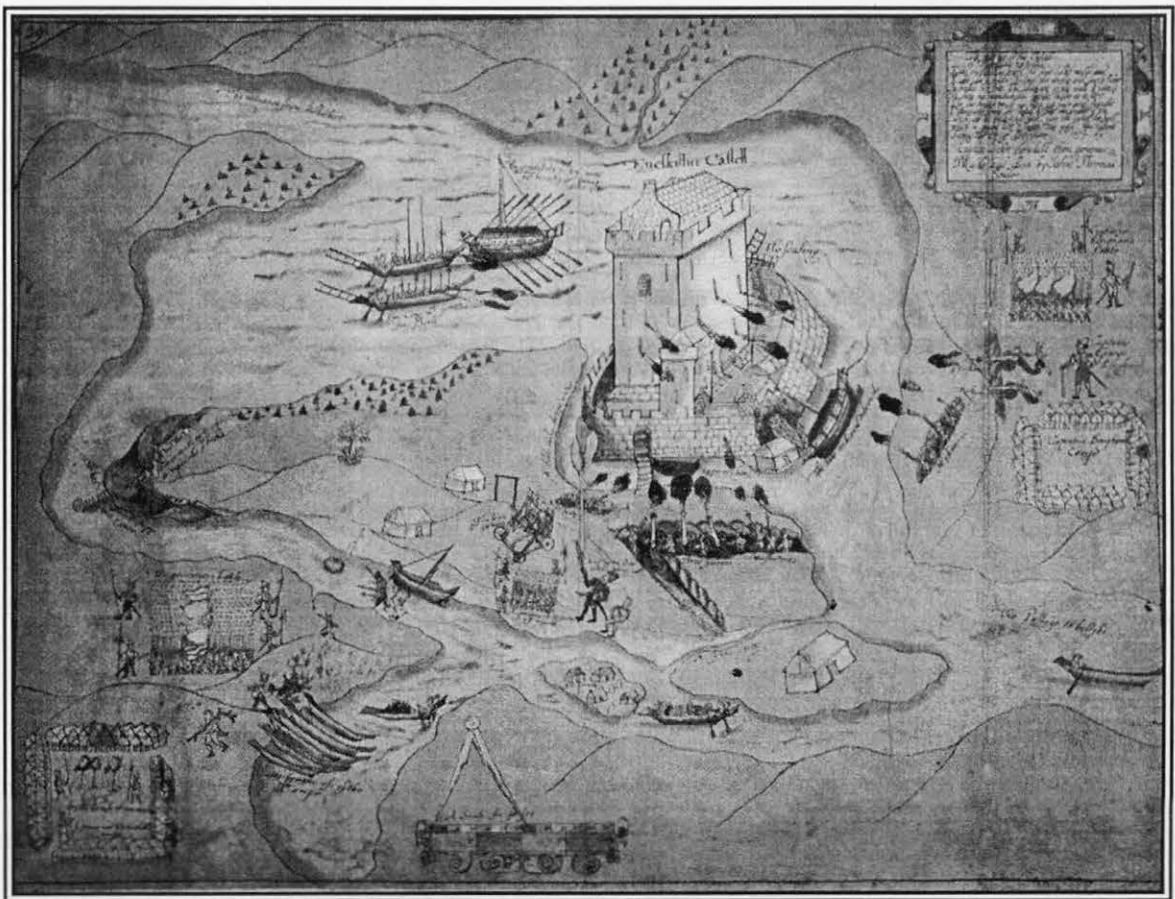


Plate 3.1: Painting of the Siege of Enniskillen in which logboats are depicted (Thomas, 1593).  
Courtesy of the British Library.

It is not clear whether the 'paddlers' are actually propelling the boats or preventing the boats from drifting. It is more likely that they are preventing the boats from drifting while the soldiers shoot, since it would require an enormous effort for two men to propel the boats with twenty-eight soldiers on board. There are brown poles which are probably pikes, but this is unclear. It is very unlikely that they are masts since the evidence of sailed logboats shows only one mast having ever been used in a logboat (Section 9.3 para 1). They appear too long to be paddles. The use of so many punt poles would cause confusion if they were used at the same time, so it is safe to discount that they are poles. Both cotts have what appears to be a ladder which extends upwards from their sterns. There were probably intended to be used to scale the castle's walls.

If a minimum of 50cm is required for each man along the boats' lengths, and they are positioned two abreast, then the boats are eighty centimetres to one metre in beam, and a minimum of 7.5 to 8m in length. However, the weight of such a large crew would probably cause logboats of this size to sink (Section 13.6). A more probable minimum length is 10m.

Two other logboats are shown carrying a cargo of branches (presumably firewood) to the English camp. Both cargoes are piled above gunwale level. Two paddlers are shown side by side in the stern of each boat. They are probably situated there to make as much room as possible for the firewood. They may be located elsewhere on the boats' outward journey when it is empty, to provide more effective propulsion and control of the boats. In the stern of a third logboat, one man paddles it on an outward journey. It is unclear whether a second paddler has been omitted by Thomas because it does not warrant the detail of the other two boats, or that the paddler is on his way to meet a companion who will help to load the cargo and return with him. The remaining six logboats are beached by the English camp. Beneath them, Thomas has noted that they are for the use of the soldiers. Whether they are for recreational purposes or a means of obtaining provisions, such as wood or animals for food, is not indicated.

All of the logboats have duck-billed projections at either end. Their purpose may simply be to facilitate entry to, and exit from, either end of the boats. Because of the location of the castle on the water's edge and the nature of the siege, the duck-bill projections may be designed to link the boats together to make a pontoon-bridge.

The logboats depicted clearly out-number the plank-built boats. However, the siting of the castle, which is surrounded by water, would suggest that more boats may have been required to lay an effective siege. Thomas may have excluded the true number of boats so that his painting would not become cluttered with too much detail. Hence, it is possible that the number of boats is a proportionate or representative figure of the relative number of boats of each type employed in the siege. If this is so, then there would have been a greater number of logboats.

Finally, there is no sign of the town which is situated on the same side of the castle as Thomas' viewpoint. Accordingly the town may be immediately behind him. The location is an ideal vantage point from which to view the scene, since it is the closest high ground to the castle. There is no evidence of trees or any form of agricultural practice in the painting. Thomas' intentions were probably to eliminate any features which may distract from the scene of the siege. This would suggest that he depicts the details of the siege to be as historically accurate as possible.

### **3.5 LOGBOAT DISTRIBUTION AND OTHER EVIDENCE**

This section deals with the literary evidence for logboats and their distribution. Unfortunately there are insufficient literary records for Scotland. Figure 3.1 shows the distribution of Irish Logboats. The shaded areas represent those to which the historical sources refer. Table 3.1 lists the artefactual records of logboats from the areas referred to by the historical records.

There are three references to the use of logboats on Lough Derg (Donegal), 1397, 1411 and 1517 (Leslie, 1932: 39, 64; Lucas, 1963: 59, 60; Seymour, 1918: 56). In all three they are rowing logboats. No boats have been found here.

Five boats have been found in Lough Ennell. Cotting is referred to ambiguously in 1698 (Lucas, 1963: 65; MacLysaght, 1950: 234). None of these boats have been dated.

There are four references to logboats in Lough Erne, Lower, from 1397, 1505, 1593 and 1600 (Lucas, 1963: 58, 60, 61, 63). Two accounts refer to Enniskillen at the southern end of the lake.

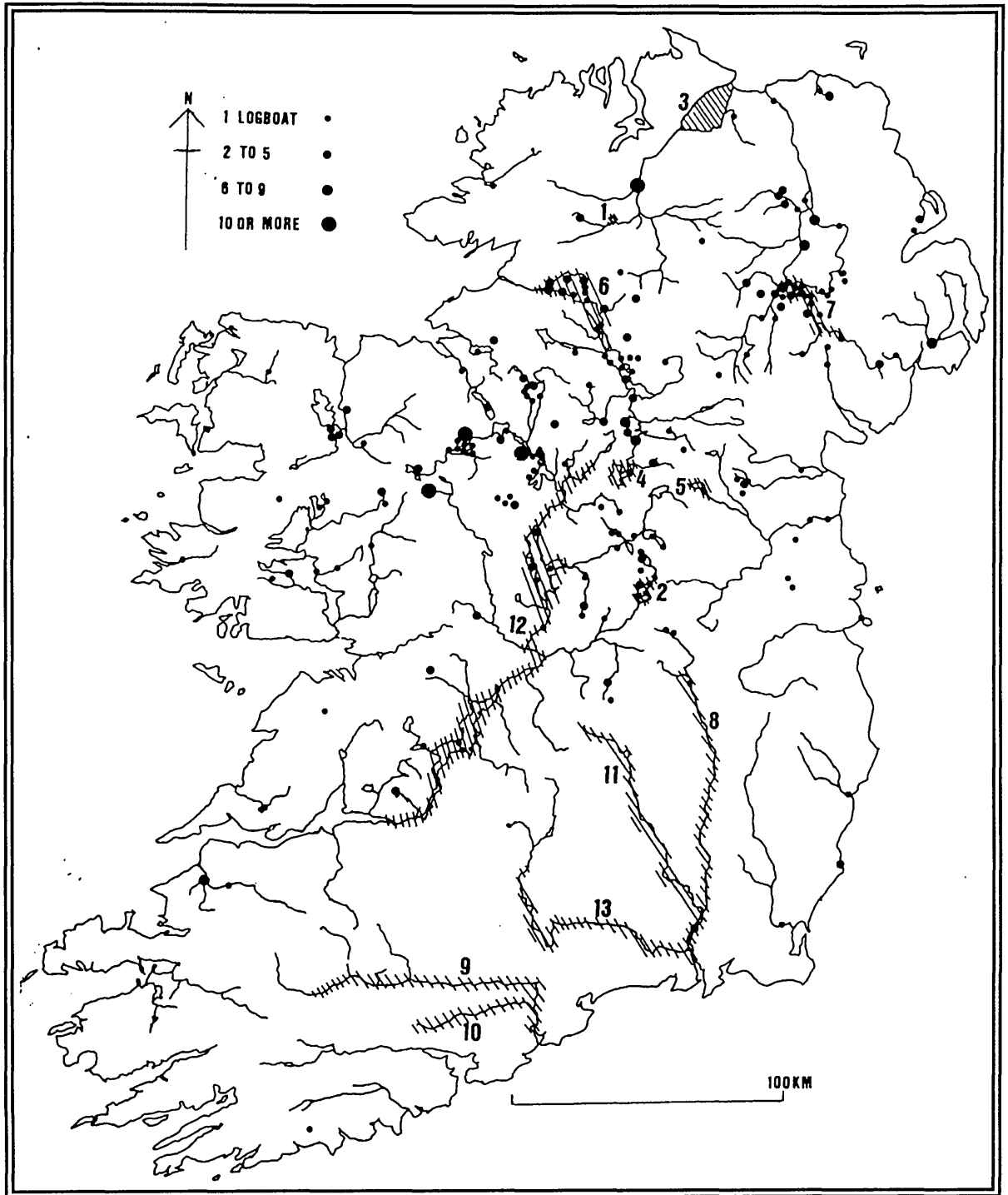


Figure 3.1: Map of Ireland depicting the logboat distributions and locations to which the literary accounts refer. The areas to which the literary sources refer are shaded and are listed as follows; 1 Lough Derg, 2 Lough Ennell, 3 Lough Foyle, 4 Lough Oughter, 5 Lough Sheelin, 6 Lower Lough Erne, 7 River Bann Upper, 8 River Barrow, 9 River Blackwater, 10 River Bride, 11 River Nore, 12 River Shannon, 13 River Suir

One boat, Crevinish 1, has been dated to *circa* 0 AD (Fry, *pers. comm.*; Section 4.3.2). This boat is clearly well outside the range of the historical references.

There is a logboat reference to Lough Foyle in 1548 (Lucas, 1963: 60). Although it is a sea lough, it is surrounded by hilly country and is thus relatively sheltered. Lough Oughter is referred to in 1390 (Lucas, 1963: 58). Eighteen boats came from here, of which none are dated.

The use of a logboat is recorded on Lough Sheelin in 1418 (Lucas, 1963: 59). No boats have yet been found in it.

Logboats from the River Bann, Upper, are recorded historically from 1472 to 1588 (Lucas, 1963: 59-60, 61). Six boats were found in this river, of which two have been dated, Derrybroughas and Levaghery. They date to 1463AD (UB-2397) and  $833 \pm 52$ AD (UB-3549) respectively (Tables 4.1 and 4.2). Only the Derrybroughas boat may be contemporaneous with historical accounts, of which the particular years referred to are 1472 and 1475 (Lucas, 1963: 60). These accounts refer specifically to the mouth of the river (Section 3.3.1 para 4). As Derrybroughas is approximately four kilometres upriver the reference may be to a different boat.

The Rivers Barrow, Nore and Suir are referred to in 1537, and again in 1652 (Boate, 1652: 59; Lucas, 1963: 60, 64-5). Only four boats have been recovered from the lower reaches of the Barrow, none of which have been dated. No boats have been discovered in either the Nore or Suir Rivers.

Both the Rivers Blackwater and Bride are referred to from 1600 to 1649 (Lucas, 1963: 64-5), yet no logboats have been recovered from either of them.

Historically, the River Shannon was widely used by logboats from 1087 to 1667 (Lucas, 1963: 58, 65). Eleven logboats are recorded as recovered from it, including those from Lough Derg and Lough Ree. However, none of them have been dated.

Despite the fact that there is little or no known correlation between dated logboat distributions and historical references, they supplement the archaeological record by referring to areas in which no logboats have yet been discovered.

*Table 3.1: List Logboats from locations to which literary sources refer.*

| Cited Locations  | Boat Names                          |
|------------------|-------------------------------------|
| Lough Derg       | None                                |
| Lough Ennell     | Gaddaghanstown                      |
|                  | Lough Ennell 1 & 2                  |
|                  | Lynn                                |
|                  | Rochfort Demesne                    |
| Lough Foyle      | None                                |
| Lough Oughter    | Derries Lower 1, 2, 3 & 4           |
|                  | Killygowan 1 & 2                    |
|                  | Killykeen 1, 2, 3, 4 & 5            |
|                  | Trinity Island 1, 2, 3, 4, 5, 6 & 7 |
| Lough Sheelin    | None                                |
| Lower Lough Erne | Bunninubber                         |
|                  | Crevinish 1, 2 & 3                  |
|                  | Drumreask 1, 2 & 3                  |
|                  | Gavary 1, 2 & 3                     |
|                  | Gubbaroe 1& 2                       |
|                  | Kesh                                |
|                  | Legg 1 & 2                          |
|                  | Portnacloyduff                      |
|                  | Rossfad 1 & 2                       |
|                  | Tully                               |
| River Bann Upper | Derrybroughas                       |
|                  | Levaghery                           |
|                  | Portadown 1, 2 & 3                  |

Table 3.1 (continued): List Logboats from locations to which literary sources refer.

| Cited Locations  | Boat Names            |
|------------------|-----------------------|
| River Barrow     | New Ross              |
|                  | River Barrow 1, 2 & 3 |
| River Blackwater | None                  |
|                  |                       |
| River Bride      | None                  |
| River Nore       | None                  |
| River Shannon    | Carrick-on-Shannon    |
|                  | Cavan                 |
|                  | Cormongan             |
|                  | Corrachuill           |
|                  | Corry 1 & 2           |
|                  | Derrynabuntale        |
|                  | Derrynagolliagh       |
|                  | Drummans Island       |
|                  | Drummans Lower        |
|                  | Lanesborough 1 & 2    |
|                  | Tumna                 |
| River Suir       | None                  |

### 3.6 SUMMARY

The literary accounts tend to record unusual or spectacular events, which chiefly consist of acts of aggression, such as murder, raiding, and warfare. They were originally written to record events which affected contemporary political issues. Most of the other accounts record unusual events or freak weather conditions. Except in a very small number of accounts, the use of logboats is not the event that is being recorded but a small detail of the occurrence. It is fortunate that the



contemporary writers saw fit to include such detail, otherwise the context in which some logboats were used may not be known.

Seventeenth century accounts show that logboats were either registered or confiscated in certain areas, because there were so many of them that their use proved difficult to control. Boate (1652) states that they were found everywhere, which suggests they were not just military craft or happened to coincide with the advent of natural disasters, which the bias in the records may easily lead us to believe, but were found to serve more mundane everyday uses. This is further substantiated by a small number of contemporary accounts. They show that the logboats were used to carry cargo, including timber, live pigs and cattle. The distances logboats travelled were not insignificant. However, the accounts again tend to show a bias towards the Barrow, Nore and Suir Rivers, in spite of the absence of finds in the latter two. These accounts exemplify the activities carried out throughout the remainder of the country. The records also show that fishing and ferrying were other activities in which they were employed, as well as in recreational activities. It is apparent that rivers proved to be natural barriers for which logboats were essential to overcome, as well as natural routeways.

Apart from the variety of uses for which logboats were employed, the literary accounts present a chronological context which not only supports the archaeological record of dated logboats (Chapter 4), but extends the period of their known use to the late seventeenth and the early eighteenth century. The period of their use is thus to *circa* 1730 AD in Scotland, and certainly to twenty years later in Ireland (1753 AD), if not a further forty years to 1796 AD.

The accounts generally reflect the artefactual distribution of logboats. They also further enhance our knowledge of this distribution by recording the use of logboats where none have yet been found, such as Lough Foyle, the Barrow, Blackwater, Bride, Nore and Suir Rivers in Ireland, and between Iona and the mainland in Scotland. It is believed that logboats are incapable of being used in the open sea except in the calmest of conditions because they tend to have a relatively low freeboard compared to other craft (Sections 13.3 and 13.6). The account of the Iona logboat does not alter this view. This event may originally have been considered worthy of recording because the author may have been surprised that a logboat was used at sea. The remains of the bottom of a

logboat was found, in March 1996, in the sheltered waters of Larne Lough, a sea inlet. There is no evidence of any river entering the sea in its vicinity. One of the Irish accounts records a logboat used for fishing in Lough Foyle, which is also a sheltered sea inlet. Apart from Iona, both the archaeological and the literary evidence show that the boats were used in sheltered or relatively sheltered conditions. This reinforces the belief that such craft were neither suited to, nor used on, the open sea.

Despite the wealth of non-literary sources of information on boats in Ireland, it is unfortunate that none are of logboats, with the one exception of Thomas' painting of the Siege of Enniskillen. However, the very detail of its composition compensates for the lack of other sources. Not only does it depict a general scene of warfare, it also shows the versatility of their uses. As well as using the logboats to supply the English camp, they are used as firing platforms so that the castle could be attacked on all sides, and the attackers are also prepared to use them as a means to scale the castle, and possibly to make a pontoon bridge.

## CHAPTER 4

### LOGBOAT DATES

#### 4.1 INTRODUCTION

Thirty-two (8%) Irish and twelve (8%) Scottish logboats have been dated by various means; three of these are absolute methods:

- a) dendrochronology,
- b) radiocarbon-dating,
- and c) archaeological association.

Alternative relative dating methods have also been used, such as geological stratification and pollen analysis. Although only 8% of both countries' logboats have been dated, there has been no bias in the selection of those dated such as geographical or environmental location, shape, size, or circumstances of discovery. The dates are not considered as a representative sample of all the logboats, and are not considered as providing a definitive range of logboat use. The literary evidence of logboat use (Section 3.2.1) emphasises this.

#### 4.2 ABSOLUTE DATING METHODS

##### 4.2.1 Dendrochronology

The main problem of dating logboats by this method is that there must be a sufficient number of consecutive tree rings in the boat from which a suitable dating sample can be obtained. The only two areas of a boat where a sample may be acquired is at either end.

Unfortunately, there are often not enough consecutive rings to allow this, though one Swiss logboat had three hundred and sixty-three consecutive rings (Egger, 1985: 118).

Six boats from Ireland have been dated by this method. These are presented in Table 4.1. None of the Scottish logboats have been dated dendrochronologically.

*Table 4.1: List of dendrochronologically dated logboats*

| Boat           | Date            | Reference                 |
|----------------|-----------------|---------------------------|
| South Ward     | 465±9 AD        | Q8591                     |
| Doogary        | 1115±9 AD       | No.62                     |
| *Inch 3        | 1188±22 AD      | Foley: <i>pers. comm.</i> |
| West Ward 8    | 1425±9 AD       | Q8592                     |
| *Derrybroughas | 15th Century AD | UB-2397                   |
| Mullynascarty  | 1520 AD         | Q8777                     |

\*Inch 3 has also been radiocarbon-dated to 1529±9AD (Q8779) and 1564±9AD (Q8778). The Derrybroughas logboat has also been radiocarbon-dated to 1463 AD (UB-2397) (Section 4.2.2).

#### **4.2.2 Radiocarbon-dating**

This is the most commonly employed method in both Ireland and Scotland. Radiocarbon dates are not considered to be precise. Standard deviations show the range of error associated with the calibration of dates. Pearson (1987: 98) states ‘that no calibration curve would be classed as definitive until it had been independently replicated to within statistical expectation and had also justified its accuracy calendrically as well as radiometrically’.

Pearson goes on to say that standard deviation ‘is not a realistic assessment of the overall error...because of the ambiguity of reporting radiocarbon date precisions’ (1987: 100). When an artefact which has no stratigraphic or associated context is radiocarbon-dated, the use of more than one sample lessens the ambiguity. However, often only one sample is taken per boat.

Because of this, a certain amount of caution is required, since the date from one sample can not necessarily be confirmed. Twenty-seven Irish and six Scottish boats have been dated by this method.

Table 4.2: List of radiocarbon-dated logboats

| Irish Boats      | Date        | Reference                      |
|------------------|-------------|--------------------------------|
| Brookend         | 5407±69 BC  | UB-4066                        |
| Carrigdirty Rock | 4800 BC     | O'Sullivan: <i>pers. comm.</i> |
| Ballylig 1       | 3507±121 BC | UB-4067                        |
| Ballylig 2       | 3519±63 BC  | UB-4091                        |
| Inch 2           | 2739±9 BC   | UB-8520                        |
| Lurgan 1         | 350±30 BC   | GrN-18361                      |
| *Crevinish 1     | 905±50 BC   | UB-2396                        |
| *Eskragh 1/2     | 215±25 BC   | GrN-14740                      |
| Drumman Lower    | 320±30 AD   | GrN-16875                      |
| West Ward 7      | 480±30 AD   | GrN-16864                      |
| River Foyle      | 510±30 AD   | GrN-19282                      |
| West Ward 6      | 510±30 AD   | GrN-16863                      |
| Altdrumman       | 580±70 AD   | UB 2731                        |
| Aughamullan      | 590±100 AD  | UB-2734                        |
| Bannmouth        | 605±30 AD   | GrN-17241                      |
| Derrygalley 3    | 810±20 AD   | GrN-16869                      |
| Levaghery        | 833±52 AD   | UB-3549                        |
| Church Island    | 1010±30 AD  | GrN-16870                      |
| Derrygalley 1    | 1110±20 AD  | GrN-16867                      |
| Maghery 2        | 1360±20 AD  | GrN-14742                      |
| Copney           | 1365±30 AD  | GrN-16866                      |

Table 4.2 (continued): List of radiocarbon-dated logboats

|                |                   |           |
|----------------|-------------------|-----------|
| Derrybroughas  | 1463 AD           | UB-2397   |
| Castledargan   | 1520±30 AD        | GrN-18747 |
| North Ward     | 1535±90 AD        | UB-2733   |
| Urney Glebe    | 1640±30 AD        | GrN-16865 |
| Derrygalley 2  | 1665±20 AD        | GrN-16868 |
| Moy            | 1705±15 AD        | GrN-14741 |
| Scottish Boats | Dates             | Reference |
| Catherinefield | 180±125 BC        | SRR-326   |
| Erskine 6      | 45±50 BC          | GU-1016   |
| Loch Arthur 1  | '150 BC - 200 AD' | SRR-403   |
| Errol 2        | 430±48 AD         | Q-3141    |
| Errol 2        | 485±40 AD         | Q-3121    |
| *Loch Doon 1   | 509±110 AD        | SRR-501   |
| Forfar 2       | 1090±50 AD        | Q-3143    |

\* Fry (*pers. comm.*) says that the Crevinish 1 sample was taken after conservation treatment to the boat which would have affected its true date. He believes a date of *circa* 0 AD is more likely. It was not recorded which of the two Lough Eskragh finds was dated (Seaby Survey Files). Goodburn (*pers. comm.*) believes that the core sample used to date Loch Doon 1 was drilled too deep. He estimates that the boat is approximately 100 years more recent than the date indicated above.

#### 4.2.3 Association to Sites

Table 4.3 shows those boats which were directly incorporated into crannogs, either as primary foundation material or as later structural reinforcement. Where they have been excavated, the stratigraphical dates of the crannogs indicate the period in which the boats were deposited, not necessarily the period of their use, unless the specific date of the boat is provided in Table 4.3. It is not safe to assume that their date of deposition corresponds with the end of their use as boats, since the crannog builders may have used long abandoned boats as building material.

Table 4.3: Logboats found within the structure of a site.

| Boat             | Site       | Site Date                    | Reference                       |
|------------------|------------|------------------------------|---------------------------------|
| Ireland          |            |                              |                                 |
| *Ballinderry 1   | Crannog    | c.11th Century               | SMR:030-118                     |
| *Ballinderry 2   | Crannog    | c.11th Century               | SMR:030-118                     |
| *Ballinderry 3   | Crannog    | c.13th Century               | SMR:030-118                     |
| *Ballynahinch 1  | Crannog    | Late Bronze<br>Age to 600 AD | Wood-Martin 1886: 206           |
| *Ballynahinch 2  | Crannog    | Late Bronze<br>Age to 600 AD | Wood-Martin 1886: 206           |
| *Ballynahinch 3  | Crannog    | Late Bronze<br>Age to 600 AD | Wood-Martin 1886: 206           |
| Cloontarsna 3    | Crannog    |                              | SMR:025-004                     |
| Cloontarsna 4    | Crannog    |                              | SMR:025-004                     |
| Cloontarsna 5    | Crannog    |                              | SMR:025-004                     |
| Cloontarsna 6    | Crannog    |                              | SMR:025-004                     |
| *Dunshaughlin 1  | Crannog    | 'Iron Age'                   | Hencken 1951: 10, 39, 151-<br>2 |
| Scotland         |            |                              |                                 |
| ‡Auchlishie      | Souterrain |                              | NMRS: NO35NE5                   |
| Barhapple Loch 2 | Crannog    |                              | NMRS: NX25NE2                   |
| †Buston 1        | Crannog    | 50 bc-570 ad                 | GU: 2636, 2637, 2688,3000, 3004 |
| †Buston 2        | Crannog    | 50 bc-570 ad                 | GU: 2636, 2637, 2688,3000, 3004 |
| †Buston 3        | Crannog    | 50 bc-570 ad                 | GU: 2636, 2637, 2688,3000, 3004 |
| Dowalton Loch 1  | Crannog    |                              | NMRS: NX44NW3                   |
| Lochlea 4        | Crannog    |                              | NMRS: NS43SE5                   |
| Lochlea 5        | Crannog    |                              | NMRS: NS43SE5                   |
| Loch of Kinnordy | Crannog    | 735±40 AD                    | Q-3142                          |

‡The boat from Auchlishie was recorded as found in a souterrain. It was noted as a boat. However when its location is considered, it may either have been originally a trough or a reused logboat. It is unlikely to post-date the construction of the site since it not envisaged here as practical to move an unwieldy object into a souterrain, unless during this was performed during the site's construction.

The boats which are preceded by a '\*' are from the same stratigraphic level as the material which is the source of the dates. These original uses are contemporaneous with, or pre-date, the dates specified from the sites.

†The dates accompanying the Buston boats were obtained from materials from various phases or contexts if the crannog. Mowat (1996: 23-4) notes no relationship between them and the boats.

Where neither the logboats nor crannogs have been dated, all that can be said is that the logboats date to within the period(s) of occupation of the crannogs or pre-date their construction. It must be stated that the source of the dating material for the crannogs may be different from that of the boats.

#### **4.2.4 Synthesis of the Absolute Dates**

Although just 8% of both Irish and Scottish logboats have been dated, Figure 4.1 shows that there is a definite tendency for the Irish dated logboats to be concentrated within particular periods, between 5400 and 2700BC, 300 and 700AD, and 1300 to 1700AD. The seven Scottish boats are more evenly distributed. Since such a small number of Scottish logboats have absolute dates, they may not be representative of the Scottish series.

If the Irish dates are considered to be representative of all Irish logboats, then there are three periods of logboat use. Since such a low number of boats have been dated, this can not be considered to be representative of the period of logboat use. Those boats dated to between 1300 and 1700 AD are from the period to which the majority of literary accounts refer. The literary accounts do not correspond geographically to the dated boats' distribution. Most of the literary accounts do not specifically set about to record logboat use (Section 3.1 para 1-2).



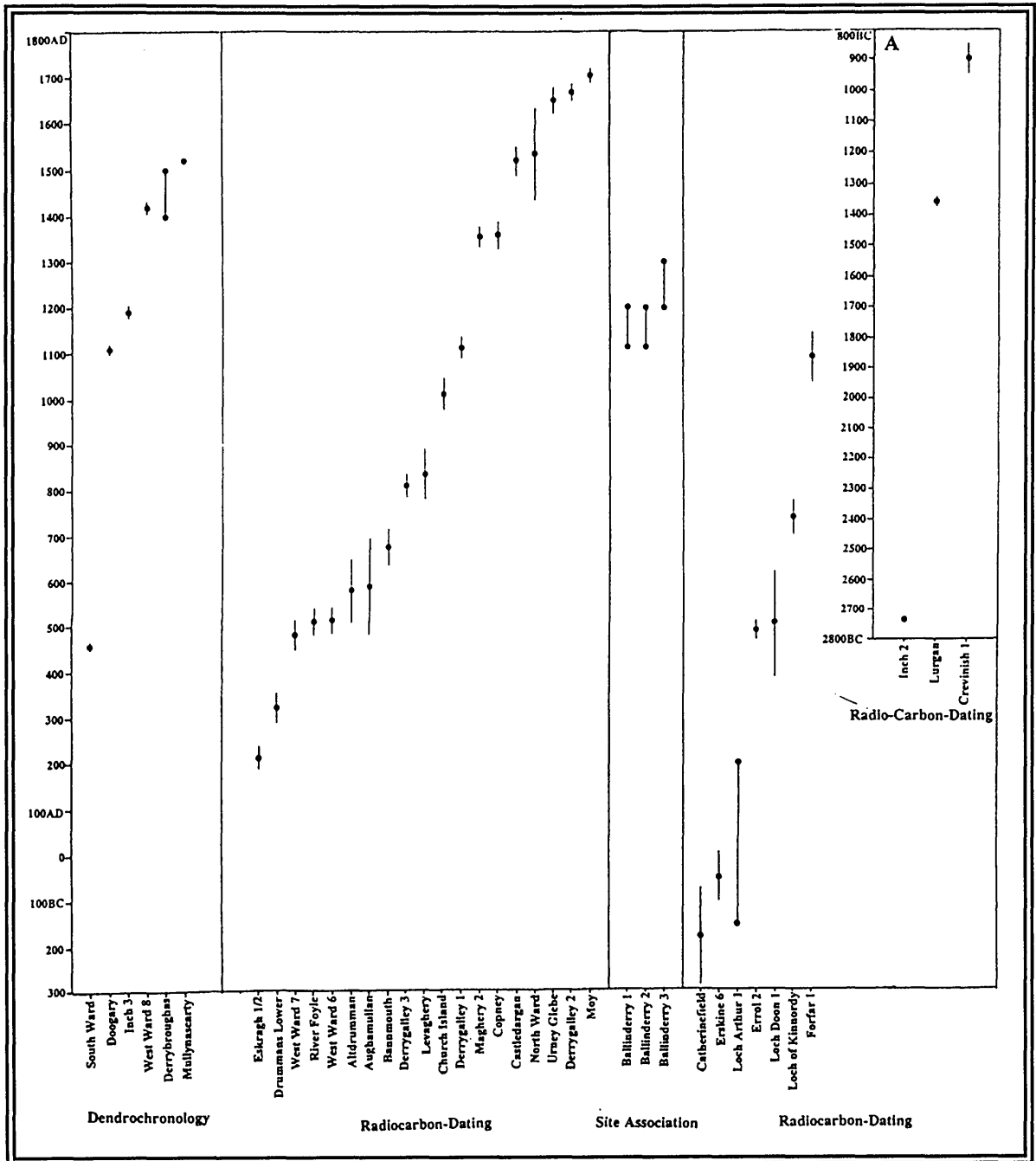


Figure 4.1: Logboats which have absolute dates. Inset A presents the radiocarbon-dates for Inch 2, Lurgan and Crevinich 1

The available evidence does not suggest that these date concentrations are representative samples of all logboats. It is believed that because of the logboats' versatility that is inherent in their differing designs, they were used consistently throughout the entire spectrum of their range of dates. If more logboats were dated, there might be fewer gaps in the record of dates.

Four logboats have recently been dated. All of them have very early dates. The earliest, from Brookend (Co. Tyrone) has been calibrated to  $5407\pm69$  BC (UB 4066). The other three, from Carrigdirty Rock (Co. Limerick), Ballylig 1 and Ballylig 2 date to 4800BC (O'Sullivan: *pers. comm.*),  $3507\pm121$  BC (UB4067) and  $3519\pm63$  BC (UB4091), (Fry, *pers. comm.*). Other early logboats may already have been found, but have yet to be dated.

#### **4.3 RELATIVE DATING METHODS**

##### **4.3.1 Artefactual Association**

To date a boat by association with an artefact is unreliable. If an artefact is recovered from beside or near a boat, they may have been deposited at different times in completely unrelated circumstances. Similarly, if a dateable artefact is found in a boat it may bear no relationship to the boat since it may have been deposited at a later date. For example, an Early Bronze Age artefact may be recovered from a logboat which has been independently dated to the fifteenth century AD.

An exception to the above is Brockish, Lough Neagh. A Mesolithic flint core is associated with the logboat. It is uncertain whether the core was found in or near it (Woodman, 1978: 246-7, 337-9). If it was recovered from the boat it would certainly prove a Mesolithic date for the boat, since the first migrants to Ireland arrived in the Mesolithic period. However, because of the questionable data, this possibility has been discounted in the present study.

##### **4.3.2 Association with an Archaeological Settlement Site**

Twenty-eight Irish and twelve Scottish boats have been found within 1km of an archaeological or historical settlement site, which are situated on or close to the shoreline. A further nineteen Irish and twenty-eight Scottish boats have been found near an archaeological site (within 300m of the site). It cannot be assumed that any of these boats were contemporaneous with the site. Of these boats, ten Irish and twenty-eight Scottish have had their nearby sites dated. Some of these dates are very unreliable.

Table 4.4: Logboats within 1km of dated sites

| Boat             | Boat Date | Site Type             | Site Date              | Reference                        |
|------------------|-----------|-----------------------|------------------------|----------------------------------|
| Ireland          |           |                       |                        |                                  |
| Brockish         |           | 'Archaeological Site' | Mesolithic-Neolithic   | Woodman, 1978: 246-7             |
| Castlefreke      |           | Tower House           | 14th century AD        | SMR 143-74                       |
| Church Island    | 1010 AD   | Island Church         | 1129-1788 AD           | SMR: 042-014                     |
| Coolbuck 1       |           | 5 Crannogs            | 1 Crannog: 1595 AD     | SMR: 212-066                     |
| Coolbuck 2       |           | 5 Crannogs            | 1 Crannog: 1595 AD     | SMR: 212-066                     |
| Coolbuck 3       |           | 5 Crannogs            | 1 Crannog: 1595 AD     | SMR: 212-066                     |
| Downpatrick      |           | Abbey & Monastery     | 900-1400 AD            | SMR: 037-050                     |
| Inch 1           |           | Abbey & Monastery     | 900-1400 AD            | SMR: 037-050                     |
| Inch 2           | 2739 BC   | Abbey & Monastery     | 900-1400 AD            | SMR: 037-050                     |
| Inch 3           | 1188 AD   | Abbey & Monastery     | 900-1400 AD            | SMR: 037-050                     |
| Scotland         |           |                       |                        |                                  |
| Cambuskenneth    |           | Abbey                 | From 1147              | NMRS: NS89SW4                    |
| Carlingwark Loch |           | 3 Crannogs            | 2 Crannogs: 'Iron Age' | NMRS: NN02SE16<br>NMRS: NN02SE18 |
| Closeburn        |           | Tower House           | 14th Century           | NMRS: NX99SW1                    |
| Eadarloch        |           | Crannog               | 16th or 17th Century   | NMRS: NN40SE1                    |
| Loch Ard         |           | Abbey                 | 1191 to post 1600 AD   | NMRS: NN40SE1                    |

Table 4.4 (continued): Logboats within 1km of dated sites

| Boat           | Boat Date | Site Type                      | Site Date                    | Reference         |
|----------------|-----------|--------------------------------|------------------------------|-------------------|
| *Loch Doon 1   | 509 AD    | Castle                         | Medieval to<br>post-Medieval | NMRS: NX49SE12    |
| Loch Doon 2    |           | Castle                         | Medieval to<br>post-Medieval | NMRS: NX49SE12    |
| Loch Doon 3    |           | Castle                         | Medieval to<br>post-Medieval | NMRS:             |
| Loch Doon 4    |           | Castle                         | Medieval to<br>post-Medieval | NMRS: NX49SE12    |
| Loch Doon 5    |           | Castle                         | Medieval to<br>post-Medieval | NMRS: NX49SE12    |
| Loch Glashan 1 |           | Crannog & Island<br>Settlement | 500-850 AD &<br>Medieval     | NMRS: NH45NE7     |
| Loch Glashan 2 |           | Crannog & Island<br>Settlement | 500-850 AD &<br>Medieval     | NMRS: NH45NE7     |
| Loch Kinord 1  |           | Crannog & Island<br>Castle     | Castle: 1335-<br>1648 AD     | NMRS: NO49NW 17   |
| Loch Kinord 2  |           | Crannog & Island<br>Castle     | Castle: 1335-<br>1648 AD     | NMRS: NO49NW 17   |
| Loch Kinord 3  |           | Crannog & Island<br>Castle     | Castle: 1335-<br>1648 AD     | NMRS: NO49NW 17   |
| Loch Kinord 4  |           | Crannog & Island<br>Castle     | Castle: 1335-<br>1648 AD     | NMRS: NO49NW 17   |
| Loch Laggan 2  |           | Island Settlement              | Medieval                     | NMRS: NN48NE1     |
| Loch Laggan 3  |           | Island Settlement              | Medieval                     | NMRS: NN48NE1     |
| Loch Laggan 4  |           | Island Settlement              | Medieval                     | NMRS: NN48NE1     |
| Loch of Leys 1 |           | Crannog                        | 1323-1550 AD                 | NMRS: N079NW2-3   |
| Loch of Leys 2 |           | Crannog                        | 1323-1550 AD                 | NMRS: N079NW2-3   |
| Loch Urr       |           | Island Settlement              | Medieval                     | Corrie, 1928: 292 |

Table 4.4 (continued): Logboats within 1km of dated sites

| Boat        | Boat Date | Site Type        | Site Date            | Reference      |
|-------------|-----------|------------------|----------------------|----------------|
| Lochmaben 1 |           | Crannog & Castle | Castle: 1200-1400 AD | NMRS: NY08SE8  |
| Lochmaben 2 |           | Crannog & Castle | Castle: 1200-1400 AD | NMRS: NY08SE8  |
| Morton      |           | Castle           | 1260-1715 AD         | NMRS: NX89NE16 |
| White Loch  |           | Tower House      | Medieval             | NMRS: NX16SW17 |

The dates of sites within the vicinity of logboats do not provide indicators of the period in which specific logboats were used. It can only be noted that there are sites near waterways that were once used by logboats. The one tentative association is Inch 3, whose date is within the period of habitation of a nearby ecclesiastical site. The available evidence does not prove any association between the two.

Table 4.5: Sites which have been dated and where logboats have been found on or adjacent to them.

| Boat            | Site Type     | Site Date         | Reference                 |
|-----------------|---------------|-------------------|---------------------------|
| Ireland         |               |                   |                           |
| Ballycally      | Island Castle | 13th Century      | SMR:110-004               |
| Church Island 1 | Island Church | 12th Century      | SMR:015-094               |
| Church Island 2 | Island Church | 12th Century      | SMR:015-094               |
| Church Island 3 | Island Church | 12th Century      | SMR:015-094               |
| Derryhollagh    | Crannog       | 'Bronze-Iron Age' | SMR:049-012               |
| Dunshaughlin 2  | Crannog       | 'Iron Age'        | Wood- Martin 1886:<br>204 |
| *Eskragh 1/2    | Crannog       | 650-400 BC        | SMR:054-031               |
| Levallinree 1   | Crannog       | 610 AD            | Q7885                     |
| Levallinree 2   | Crannog       | 610 AD            | Q7885                     |
| Levallinree 3   | Crannog       | 610 AD            | Q7885                     |

Table 4.5 (continued): Sites which have been dated and where logboats have been found on or adjacent to them.

| Boat          | Site Type         | Site Date    | Reference      |
|---------------|-------------------|--------------|----------------|
| Scotland      |                   |              |                |
| Carn an Roin  | Crannog           | 1200-1300 AD | NMRS: NN02SE11 |
| Loch Laggan 1 | Island Settlement | Medieval     | NMRS: NO49NW17 |
| Lochlea 1     | Crannog           | 850-1500 AD  | NMRS: NS43SE5  |
| Lochlea 2     | Crannog           | 850-1500 AD  | NMRS: NS45SE5  |

\*Both Eskragh 1 and 2 (Section 4.2.2 para 3) were found adjacent to a crannog whose construction has been dated to 650 to 400 BC. (Williams, 1978: 37-9). However, it is not specified which boat was dated. The stated date is 215±25 BC. Although the date is not contemporaneous with the crannog's construction, it does not mean the boat was not contemporary with the period of the crannog's occupation

It may be stated that the logboats listed in this table are less indirectly associated with the archaeological sites than those in Table 4.4. This could apply to the three boats from Church Island, Co. Sligo. These boats were found on the foreshore of the island, on which the only site is a twelfth century church. However, these logboats may have been deposited on or beside the site a considerable time after the site was finally abandoned.

### 4.3.3 Geological Dating

Two Scottish logboats have been dated geologically, Friarton and River Carron. The Friarton boat was recovered from the River Tay, about 6.6m below OD, which according to Mowat (1996, 36) 'suggests that the area was inundated at a relatively late stage, probably in the later centuries of the 8th Millennium BP'. The logboat was, however, recovered from 'beneath the carse clays...on a thin peat-bed under 10 feet of estuarine silt' (Clark, 1969: 109). McGrail (1978, i: 160) notes that Geikie (1879) examined the boat after it was removed from its original position and was shown the location by the Friarton Brickworks Manager. As a result its exact stratigraphy may be called into question.

The logboat from the River Carron was found in carse clay from the marine transgression between 6000 and 4000 BC (Morrison, 1980: 104; Mowat, 1996: 77). However, its location was not precisely recorded.

Mowat notes twelve other logboats that were found 'deep in a deposit', and a further two found in a high river terrace which indicates their 'high antiquity'. The twelve are; Dingwall; Falkirk; Glasgow, London Road; Glasgow, Old St. Enoch's Church; Glasgow, Springfield 1-5; Glasgow, Tontine; and Glasgow, Yoker 1-2, (Mowat, 1996: 136). No dates were recorded.

#### **4.3.4 Dating by Pollen Analysis**

One boat from Scotland, Kilbrinie Loch 4, has been dated by pollen analysis to between 3000 and 700 BC. Mowat points out that the surrounding soil samples probably date 'from the Sub-Boreal period on the basis of analysis of the organic remains found in interstices'. He stresses that the 'surrounding sedimentary environment rather than the boat itself was analysed' and so this date must be treated with caution (Mowat, 1996: 136).

### **4.4 DATING BY FEATURES**

Further methods have been used to date logboats: dating by tool marks; dating by 'modern' features on the boats; and evidence for metal fixtures. Since these methods either cover a very broad range of dates or evidence of them does not survive, they are at best circumstantial, and hence point to their limited value as dating tools.

#### **4.4.1 Dating by Tool Marks**

Nineteen Irish and fourteen Scottish boats have tool marks recorded on them. However, most of them are very worn and/or have been examined by archaeologists with insufficient knowledge of tool mark analysis. When tool marks are noted, the accounts often omit the signature blade lengths,

the depth of the mark, and its location, which could indicate the type and period of the tool. As a result they are very unreliable indicators of age.

#### 4.4.2 Dating by 'Modern' Features

Mowat lists certain features which he suggests indicate 'possible derivations from plank-built boats of recent or modern type' (Mowat, 1996: 137). However, the archaeological evidence from both the Irish and Scottish logboats does not indicate the features as being of possible 'modern' origins. He also cites 'snout-like' bows and 'cutwater prows' as modern derivations from plank-built boats. The features may be derivations of plank-built boats. If they have no apparent functional values they may simply be skeuomorphic features. The following date-ranges from the Irish and Scottish boats in Table 4.7 questions the features' reliability as a method of dating them to a 'modern' period.

Table 4.6: List of features cited as being 'modern' and accompanying independent dates.

| Features        | Earliest Date                  | Latest Date             |
|-----------------|--------------------------------|-------------------------|
| Keelson         |                                |                         |
| Irish           |                                |                         |
| Scottish        |                                |                         |
| Ribs            |                                |                         |
| Irish           | 1350±30 BC (Crevinish 1)       | 1520 AD (Mullynascarty) |
| Scottish        | 3000-700 BC (Kilbrinie Loch 4) | Pre 600 AD (Buston 3)   |
| Rowing          |                                |                         |
| Irish           |                                |                         |
| Scottish        |                                |                         |
| Running Strakes |                                |                         |
| Irish           |                                |                         |
| Scottish        |                                |                         |



Table 4.6 (continued): List of features cited as being 'modern' and accompanying independent dates.

| Thwart Rests                |                               |                         |
|-----------------------------|-------------------------------|-------------------------|
| Irish                       | 510±30 AD (River Foyle)       | 1750±15 AD (Moy)        |
| Scottish                    | 485±40 AD (Errol 2)           | Pre 600 AD (Buston 3)   |
| Transoms or Transom Grooves |                               |                         |
| Irish                       | 905±50 BC (Crevinish 1)       | 905±50 BC (Crevinish 1) |
| Scottish                    | 150 BC-200 AD (Loch Arthur 1) | Pre 600 AD (Buston 3)   |
| Sailing                     |                               |                         |
| Irish                       | 905±50 BC (Crevinish 1)       | 905±50 BC (Crevinish 1) |
| Scottish                    | No examples                   | No examples             |

The above table lists the features and shows the dates ascribed to them by other means such as radiocarbon-dating and dendrochronology. None of them can be considered to be relatively modern. Keelsons, ribs, strakes, and transoms are found in boats of all types from antiquity. Evidence of rowing and sailing are seen as early as the first century BC in the Brighter boat model (Section 3.4 para 7-9).

#### 4.4.3 Metal Fixtures

A final method that has been used to give a logboat a broad date range is evidence of metal attached to the boat. With the exception of Glasgow, Clydehaugh 2, (Scotland), which had a lead repair patch in it, all other boats listed have iron fixtures (Section 8.8 para5-7). Thirteen Irish and one other Scottish boat had iron nails in them. These iron fixtures indicate a date between the Iron Age and the final phase of logboat use. The Irish boats are Annagh, Ballyhaunis 1, Clooncunmy 2, Derrya 1, Derrya 3, Derrymore, Kilturbid, Lough Elia, Stradone 2, Tumna, Whitewood 2, and Whitewood 3. The Scottish boat is Loch Chalium Chille in which the nails secured five iron rings. Lea Shun, Scotland has a recessed metal binding strap which may be the result of modern conservation work (Mowat, 1996: 50).

The date range is too broad for the method to be used realistically. It covers a period of *circa* 3000 years, at least half of the overall period in which logboats were used.

#### 4.5 PERIOD OF USE OF LOGBOATS

The literary evidence (Section 3.2.1 para 6-7) shows that logboats were in use to within at least the first half of the eighteenth century in both Ireland and Scotland (Joass, 1880: 179-80; MacCracken, 1971: 63). This period of use can be verified loosely by the archaeological evidence in Ireland. A boat from Moy has been radiocarbon-dated to  $1705 \pm 15$  AD. The next latest dates are  $1665 \pm 20$  AD, (Derrygalley 2,) and  $1640 \pm 30$  AD (Urney Glebe). The earliest dated Irish logboat is Brookend at  $5407 \pm 69$  BC. This provides an overall known range of nearly 7,100 years. When this evidence is combined with the literary evidence, the range of known logboat use is continued up to 1796.

The earliest dated logboat in Scotland may be the Friarton logboat, possibly dating from the later centuries of the sixth millennium BC. The next two possible earliest dates are from Kilbrinie Loch 4 which may date to between 3000 and 700 BC and River Carron which may date to between 6000 and 4000 BC. However, the three dates are problematical. The next earliest date is Catherinefield which dates to the  $180 \pm 125$  BC.

The most recently dated boat is Forfar 1, which dates to  $1090 \pm 50$  AD. Because of the ambiguity of the Friarton, Kilbrinie Loch and River Carron dates, they are not considered to be accurate indicators of age. As a result the archaeological evidence gives a range of thirteen hundred years. The evidence from historical sources (Section 3.2.1 para 6-7) could extend it to approximately two thousand years.

#### 4.6 THE CESSATION OF LOGBOAT USE

Section 3.2.1 para 6-7 shows that logboats were still used during the last century in several countries in continental Europe. This section examines the factors contributing to the end of use of logboats in Ireland and Scotland.

During the eighteenth century, deforestation resulting from the development of timber based industries, which had started during the previous century, appears to have been the primary cause of the end of logboat making. Maddock (1971: 15) notes that in 1600 'about one-eighth of Ireland was forested' but by 1800, this figure was 'reduced to a fiftieth as a result of commercial exploitation'. Mitchell (1986: 183-4) says that 'throughout the seventeenth century the number of...[barrel]...staves produced in Ireland rose steadily and over-production led to exhaustion of supply. After 1770 all needed staves had to be imported'. He states that the destruction of the woodlands was so complete that timber products had to be imported in volume for the first time.

Rackham (1980: 6) has noted a similar situation in Britain, but not to such a severe extent. Mowat (1996: 129) notes that 'similar...factors were probably important in Scotland where logboat construction was probably already constrained by the absence of extensive tracts of deciduous, and specifically oak, woodland across most of the North and West of...' Scotland. He also states that Argyll 'might be expected to have been a major area of logboat use on account of its climatically-determined woodland...', but was rapidly denuded in the late 18<sup>th</sup> century due to the charcoal industry'.

Evans (1957: 241) states that 'as the country...[Ireland]...lost its forests it must have become difficult to obtain trees of the right size and kind, especially oak, for boat-making, and by the eighteenth century, it seems, plank boats retaining some features of the dug-out were substituted', i.e. cots. Lucas (1963: 66) considers that logboats may have continued 'until well into the eighteenth century in certain locations'. He equates the demise of logboats, not through lack of efficiency of construction when compared with other boats, but with the loss of forests.

McCracken (1971: 63) also states that 'with the passing of the great trees...[logboats]...ceased to be made and they were succeeded with the conventional plank and rib boat'.

The tradition of the plank-built cot, which was similar to the logboat in proportion, probably commenced at about this time (Tighe, 1802: 150; Evans, 1957: 242). This tradition still continues in Co. Kilkenny (Nolan, *pers. comm.*). One of the primary reasons for the success of the substitute for logboats was probably that use could be made of more of the tree in making a plank-built cot.

Plank-built and other types of boat would have been continuously in use throughout the period of logboats. More plank-built boats than logboats could be made from the same number of trees, since logboats use the entire tree trunk and leave a lot of wasted material. The increasing scarcity of wood as a natural resource and the lack of efficiency in logboat construction were central to its demise.

It is interesting to note that the forests surrounding the Shannon, Blackwater (Munster), Bride, Nore, Suir, and Barrow Rivers were amongst the first in Ireland to be denuded (Section 11.5.1 para 5) and they are also the same rivers where the tradition of plank-built cots is strongest (Boate, 1652: 37; Evans, 1957: 242; Maddock, 1990: 545). This reinforces the view that logboats fell out of use as a result of the disappearance of forests. As this happened, it is possible that logboat construction became too expensive on account of the amount of material wastage in their making. If this were the case, the areas where logboats were made would have contracted slowly to small pockets where there was locally available material.

## CHAPTER 5

### LOGBOAT CONSTRUCTION

#### 5.1 LOGBOAT BUILDING

Ethnographic evidence indicates a variety of techniques by which logboats were made. A large proportion refers to expanded or extended logboats (both of which are developments of the basic non-expanded logboat, Section 2.1 para 3-4, 7).

The study of ethnographic material, such as that dealing with traditional skills, may provide useful knowledge of the continuity of techniques from the earliest times. However, for various reasons, different techniques were established, developed, and continued in their own limited geographical environments. Extrapolation of the results of studies between different countries could be unsound and misleading.

The archaeological evidence suggests that predominant tree species used in Ireland and Britain for logboats was oak, while most of the ethnographic records are from places which have climates unsuitable for oak. The softer wood species used in those countries led to the development of different building methods than those used with the hard woods such as oak. Therefore, in the current study, these records are of limited value. These accounts (e.g. Lothrop, 1932, Hornell 1938 and Hurault 1970) all noted that the tree trunks were hollowed by controlled fire. Fire was not used to hollow logboats made from hard woods (Section 12.6.1 para 4). Ellmers' studies (1973: 25-35), referring to the constructional methods used for German oak logboats, are based on the remains of three unfinished boats and on one boat which was built in the Mondsee in 1965.

The logboats' features which relate directly to construction (i.e. those that were cut in the solid or incorporated in them as composite parts) are examined in Section 5.4.

## 5.2 LOGBOAT BUILDING SEQUENCE

The following is an account of the manner in which logboats were constructed based on the available evidence of distinguishing patterns of logboat remains. Accounts of recent logboat constructions are discussed in Section 5.3.2 and in greater detail in Chapter 11.

### 5.2.1 Tree Selection

McGrail (1978, i: 28) suggests that the choice of tree species depends on its local availability; suitability of a specific tree trunk for boat manufacture is another determinant. A knot-free log would be of great value, since this would eliminate areas of weakness in the finished boat. In the Irish archaeological record alder, oak, and poplar are the tree species recorded as used to make logboats. Lucas (1963: 60) notes that in 1517 AD, a logboat made from beech was used in Lough Derg, County Donegal. However, this is not a native species, and the stated date predates the known date of introduction of beech to Ireland (Section 11.5.1 para 6). In Scotland logboats made from both oak and scots pine have been recovered. The more favoured of the two is oak.

Other requirements for suitable logboat material are proximity to water, straightness of bole and grain, and the purposes for which the boat would be employed, i.e. the size of boat to be built determines the required size of trunk. A builder would not choose a large trunk from which to make a small boat. The available evidence shows that in almost all circumstances sapwood and bark was removed and the boat made from the heartwood. One Scottish (Littlehill) and two Irish boats (Altdrumman and Mullynascarty) are recorded with sapwood in small quantities. Littlehill also had traces of bark. To make a small boat from a large trunk, an unnecessary amount of labour would be required in removing a greater amount of wood than required if a smaller trunk were used (Section 5.2.3 para 1-3). An otherwise unnecessarily large trunk would be used, only if the builder chose to use a wind-fallen tree to avoid the initial process of felling, or if no more suitable ones were available. It is probable that the process of making a logboat commences during winter. There is no leaf cover on the prospective tree or the surrounding ones, which could at other times obstruct its examination for suitability. The absence of foliage makes it easier to determine the side

of the tree on which the crown is weighted, and therefore the easier felling direction. An additional advantage is that the true shape of the trunk with its attendant knots and branches can be discerned.

The builder(s) can then decide the part of the trunk they wish to hollow, and the part to retain. Presumably the side containing most knots and branches would be hollowed, since these indicate areas of weakness where the wood would split causing the finished boat to leak.

As the wood dries, cracks appear along the grain which, if left untreated, become splits through the wood. During the winter, the cooler weather alleviates the rate of drying significantly.

At ground level, as there is less growth on the forest floor in winter, so less clearing is necessary to make a work area prior to felling the tree. A further advantage of making a logboat during the winter is that the working environment is more pleasant for the arduous physical work, due to the cooler weather. There may also have been more time available if less work was being devoted to agricultural activities.

### **5.2.2 Preparation of the Log**

Once a suitable tree had been selected and felled, it was cut to the appropriate length. Excess timber such as branches were removed. However, Ellmers (1973: 4) suggests that some branches were retained to prevent the log from rolling during construction. Wedges were also used to prevent movement of the log.

Oak and scots pine boats required unseasoned or green logs for their construction. Alder is an unsuitable species for logboats. It is suggested that the boat from Derrybrusk was made from alder due to a lack of suitable local species (Section 11.3 para 6 and Table 11.2).

Sap and high moisture content limit the rate at which wood hardens: this would make it more pliable and also reduce radial splitting through shrinkage. Radial splitting causes problems with leaking once the boat has been made. The period during which a log may be used to construct a

logboat is approximately six months after felling. During this period it remains sufficiently fresh and pliable. Later, the use of hand tools to make a boat from the hardened wood would be an increasingly difficult task.

### 5.2.3 External Shaping

In both Ireland and Scotland the available evidence suggests that the external shape of the proposed boat was made first. After completion, further refinement of the external shape may have taken place. However, due to the weight of the wood and the relative thinness of the sides (as little as 2 cm), it is unlikely that the boat would have been rolled over once it had been completely hollowed without internal bracing, since this would cause the sides to crack. Shaping the hull would have been done either by eye and/or by defining the outline with charcoal or a similar material. In all cases the desired external size of the boat was limited by the original size of the log.

Since sapwood is much softer than the internal heartwood it is more susceptible to rot, and should therefore be removed to ensure a long life for the logboat. However, available evidence shows that this was not always the case. Sapwood thickness can vary on different sides of the parent log. If the hull is shaped externally first, the excess sapwood can be removed and the builder will know by how much to hollow out the log. The sapwood is easily identified because of its lighter colour. Being softer than the heartwood it is easier to remove.

If the hollowing was done first, the builder might have no choice eventually but to use sapwood in the hull, or worse, to discard the boat, as he might have removed too much heartwood. However, the archaeological record shows that in certain instances the maximum girth possible proved more important than a lengthy life span of the boat. Such examples are evident in Altdrumman (Figure 5.1) and Mullynascarty (Figure 5.2) in Ireland, and Littlehill and Loch Doon 1 in Scotland, where patches of sapwood are still discernible on the hulls' exterior, in particular, where there is a rough outline to Mullynascarty's starboard exterior.



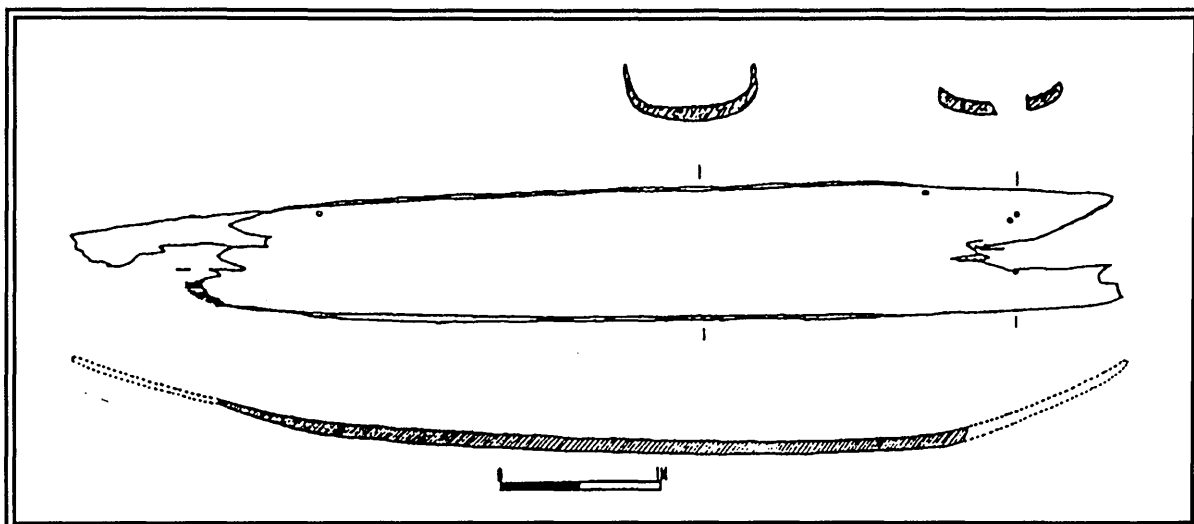


Figure 5.1: Altdrumman (after Bourke).

In the case of the Mullynascarty logboat, large sections of the hull up to 1m in length, at the turn of the bilge, are composed of sapwood for its entire thickness, as well as along parts of its sides. Size was apparently a priority overriding other considerations such as robustness and durability in the manufacture of this boat.

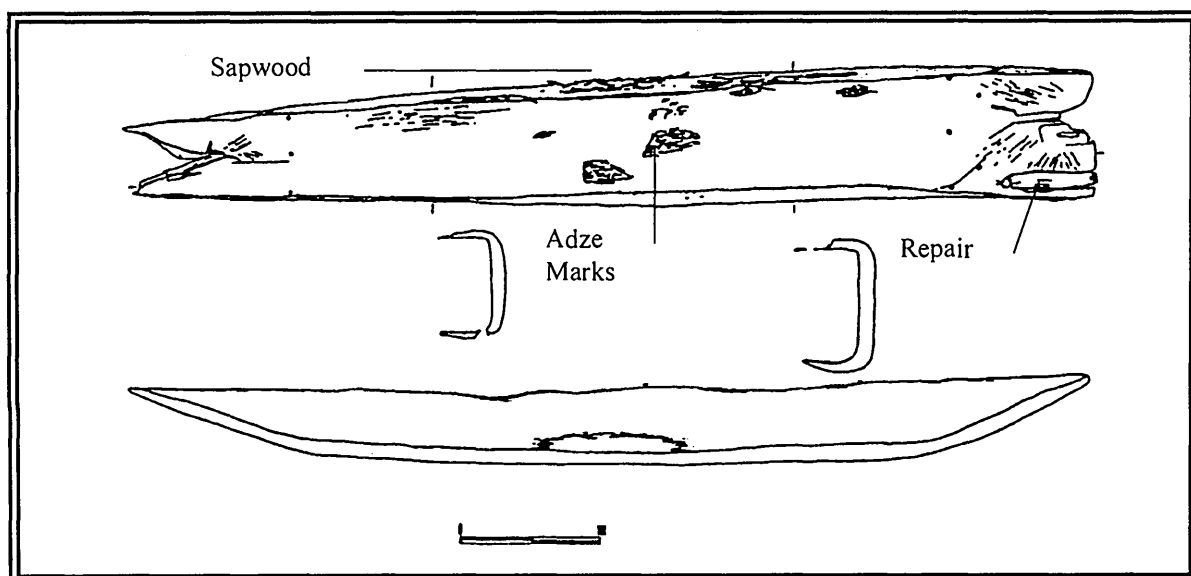


Figure 5.2: Mullynascarty.

The use of tumblehome (where the outer surfaces of the gunwales curve inwards close to the sheerline from using the maximum amount of the log), such as on Loch Doon 1 (Scotland),

enables the maximum height of boat to be made from the log, and thereby achieves increased height and freeboard.

#### **5.2.4 Tools**

The tools employed in boat building were axes, adzes and in some instances drills or wood augers. Eighteen Irish and twelve Scottish boats have been noted as retaining tool marks. These marks are too worn to be identified in eight of the Irish and six of the Scottish boats. With the exception of Loch Doon 3 and Springfield 5 in Scotland, and Headford in Ireland, all the marks are located on the inside of the boats.

Only three of the Irish and four of the Scottish boats' marks were in sufficiently good condition for their signature lengths to be recorded. Crevinish 1 (Ireland) has a signature axe-blade length of 7.5cm, and an adze-blade signature 4cm long. Doon 2's (Ireland) axe signature was recorded as 14cm long. All recorded adze marks are between 3 and 4cm in length. The Irish Times (21 June, 1932) noted that the Headford logboat had the inscription 'IVII' carved into the bow. The significance of this is not known.

#### **5.2.5 Hollowing**

Both Hornell (1938: 47) and Salmonsson (1957: 294) state that the exterior of the boat was shaped prior to hollowing. However, Ellmers uses evidence from his unfinished boats from which he suggests that the interior was hollowed first. McGrail (1978: 31) suggests the possibility of two distinctive 'approaches to logboat building; external first; and internal first'. He also suggests a compromise situation, in which both internal hollowing and external shaping could have taken place on the site where the tree was felled, in order to reduce deadweight and facilitate transportation to the launch site. The latter may indeed be possible. However, Section 5.2.3 shows that a process of primary external shaping is favoured here, and is substantiated by the archaeological evidence.

In order to hollow the log, the remaining outer trunk, after external shaping, is removed by a technique of scoring and splintering (Goodburn: *pers. comm.*), in which an axe is used to cut V-shaped grooves in the timber at regular intervals along the log. Wedges of wood and/or metal are then hammered into the log along the grain at appropriate points where excess wood can be removed in large pieces with a minimum of effort. This process produces a flat surface of timber which is flush with the intended gunwales. Plate 5.1 shows the excess wood being removed from the Loch Doon 1 Replica (Section 12.6.1). Christensen (1990: 136) cites evidence for this method from a half-finished Bronze Age logboat from Germany, in which a wooden wedge was found jammed into the base of the boat.



*Plate 5.1: Loch Doon 1 replica under construction.*

The thickness of the sides and ends are then outlined with charcoal or a similar material. The score and splinter process is resumed using an axe within the enclosed area. The wood between the scores is then split off, using the axe to cut out the intermediate sections of wood along the grain.

This process is repeated continually until the log has been sufficiently hollowed out to the required thickness of the bottom and sides. An adze is then used to finish or tidy up the hollowing process. Recorded ethnographic parallels such as Greenhill, (1971: 111), Hornell, (1948: 47), and Rasmussen (1953: 25-6), note the use of fire combined with tools to facilitate the hollowing process. Although Ellmers (1973: 27) does not cite his evidence, he has stated that an unfinished boat from Austria was hollowed with the use of fire. McGrail (1978, i: 32) notes that the fire is 'normally lit on top of the area to be hollowed', whether the fuel was resin or wood, and was constricted by sprayed water or by applying wet clay. However, such a process was not used in the Irish and Scottish examples, since fresh hardwoods will not burn (Section 12.6.1 para 4). Christensen (1990: 136) says there is no evidence for the use of fire in hollowing the Danish logboats.

#### **5.2.6 Intermediate Stage**

McGrail (1978, i: 33-4) notes, from the ethnographic accounts, an intermediate stage in which unfinished boats were stored under water until they were to be completed. They were retained underwater by being loaded with stones, or by securing them between posts. There are two definite and two possible instances of boats kept underwater in Ireland, and none in Scotland. These are Ardsallagh, Church Island 1 (Co. Sligo), Cormongan, and Clonlisk, where the first two were weighed down by stones, and the latter two were held by posts. Since they were completed logboats, the posts may actually have served as mooring posts. Three unfinished boats and a possible fourth, Loch Doon 1, Scotland and Inch 2, Kinnegoe and Lurgan from Ireland, had their hulls externally completed while their interiors were unfinished. In all cases there was no evidence of any manner of retaining them underwater for future retrieval. The Lurgan boat was recovered from a bog (previous lake), where it may have been deposited for future retrieval.

If Irish or Scottish logboats were retained in an unfinished condition underwater, they were few in number or are yet to be recovered. Those logboats stored underwater were probably put there with the intention of keeping them in a moist environment to prevent drying-out until their services were required. Another possibility for the use of stones found in the boats would be as ballast to

increase their stability. The more weight in the bottom of the boat, the lower is its centre of gravity compared to its centre of buoyancy. While this would tend to lessen the available freeboard, it would increase its stability (Sections 13.8.2 and 13.8.3). Stones may have been used as anchors, although no evidence for materials by which they may have been attached to the boats remain.

Since the wood can dry out quickly during construction, the builders may have filled the boat with water at the end of each day's hollowing. This would prevent splits from occurring along the grain and keep the wood fresh and pliable.

### **5.2.7 Preservation**

McGrail cites several methods of preserving logboats, from ethnographic sources, which are of some value, since these processes rarely survive in the archaeological record. The methods mentioned are by charring and rubbing oil on the hull to prevent splitting. This acts also as an insect repellent (Eskerod, 1970: 74-5; Lane-Fox, 1875: 404; McGrail, 1978, i: 34). Other methods cited are the use of beeswax in Ecuador, tar in Hasselo, oil in North West America, sandstone or coral stone rubbing, and animal fats. Most of the above processes leave no trace. A mop-head was found near the six logboats from Loch Doon, Scotland. Mowat (1996: 56) has noted the suggestion that it was used for 'spreading pitch on the logboats'.

Probably the most commonly available and easily applied preservative would have been animal fats or oil. Unfortunately, evidence for it does not survive in the archaeological record. Dixon (*pers. comm.*) will be excavating a logboat from Croft-na-Caber, Loch Tay. He intends to establish if traces of preservative material remain on the boat's undisturbed bottom.

### **5.2.8 Time Taken**

Various estimates of the time taken to complete a logboat have been made. This depends on the boat size, distance between the felling and launching sites, the number and skill of the manpower,

and the species of the log. Hurault (1970: 73-4), Longstaff (1930: 261), Paret (1930: 112) and Salemke (1972: 4) all noted the time taken to build a logboat. However, their information is of limited value since either the species of wood, or more frequently the size of the boat, was not recorded.

Logboat reconstructions can give a more accurate indication when factors of skill are considered. Christensen (1990: 140) bases his experience on logboat reconstruction when he says it takes 'two experienced boat builders' approximately one week to make a logboat. However, he states neither the tree species, the size of the boat, nor the hours worked. Goodburn and Redknap (1988: 7, 19-20) note that forty-five six and a half hour days were spent producing the 3.7m long Clapton replica from oak. They say that a skilled and fit builder would have taken approximately twenty-two person days. They distinguish between skilled workers, who would have been used to construct any number of artefacts from wood, and so would have had a substantial advantage over modern experimental logboat builders, who through lack of skill and experience would take much longer. Hence, ethnographic parallels cannot be used in the current context and such results from experimental archaeology must be treated with caution.

### **5.3 EVIDENCE OF CONSTRUCTION TECHNIQUES**

Evidence of the manner in which logboats were made in Ireland and Scotland is available from two sources, the archaeological record and logboat reconstructions (Chapter 11). Ethnographic sources have a very limited value (Section 5.1 para 1-2). There is just one elusive reference from the literary sources, in which the Brehon Laws noted that their construction did not require much technical skill (Section 3.2.1).

### 5.3.1 Archaeological Evidence

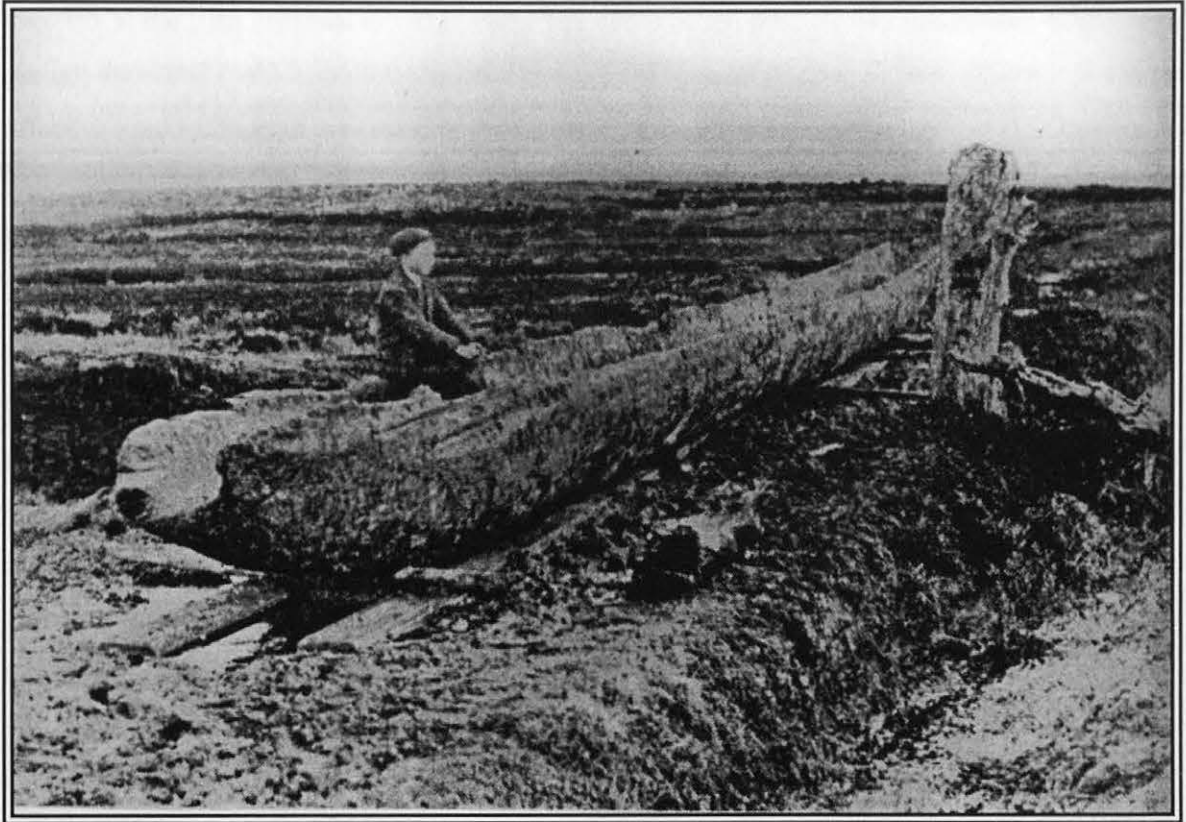
Three Irish boats (Inch 2, Kinnegoe and Lurgan) and one Scottish boat (Loch Doon 1) are in an unfinished state. Deductions from their manner of construction support the above theories about probable construction techniques.

The 2.3m long Inch 2's hull was completed externally prior to commencement of internal hollowing. Approximately two-thirds of excess internal wood remains. It was abandoned after an accident when the port side broke away 1.95m from the stern. This was probably caused by splitting the wood during the hollowing process. Clearly it shows that the hull was finished externally prior to hollowing. Again, the Kinnegoe's hull was completed prior to hollowing. The bottom is 17cm thick and its internal surface remains in a very uneven state. Internally, at the junction of the floor and the stern, and partly up the stern, are the remains of hollowing where the wood has a very hacked appearance, which suggests again that internal excess wood had not been entirely removed. Finally, the thickness of the sides varies considerably from 3 to 8cm where internal excess wood had not been removed to reduce the boat's dead-weight. Externally the sides had been completed.

The 15.24m long Lurgan boat, Co. Galway (Plate 5.2) is the largest surviving European logboat. It is made from an oak tree trunk with no extensions. While the outside of the hull was finished, the floor had not been completely hollowed. The average thickness of the floor in the stern-half of the boat is 30cm, and 17cm in the remaining half. Within 1.5m from the stern there is a large bulbous rise in the floor which is not shown. Throughout its length, the surface of the floor is very uneven with pits of 3 to 4cm in depth. An internal keelson with six integral transverse ribs (Sections 5.2.6 para 1 and 5.3.1 para 3-4) have been given various interpretations such as seat supports by Costello (1902; 57-8).

A more plausible explanation is that the large size of the parent log required it to be compartmentalised by the keelson and ridges. This process would probably have increased the control exercised by the builders while they used the score and splinter technique (Section 5.2.5 para 2-3). Attempts to split out such large sizes of wood without firstly dividing it into

compartments may cause the wood fibres to pull off the sides of the boat. The remaining 'keelson' and integral ribs are probably the residue of this adapted hollowing out process, which was never completed.



*Plate 5.2: Lurgan (Courtesy National Museum of Ireland).*

Similar to Kinnegoe, the Loch Doon 1 boat's hull is finished externally, while the floor has not been completely hollowed. The central section of the floor is 18cm thick, while it is 14cm thick by the sides. Also on the floor are the remains of at least two score marks, which show that the technique of score and splinter was applied to hollow the boat. Finally, while the exterior of the hull was finished first, a thick duck-billed like projection remains on the stern which is, in fact, excess wood from cutting the log off the tree trunk. At the time the boat was abandoned, this excess wood had not been removed.



### 5.3.2 Evidence from Logboat Reconstruction

The construction of replica logboats fills gaps in our knowledge of the manner in which they were built and shows the limited value of the ethnographic records. Two attempts were made to build logboats at the Irish National Heritage Park. The construction process was undertaken over a long period; the wood (oak) seasoned and became too hard to work (Culleton, *pers. comm.*). The most effective time for logboat construction is while the log is still in its green state.

During the reconstruction of the Clapton logboat (Section 12.5.1 para 4), animal fat and raw linseed oil were applied to the exposed surfaces of the timber (Goodburn and Redknap, 1988: 19). Lard was used on the Loch Doon 1 replica and on two experimental logboats made by the writer in Ireland in November 1994 and May - June 1995 (Sections 12.8.1 and 12.9.1). The purpose was to prevent exposure to air and consequent loss of moisture. Both of these would cause rapid drying and splitting of the wood. Areas of the Loch Doon 1 replica which had been accidentally left exposed overnight showed small cracks on the timber's outer surface (Section 12.6.1). Preservative materials would have been applied to logboats during construction and probably throughout their effective lives.

During the hollowing of the author's second experimental logboat, it was found that both radial splitting at the ends of the log and splitting along the grain were arrested by filling the boat's interior with water at the end of each day.

Flint axes were successfully used in the reconstruction of the 5.5m long Verup 1 boat from Denmark (Christensen, 1990: 136-7). However, the wood species was lime - a softer and more easily worked wood than oak or scots pine (Section 12.3.1 para 1). McGrail (1978, i: 36) says there is no direct evidence for stone tools used in constructing oak boats. He suggests that the 'easily-worked less tool-blunting species' of tree were used during the 'pre-metal age' to make boats. However, Inch 2, Ireland, which has been dated to 2739±9 BC (UB-8520) is clearly within the pre-metal age. Its wood species is oak and indicates that it was feasible to use stone tools in hardwood logboat construction. The remains of the unfinished boat's hollowed out areas also appear to be consistent with the use of stone tools, when compared to the remains from metal tools

such as in Mullynascarty (Figure 5.2). The form of the hollowed areas are certainly inconsistent with wear or erosion. In addition, the recently dated oak logboat from Brookend, Co. Tyrone, (5407±69 BC) would have been made with stone tools.

The available evidence shows that fire as a tool for either hollowing the logs or hardening and preserving the surfaces of the boat was never used in Ireland or Britain. During the construction of the Loch Doon 1 replica (oak) a fire was lit in one of the score holes in which wood was used a fuel (Plate 5.3). It was maintained for two hours. The result was that the wood was charred to a depth of only 1mm, affecting frayed wood fibres from previous axe work only.



*Plate 5.3: An unsuccessful attempt to hollow the Loch Doon 1 replica logboat with fire.*

An elaborate attempt was made to use fire during the construction of a logboat at Hillsborough Lough, 1969, with no success. The fire was maintained at a 'white heat' using a bellows which was worked by a stationary bicycle (Hutchinson, 1960: 39; Fry, *pers. comm.*). In addition,

Lawrence (1992: 35) cites Cosner (1956), whose experiments indicated that using fire to harden the wood did not increase its life-span and may have reduced resistance to abrasion.

## 5.4 CONSTRUCTIONAL FEATURES

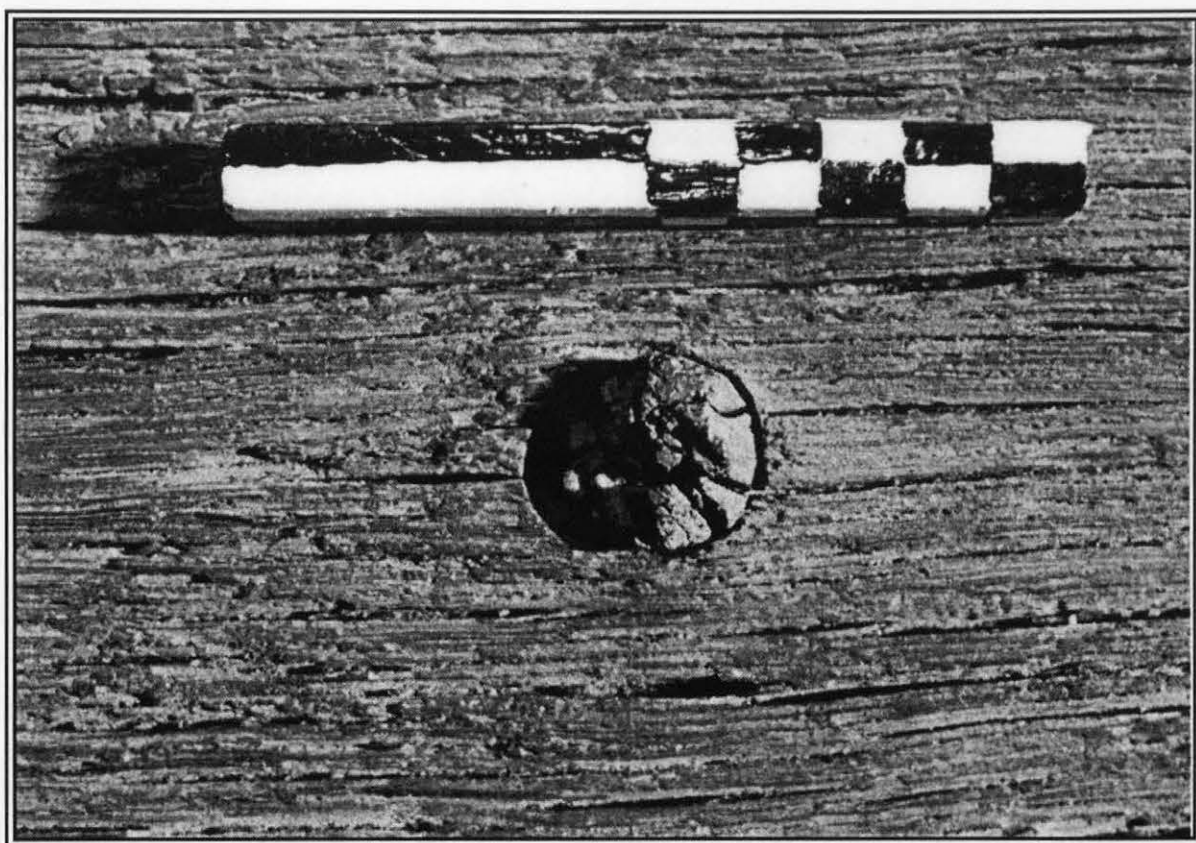
This section examines the evidence of features that are specifically associated with construction of logboats. Appendix 4 presents a list of the boats that have various features. All other features which are not an integral part of making the boat are examined in the following chapter.

### 5.4.1 Thickness Gauges

Thickness gauges were used in the construction of sixty-four (16%) of the Irish and twenty-one (18%) of the Scottish logboats. They are either drilled externally or internally to a required depth into the bottom of the hull. When, during the hollowing, the holes are encountered after they had been drilled externally, the builder ceased hollowing since the required thickness of the bottom has been met. The boat was then finished internally with an adze and the holes plugged, most frequently with a wooden dowel flush with both surfaces of the bottom. Internally, once the boat is hollowed to a sufficient depth, the holes are drilled through the bottom from the inside. Hollowing then continues until the required thickness of the floor has been met. This method would prevent possible cracking of the sides if the boat were rolled over to insert the plugs from the outside. The reason why the plugs would have to be inserted externally if the holes are drilled from the outside is that the motion of the wood auger would cause the point of entry of the hole to be wider than its exit point.

The most likely scenario is that the holes were externally drilled, since boats such as Mullynascarty have their thickness gauges penetrating the hull on the turn of the bilge (Figure 5.2). Their angles would make internal drilling extremely difficult, if not impossible. This would require some method of bracing, whereby the sides would have been supported so that they would not crack when the boat was turned over to insert the thickness gauge plugs.

Thickness gauges are located either in the floor or along the chines. They are drilled perpendicular to the outer surface of the boat. They are not necessarily transversely aligned like fitted-rib holes (Section 7.6.2), but may share the same longitudinal axis. An easily distinguishable feature of them is when the dowel plug remains its ends are flush with both surfaces of the bottom. The dowel plug from Altdrumman, Co. Tyrone, (Plate 5.4) has shrunk and partly moved from its previous position, flush with the surface of the wood.



*Plate 5.4: A plugged thickness gauge on Altdrumman*

The use of thickness gauges suggests that external shaping is the first process in logboat construction, since it is easier to gauge the required thickness from the outer surface once it is completed, than hollowing first and shaping the outside afterwards. This would suggest that some form of bracing of the sides was used when the boat was rolled over. The chines are the widest points of the bottom of the hull and would require more care if internal hollowing was the first process of boat building. Despite the additional safety resulting from thickness gauges, accidents

have occurred. Seven thickness gauges were used on the Mullynascarty boat on two longitudinal lines by both chines. At two locations in the central area the floor had been adzed (to finish or tidy the hollowing process) to a depth of 1cm more than was intended. The remainder of the floor was completed, but the over-adzed area was left in its rough state to reduce any possible further weakening which might have been caused by attempts to smoothen the surface.

The sides of the logboats never held thickness gauges, since the process of hollowing down by the side could easily be checked by eye. When the boats remained on their bases the extent of hollowing of the bottom could be difficult to determine, hence the use of thickness gauges. In general, they vary from 1.5 to 2.5cm in diameter. They occasionally measure as much as 5cm in diameter, such as Callow, which had widened from its original size through erosion.

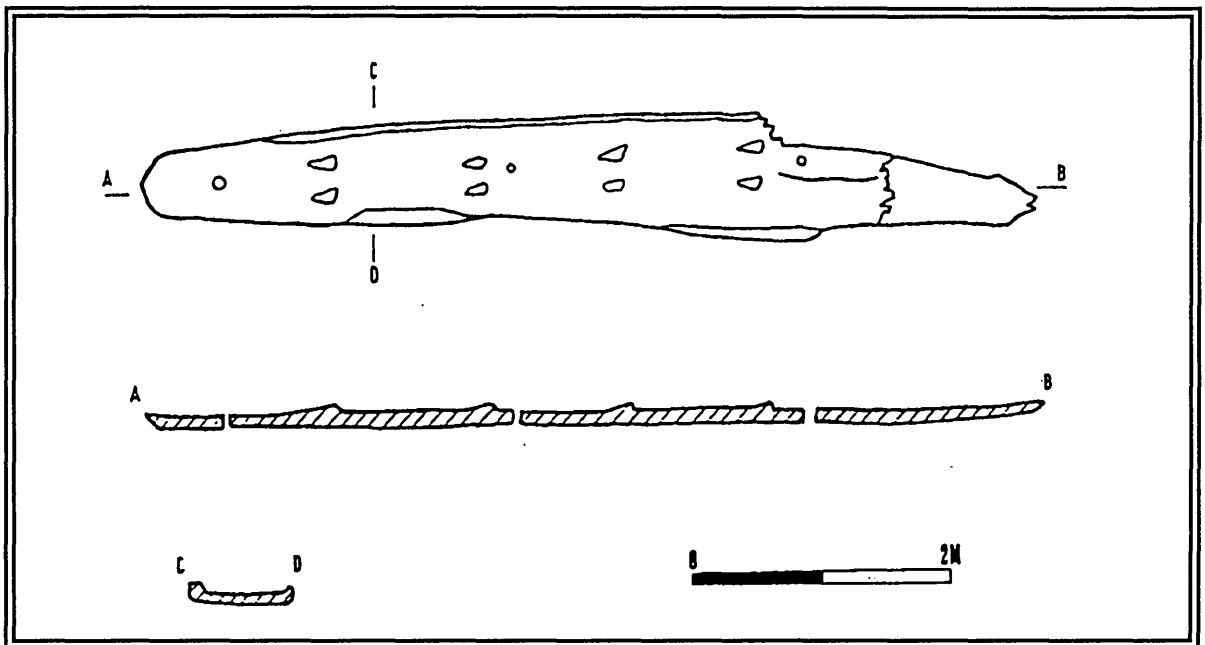


Figure 5.3: Callow (after Danaher, NMI).

Sixty-four Irish and twenty-one Scottish logboats have thickness gauges, (16% and 18% respectively). Of these, sixty-three Irish and sixteen Scottish hulls have the number of gauges recorded. The number of gauges on an individual boat varies from one (Springfield 3) to fourteen (Garmouth). Mowat (1996: 74) notes that the logboat from 'Orkney' has 'thirty-six certain or probable thickness gauge holes, spaced irregularly and at varying angles,...[which]...pierce the

floor and sides'. However, since thickness-gauges were not used on boats' sides, these holes may have been used to retain fitted ribs, extensions or washstrakes.

The highest concentration of thickness gauges in both Irish and Scottish boats is in the one to eight range, (Table 5.1). Of these, thirty-seven Irish and four Scottish boats have from one to three gauges in a boat, while twenty-four Irish and eight Scottish boats have between four and eight gauges. The only unusual departures from this are the remaining boats which have from nine to fourteen holes. Of these there are three Irish and four Scottish boats. This suggests a general higher frequency of thickness gauges used in individual boats in Scotland than Ireland. Whether this reflects a more cautious approach to logboat building or a lower degree of skill in Scotland is unknown. From practical experience (Section 12.8.1 para 5), one thickness gauge approximately every 3m along the boat's longitudinal axis has been found to be sufficient to maintain an even floor thickness.

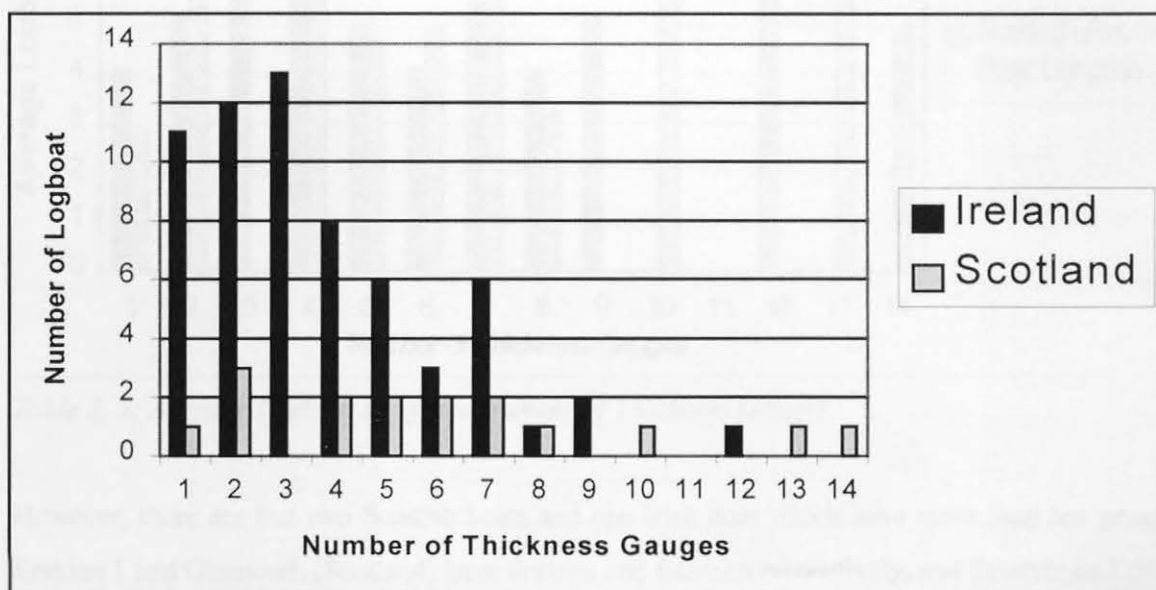


Table 5. 1: Logboats with Thickness Gauges.

The presence of thickness gauges along the chines of some boats would suggest that the builders were attempting to minimise excess wood in order to make the boat lighter and to obtain a higher degree of buoyancy, since careful work is necessary in these areas.



When the average boat lengths are taken into consideration, the result is an average length of 6m for boats with thickness gauges. For boats which have up to six thickness gauges, the average Scottish length is 6m, and the average Irish is 5m (Table 5.2). The average length for Irish boats with seven to ten thickness gauges is 6m, whereas the Scottish average length is 5m. In the case of boats with up to fourteen thickness gauges, the average length is 9m for Irish ones and 7m for Scottish. This suggests that the number of thickness gauges increases proportionately with length in the Irish logboats, as would be expected. In the Scottish boats which contain up to ten thickness gauges, the number of gauges has an inverse relationship to boat length.

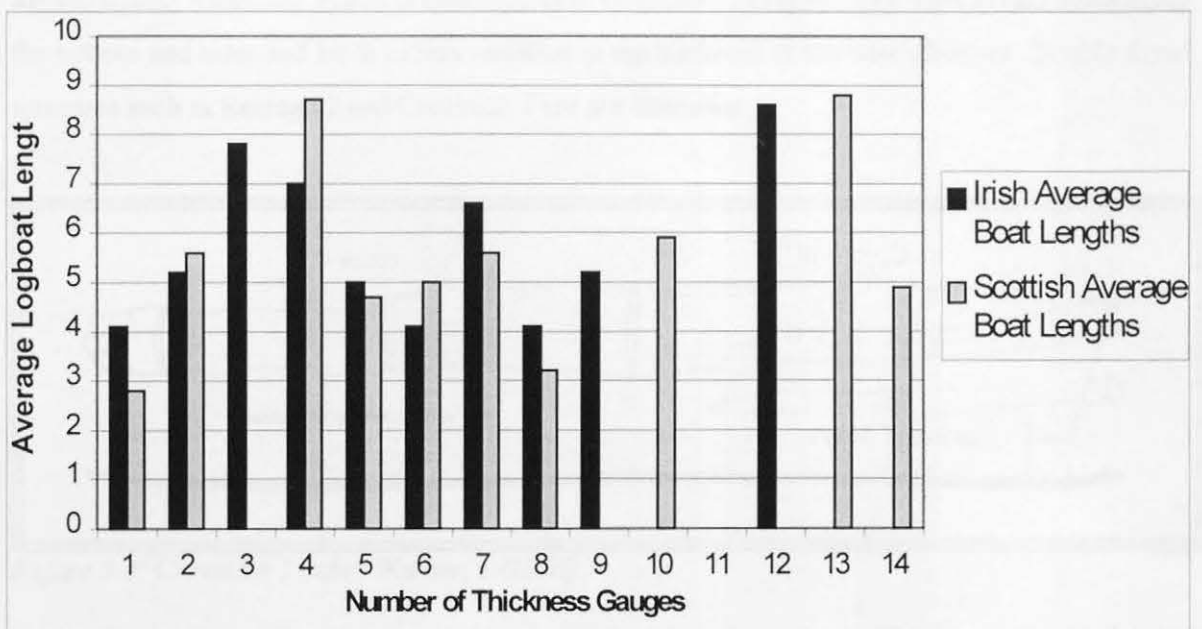


Table 5. 2: Average Logboat Length to Number of Thickness Gauges.

However, there are just two Scottish boats and one Irish boat which have more than ten gauges. Erskine 1 and Garmouth (Scotland) have thirteen and fourteen respectively, and Drummans Lower has twelve. Since this applies to only three boats they can be considered to be exceptions to the rule. At present, the most plausible explanation for the inverse relationship between boat length and the number of gauges in the Scottish series is that some boat builders were perhaps less skilled than others. This may have manifested itself in the use of more gauges irrespective of boat size. An examination of the types of logboat with thickness gauges did not favour any particular distribution patterns.

### 5.4.2 Fitted Transoms

As the title suggests, a fitted transom, or sternboard, is a board which is inserted into the stern of the logboat to close and seal the open stern in a watertight manner. They were probably used to avoid structural weaknesses caused by heartwood rot at the root end of the tree. The usual technique was to create a trench or grooved line several centimetres wide and deep, internally in the floor and sides of the boat into which the board was inserted, for example Springfield 2. Watertightness was secured by applying caulking material such as moss or other vegetable matter. A variation on the above is where the thickness of the floor and sides increase to a broad ridge at the stern, into which the trench is recessed, as in Crevinish 1 (Figure 5.4). This avoids weakening the bottom and sides and leads to less variation in the thickness of the boat's bottom. Double fitted transoms such as Eskragh 2 and Crevinish 1 are not unknown.

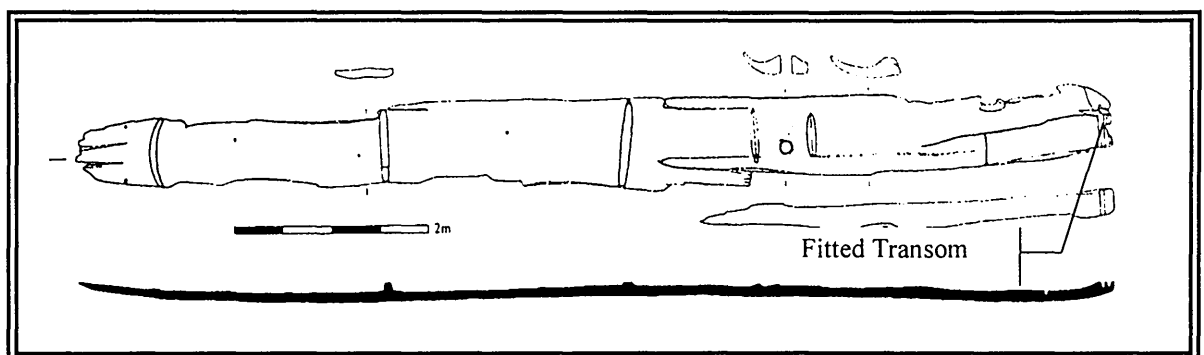


Figure 5.4: *Crevinish 1* (after Warner, DOENI).

Perhaps the most elaborate transom arrangement in Western Europe is found in the Hasholme logboat, England. A transverse groove was cut into the floor and sides, with a large recess on the starboard side into which a wooden block was used as a repair. This block contains a groove which is a continuation of the fitted transom groove and is pegged into place. Across the outside of the fitted transom a transverse wooden bar was set horizontally from gunwale to gunwale. This bar was used in conjunction with a U-shaped projection in the solid on the outside of the transom which was below the bar and maintained the transom in position. A narrow horizontal plank was placed on top of the transom and was pegged vertically into the gunwales (Millet and McGrail, 1987: 108-125). None of the Irish or Scottish boats with fitted transoms have such a complex arrangement.



Twelve Irish and twenty-four Scottish logboats have fitted transoms or evidence of them (3% and 16% respectively). All of these boats are dissimilar-ended, of which five from each country are tapered in form (Chapter 6). Ten (83%) Irish and fifteen (75%) Scottish are between 4 and 8m long. The remaining two Irish and three Scottish boats are greater than this in length, of which the longest are 12.8m (Lough Owel 1, Ireland) and 13.72m (Loch Arthur 1, Scotland). Since the occurrence of fitted transoms is relatively rare in both countries, and a solid stern is far stronger because of its non-composite nature, it is believed that the root end of the tree would have had large splits, cracks, or heartwood rot before a fitted transom would have been used. Eskragh 1's double-fitted transom (the only known case in Ireland or Scotland) would have provided further protection from water leaking into the boat (Figure 5.5).

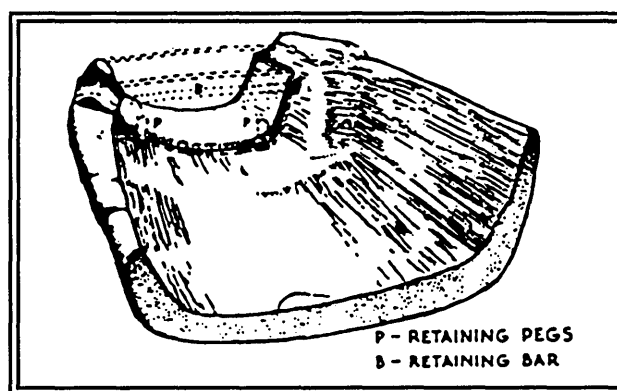


Figure 5.5: Detail of Eskragh 1's stern (after Collins and Seaby, 1960)

### 5.4.3 Side Extensions

It has been stated in Section 2.1 that side extensions are a means of increasing the height of the logboats' sides, which provide a higher freeboard by attaching a board vertically to each side. The two methods by which they were secured were by being dowelled into place or lashed through a series of matching holes on both the boards and the boat's sides. Evidence of extensions occurs in three Irish boats, Garraunfadda, Downpatrick and Portmore, and three Scottish boats, Buston 1, Dowalton Loch 1 and River Clyde. A further two Scottish boats (Erskine 1 and Lochmaben, Castle Loch 2) have 'partial' side extensions (Mowat, 1996: 123).

It was noted that the Garraunfadda boat had either a willow or poplar planks on each side. They were lashed to the gunwales with willow withies through holes set approximately 25cm apart. When the use of willow withies on the boat is considered, it is very likely that the boards were also made from willow. The extensions do not survive on the Portmore boat which has thirty-six horizontal holes below the gunwales, but judging by the location and number of holes it can be reasonably assumed that the boat was extended.

Downpatrick's ambiguous evidence has two horizontal stern holes and a vertical groove, all of which correspond to a board found inside the boat which could have been used to extend it. Dowalton Loch 1 was noted as having boards pegged to the sides of the boat.

#### 5.4.4 Caulking

The use of caulking material has been recorded in seven logboats, five Irish and two Scottish, which would make any gaps or seams watertight. Caulking is used in conjunction with features which are of both a constructional and non-constructional nature. Those features which use caulking and are of a constructional nature are discussed here. The remainder are discussed in the following chapter.

Two of the Irish boats had caulking material associated with their thickness gauges (Clooncoe 1 and Derrya 2). Cahore 1's transom groove was caulked, and Garraunfadda's side extensions were caulked.

Both Clooncoe 1 and Derrya 2 have three caulked thickness gauges. Clooncoe 1's caulking was noted as 'plant debris' (National Museum of Ireland; *Topographical Files*), while Derrya 2's consisted of ash and moss (National Museum of Ireland; *Topographical Files*). Wilde (1863: 203) noted that Cahore 1's transom-groove contained 'bark'. Moss was inserted between the boards which formed the side extensions to the Garraunfadda logboat (National Museum of Ireland; *Topographical Files*).

Mowat (1996: 21) notes that one of the Scottish logboats, Dalmarnock, has two thickness gauge holes which were found 'closed by reddish chert pebbles rammed in'. Vegetation or organic material, such as moss, can act as effective caulking. However, it is difficult to imagine how thickness gauges plugged with pebbles can remain watertight. It can be hypothesised that since they were reddish chert there may have been some ritual significance, but this is not favoured here, since the boat would still leak and sink. It is more plausible that the thickness gauge plugs had fallen out after the boat's effective life and that the pebbles were inserted by natural means. It is believed that many more boats which had features that required them to be sealed against leakage used vegetation as caulking, but this was not noticed during their recovery and subsequent examination.

## 5.5 SUMMARY

The logboat builders would have taken considerable care when choosing which tree to use for constructing a logboat. Both archaeological and reconstruction evidence indicates that the trees were selected on the basis of their proximity to water, as well as the suitability of the trunk. This process would have been facilitated by the lack of obscuring foliage during the winter period.

The available evidence shows that the boat was externally shaped first. It was then hollowed by a process of score and splinter until the required depth had been met. Thickness gauges were used in the bottom of a number of logboats to avoid weakening them by removing too much wood. Fire was incapable of aiding the hollowing-out.

Once the wood was chopped out by axe, adzes were employed to smooth the floor surface, and axes used to further thin the sides to their required thickness.

Some evidence exists to show that there was an intermediate stage of construction with some logboats. They were stored underwater to be retrieved at a later date for completion. The use of water would have arrested the drying-out of the wood and maintained it in a fresh and pliable condition.

In a small number of logboats, the builder overcame potential difficulties, such as heartwood rot on the root end of the tree, by using fitted transoms. These were inserted into a groove and may have been caulked to prevent water from leaking on board.

There is evidence for the use of extensions in both Irish and Scottish logboats. By attaching and sealing boards to the boats' sides, the builders increased the available freeboard. This would have insured that the boats could carry greater loads than would otherwise have been possible. Undoubtedly those logboats which had features such as thickness gauges, fitted transoms or extensions, would have used caulking, probably of a vegetational nature. However, it appears that few instances of this have been recorded. This may be due to the possibility of the material being washed out prior to the boats' discovery. It is more probable that caulking was not detected when the boats were originally examined.

## CHAPTER 6

### LOGBOAT FORMS

#### 6.1 INTRODUCTION

This chapter describes and classifies the forms of logboats from the available evidence in Ireland and Scotland. Their frequency of use and physical environments are compared within regions and between both countries. This chapter also serves to distinguish between the forms, so that the implications of their applications from the point of view of naval architecture may be better understood.

Logboat speed is governed by factors of resistance which impedes the boat's forward motion. Resistance consists of frictional, wind, and eddying resistance (Section 13.9 para 1-3). Frictional resistance interacts with the boat's bow form, displacement, hull length. Eddy resistance or form drag interacts with the boat's stern where the separation of the water from the hull induces ventilation and causes eddies to occur, which drag on the boat. The smoother the boat's entry into undisturbed water and the smoother its separation, then the potentially faster it is. The roughness of the hull also directly affects resistance. This is discussed in further detail in Chapter 13. Other factors which are also discussed in Chapter 13 that affect speed are displacement, broadness coefficients, and the boat's length.

#### 6.2 LOGBOAT FORMS

There are six forms of logboat which are based on external hull shape: barge; box; canoe; dissimilar-ended; punt; and tapered boats. Regardless of size, each group contains variations which are insufficient to warrant separate typologies or significantly alter their actual performance (Section 13.9.1.2 para 10-14). However, the most distinctive variation is that of tapered logboats, whose style of construction, hull outline, and degree to which it affects performance, warrants a separate class of its own.

### 6.2.1 Box-shaped Logboat

As the term suggests, the box form is parallel-sided with a square cross-section and vertical square ends. In general there are no distinguishing features to determine the bow or the stern. There are no additional features associated with them. In terms of function and style, the box logboat may be considered to be the crudest form of logboat.

### 6.2.2 Barge Logboat

The barge form is parallel-sided with a vertical stern and a rounded bow on all three planes, e.g. County Tyrone. It usually has a square cross-section. Similar to the box logboat, none of them have any additional features.

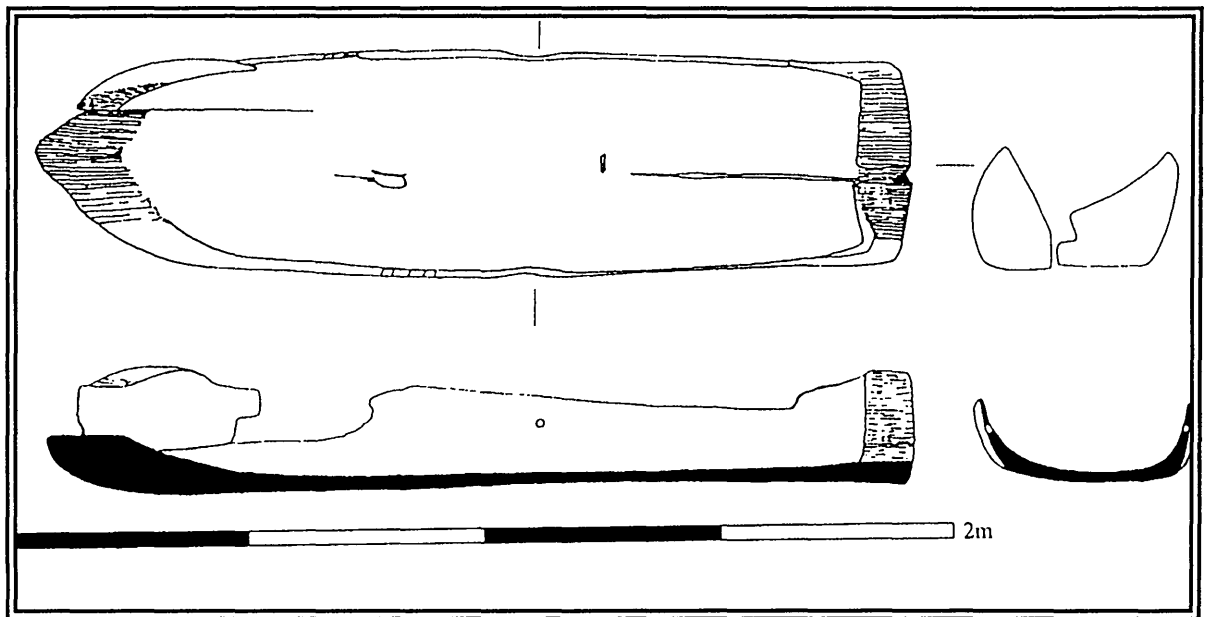


Figure 6.1: Co. Tyrone (after Bourke).

### 6.2.3 Canoe Logboat

The canoe is parallel-sided with rounded ends in all three planes and has a rounded cross-section, e.g. Ballybeg. Occasionally, the stern is slightly broader than the bow. More common than the marginally broader stern is a slight swelling of the sides in the stern-half of the boat, close to its midships. These boats have features such as duckbill projections, thickness gauges, solid and fitted ribs, and rowing emplacements. In one example, Drinagh, there is a mast step.

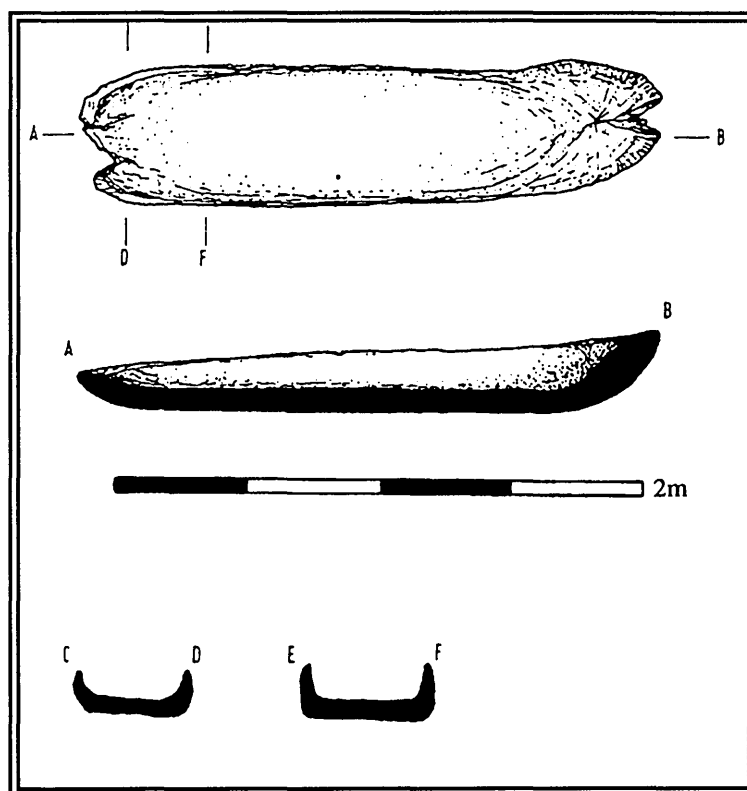


Figure 6.2: Ballybeg (after MacDowell, 1983).

### 6.2.4 Dissimilar-ended Logboats

The dissimilar-ended boat is generally parallel-sided with a square cross-section. Its bow is either rounded, a rounded-point, or pointed, while the stern tends to be vertical, whether this is in solid

form or has one or more fitted transoms e.g. Crevinish 1 (Figure 5.4). Other features associated with dissimilar-ended logboats are thickness gauges, fitted and solid ribs.

### 6.2.5 Punt Logboat

The punt is parallel-sided with square ends. In section it has flared sides and ends. It usually has flared sides, e.g. Beltoy 1 (Figure 1.4). The greatest variation is that the sides tend to be vertical instead of flared. This is so that the maximum use can be made of the parent log. This type was most probably used for carry cargo (Sections 13.2.2 and 13.10.1).

### 6.2.6 Tapered Logboat

The greatest variant shared by all the above boats is a tapered plan, which warrants a class of its own since it can significantly influence the boat's performance. The tapered boats can be subdivided into barge, canoe, dissimilar-ended and punt forms. All of them have a wide broad stern which narrows significantly throughout its length to the bow, e.g. Lurgan.

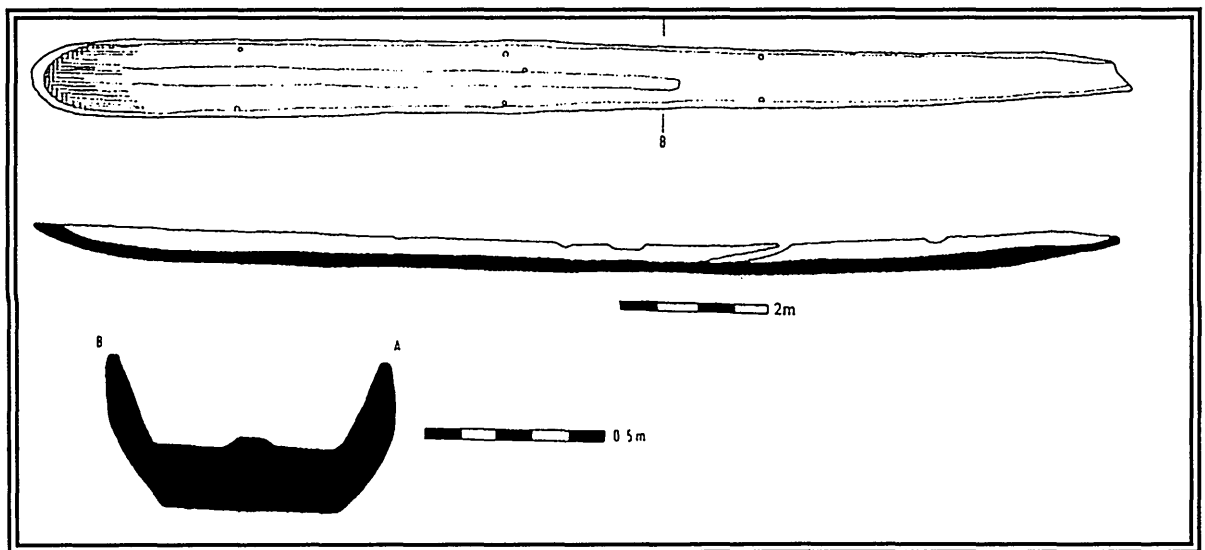


Figure 6.3: Lurgan (after Raftery, NMI)



### 6.3 COMPARISON OF LOGBOAT FORMS

If all logboats are considered to be of similar sizes, in particular where their displacement and lengths of the main hull section are discounted, and the propulsion methods are the same, as is the energy input, then the ends dictate the speed of the logboat. The influences of their lengths, broadness coefficients and displacement alter the effects of their end forms (Sections 13.9.1.2 para 10-14).

The fastest boat is the canoe since it has the smoothest overall entry into, and separation from, water. Because of its rounded ends, it is also the most manoeuvrable. The second fastest logboat is the dissimilar-ended boat, since all their bows enable smooth entry. However, their sterns are straight in plan and vertical in longitudinal-section which induces more drag than any other logboat stern forms. This also impedes manoeuvrability.

While the barge logboat can be considered to be in the same class as the dissimilar-ended boats, their higher displacement values relative to their lengths' put them in a separate and slower class. These boats can be considered to be middle of the range for speed.

In keeping with the dissimilar-ended is the box form of logboat's flat and vertical ends, which makes this the slowest boat. Its stern acts in the same way as the dissimilar-ended boat and the bow creates more friction than any other logboat. The punt's square ends, in plan, make them relatively slow. They differ from the box form in that, in longitudinal-section, the ends incline upwards, which reduces the frictional resistance and form drag.

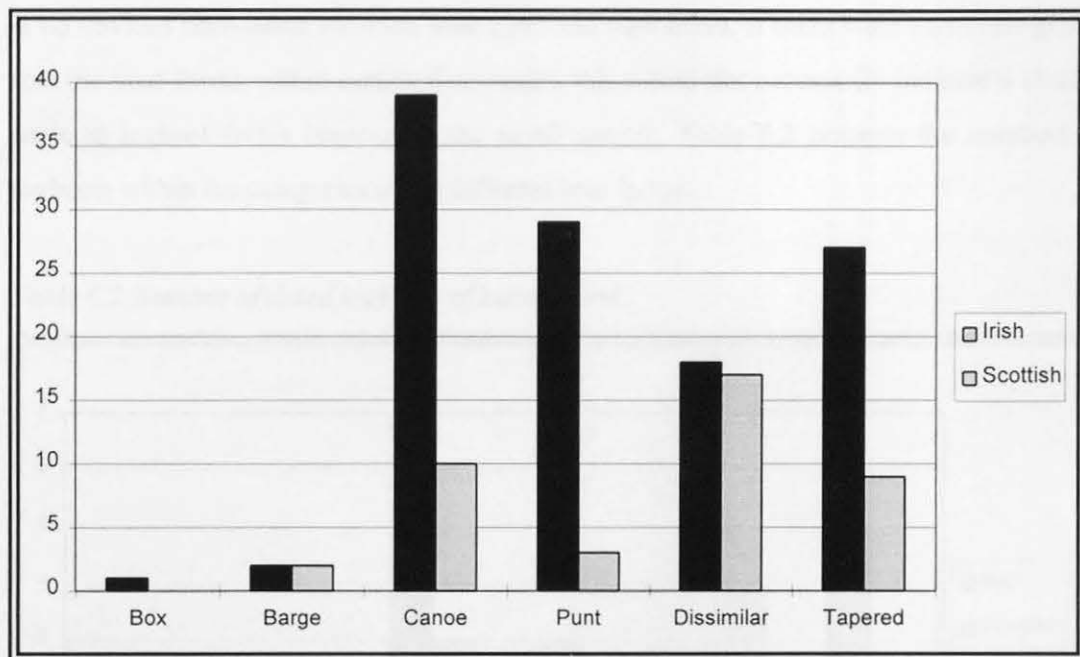
The tapered boats host a variety of the above ends. What makes them so distinctive is the manner in which their widths' increase towards the stern, inducing further frictional resistance. With the exception of the box form, tapered logboats can be considered to be a hybrid of all other forms.

Appendix 5 lists both Irish and Scottish logboat forms. One hundred and sixteen (29%) of the Irish logboats are sufficiently well recorded to ascribe them to a form. The two smallest classes are the box, of which there is one boat (Cloonagalloon), and the barge, of which there are two (County

Tyrone and Kinnegoe). The most common Irish boat is the canoe (Ballybeg), with thirty-nine boats. The second most common form is the punt (Beltoy 1), with twenty-nine boats, while eighteen boats can be ascribed to the dissimilar-ended class (Bellarena), and there are twenty-seven tapered boats (Bunduvowen).

In Scotland, of the forty-seven recorded boat forms, there are no box forms, two barges (Loch Doon 1 and 6), ten canoes (Kilbrinie Loch 3), twenty-three dissimilar-ended (Buston 3), three punts (Kirk Loch 1), and nine tapered (Buston 1).

Table 6.1: Recorded logboat forms in Ireland and Scotland



The single most common forms are the canoe in Ireland and the dissimilar-ended in Scotland. The second most common forms are the Irish punt and the Scottish canoe. When the circumstances in which both countries boats are located are considered, the low numbers of Scottish punts and Irish dissimilar-ended boats is striking. This does not appear to be a reflection of the archaeological record, considering 28% of the Irish and 31% of the Scottish boats have their forms noted.

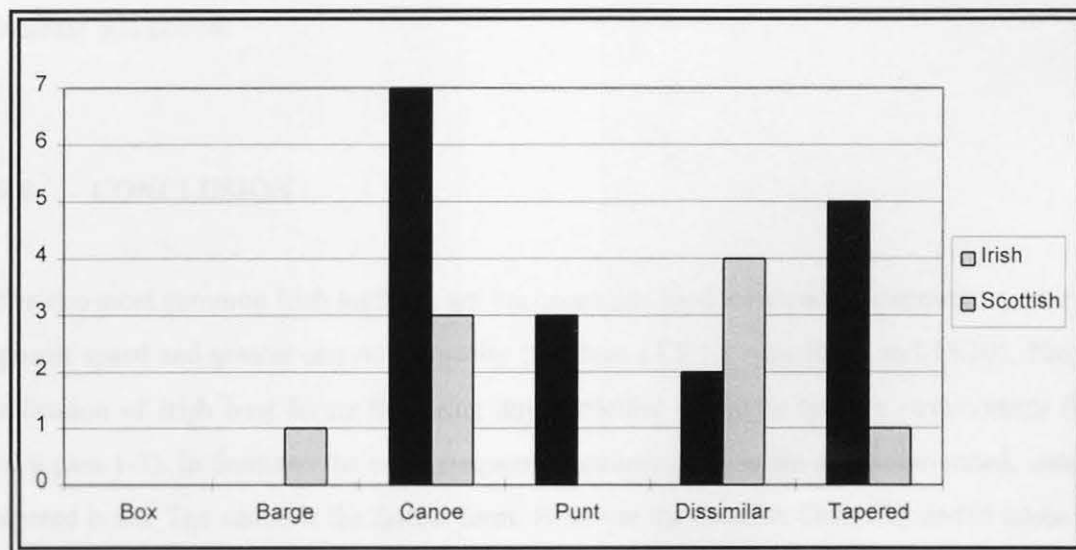
The most comparable boat form between either country in proportional terms is the tapered boat, which accounts for 24% of the Irish and 19% of the Scottish recorded forms. In proportional

terms, these figures reflect the numbers of the non-tapered or other logboat forms. There is one Irish tapered Barge derivative (Dullaghan), ten Irish tapered canoes (e.g. Lemonfield), eight tapered dissimilar-ended (e.g. Derrya 2) and eight tapered punts (e.g. Culleen More). In Scotland, there is one tapered canoe (Dalmarnock), and tapered eight dissimilar-ended (River Clyde).

#### 6.4 LOGBOAT FORMS AND THE DATING EVIDENCE

Of the known logboat forms, seventeen (15%) of the Irish and nine (22%) of the Scottish boats have been dated. It is unfortunate that there is such a small number of dated logboat forms. There is no obvious correlation between boat form and their dates. If there were particular groupings of specific boat forms within certain date ranges this would not necessarily indicate a chronological basis to logboat forms because of the small sample. Table 6.2 presents the numbers of dated logboats within the categories of the different boat forms.

*Table 6.2: Number of dated logboats of known form*



The date ranges for each class of boat are listed in Table 6.2.

It can be seen from Table 6.2 that the known dated boat forms share contemporaneous periods with each other. This indicates that there is no chronological progression from one logboat form to

another. The long period of use of canoes, dissimilar-ended and tapered logboats in both countries would suggest that these boats had successful designs. This is further substantiated in Chapter 13.

*Table 6.2: Date ranges for logboat of known form.*

| Form             | Ireland               | Scotland            |
|------------------|-----------------------|---------------------|
| Box              |                       |                     |
| Barge            |                       | 509±110 AD          |
| Canoe            | Post LBA - c.15 AD    | 45±50 BC - 1090 AD  |
| <u>Punt</u>      | 580±70AD - 1705±15 AD |                     |
| Dissimilar-ended | c.0 BC - 1535±90 AD   | c.0 BC - 1465±40 AD |
| Tapered          | 2739±9 BC - 1520 AD   | Medieval            |

From the available evidence in Table 6.2, the punt appears to have the shortest known period of longevity, just over one thousand years. However, this covers as much as one-fifth of the known period of logboat use in Ireland. In addition, other punts may be dated in the future which could increase this period.

## 6.5 CONCLUSION

The two most common Irish logboats are the canoe and punt which are respectively most suited to greater speed and greater carrying capacity (Sections 13.9 1.2 para 10-14 and 13.10). There is no indication of Irish boat forms favouring any particular region or specific environment (Section 10.9 para 1-3). In Scotland the most frequently occurring forms are dissimilar-ended, canoes and tapered boats. The canoe is the fastest form. However the Scottish dissimilar-ended boats replace the Irish punts for cargo-carrying capacities. In addition, they also have very good relative attributes of potential speed (Section 13.9.1.2 para 10-14). While there is no specific concentration of other boat forms, the dissimilar-ended are heavily biased towards Region 5 and the River Clyde. It appears that these boats were used to carry cargo along the course of the river. The available evidence would suggest the builders had knowledge of the effects of varying hull forms. The

design considerations of dissimilar-ended and to some extent tapered logboats are biased towards maximum load capacity rather. Their pointed bows reduce resistance to facing currents and do not detract from their carrying capacities (Section 13.9.1.2 para 10-14).

The limited dating evidence would suggest that boat forms are not a function of chronology, but are directly related to their performance attributes for specific tasks. This clearly indicates that their builders had a comprehensive knowledge of aspects of naval architecture. If this is so, it can be further stipulated that this knowledge may have been confined to a small number of people in each community. There may have been local craftsmen who constructed the logboats for the community. This can be further substantiated by the fact that there is a detailed knowledge required to make logboats, and the safe maximum number of people who could work on a logboat at any one time is two to four (Sections 12.4.1 para 1 and 12.6.1 para 1).

## CHAPTER 7

### LOGBOAT DIMENSIONS

#### 7.1 INTRODUCTION

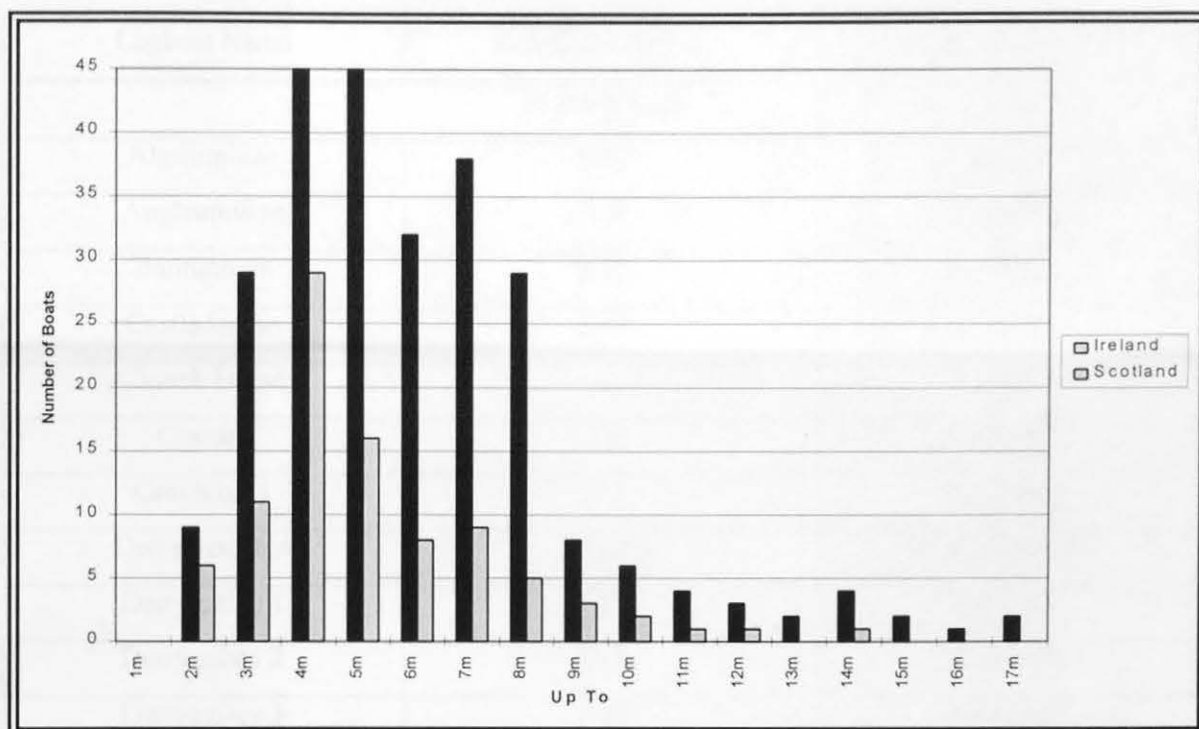
The dimensions of logboats are determined by the size of the parent log and the intentions of the builder. The available evidence suggests that in most cases, the builders made the maximum possible use of the parent logs (Section 5.2.3 para 2). Tree selection would, therefore, have been dependent upon the tree size which suited the builders' requirements (Sections 5.2.1 para 2-3). The sizes of both Irish and Scottish logboats vary greatly. This chapter addresses the lengths, widths, heights and the coefficients of the boats (ratios of their dimensions), and compares the Scottish to the Irish boats. The comparative analysis of the boats' sizes in this chapter together with the naval architectural evaluation in Chapter 13 explains the use of different sized logboats.

#### 7.2 LOGBOAT LENGTHS

The external length of two hundred and fifty-nine (64%) Irish and ninety-two (61%) Scottish logboats have been recorded. These are listed in Appendix 6. They are as short as 1.83m in Ireland (Annamakiff), and 1.37m in Scotland (Barhapple Loch 1). The longest recorded Irish boat is Kesh 1. It was measured in 1887 as 16.76m. The only other recorded aspects of this boat were its width and the shape of the ends. It was left *in situ* in Lower Lough Erne. This length may have been recorded inaccurately, and remains unconfirmed until the boat is recovered and examined. Loch Arthur 1 (13.72m) is Scotland's longest logboat.

The majority of logboat lengths are between 3 and 8m in both Ireland (218 boats) and Scotland (78 boats). Nine Irish and six Scottish boats are under 3m in length. Thirty-two Irish and eight Scottish are over 8m.

Table 7.1: Irish and Scottish logboat lengths



In proportional terms, the lengths of both Irish and Scottish logboats are similar, with a strong concentration in the 3 to 8m range. The most notable feature is the large concentration of the Scottish lengths at 3 to 4m (compared to the Irish lengths). This is balanced by the predominance of the Irish boats in the range from 5 to 8m.

The 15.24m Lurgan boat (Plate 5.1) is very unusual as it is the only known logboat of such length in Europe with the hull and ends made in the one piece.

The above figures indicate a correlation between the Irish and Scottish series in a general preference for similar boat lengths. Twenty-three Irish and seven Scottish boats whose lengths are known have been absolutely dated to between 2739 BC and 1740 AD. From the available evidence there appears to be no correlation between boat length and date or period of use in either country (Table 7.2).

Table 7.2: Irish and Scottish Logboats of recorded dates and lengths.

| Logboat Name      | Length (in metres) | Reference Table  |
|-------------------|--------------------|------------------|
| Irish logboats    |                    |                  |
| Altdrumman        | 5.56               | Table 4.2        |
| Aughamullan       | 3.5                | Table 4.2        |
| Bannmouth         | 3.67               | Table 4.2        |
| Castledargan      | 3.12               | Table 4.2        |
| Church Island     | 6                  | Table 4.2        |
| Copney            | 1.9                | Table 4.2        |
| Crevinish 1       | 10.5               | Table 4.2        |
| Derrybroughas     | 4.29               | Tables 4.1 & 4.2 |
| Derrygalley 1     | 5                  | Table 4.2        |
| Derrygalley 2     | 4.14               | Table 4.2        |
| Derrygalley 3     | 1.85               | Table 4.2        |
| Doogary           | 7                  | Table 4.1        |
| Drumman Lower     | 8.6                | Table 4.2        |
| Eskragh 1         | 7.39               | Table 4.2        |
| Inch 2            | 2.3                | Table 4.2        |
| Lurgan            | 15.24              | Table 4.2        |
| Maghery 2         | 3.8                | Table 4.2        |
| Moy               | 5.41               | Table 4.2        |
| Mullynascarty     | 7.23               | Table 4.1        |
| North Ward        | 4.7                | Table 4.2        |
| River Foyle       | 4.9                | Table 4.2        |
| West Ward 6       | 4.88               | Table 4.2        |
| West Ward 7       | 3                  | Table 4.2        |
| Scottish Logboats |                    |                  |
| Catherinefield    | 2.42               | Table 4.2        |
| Errol 2           | 8.64               | Table 4.2        |
| Erskine 6         | 6.5                | Table 4.2        |



*Table 7.2 (continued): Irish and Scottish Logboats of recorded dates and lengths.*

| Logboat Name     | Length (in metres) | Reference Table |
|------------------|--------------------|-----------------|
| Forfar 2         | 2.65               | Table 4.2       |
| Loch Arthur 1    | 13.72              | Table 4.2       |
| Loch Doon 1      | 3.37               | Table 4.2       |
| Loch of Kinnordy | 4.32               | Table 4.2       |

With the exception of two boats, Curraghboy and River Barrow 2 (whose respective lengths are 11.1 and 11.83m), all boats above 8m are from lakes or drained lakes. The distribution of the remainder reflect the overall logboat distribution.

### **7.3 LOGBOAT WIDTHS**

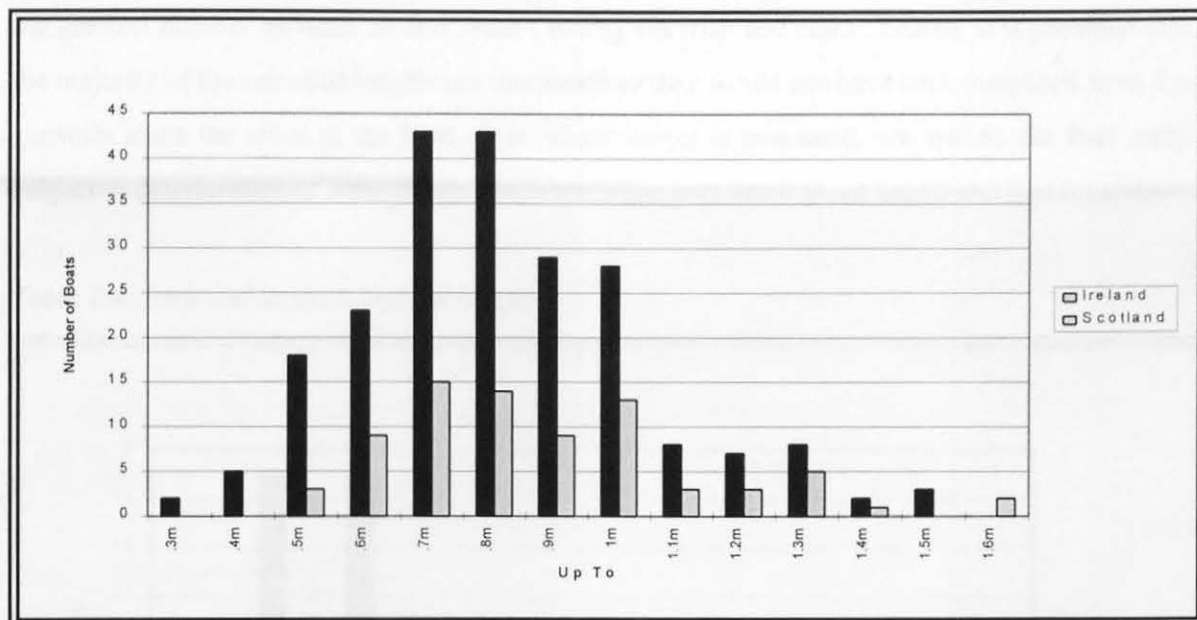
Two hundred and nineteen (54%) Irish and seventy-seven (51%) Scottish logboats' widths are recorded. These are listed in appendix 7. The minimum recorded Irish width is 27cm (Dysert Marshes 1), which is very unlikely to be the complete width, and the widest is 1.44m (Castlefreke). In Scotland, the narrowest width is Loch Laggan 6, which measures 41cm. The two widest boats are Erskine 1 and Loch Arthur 1, both of which measure 1.52m. It is very unlikely that many of these boats' original widths survive. It is probable that the recorded widths would have been as found, rather than as built, as an apparently very narrow boat would have been inherently unstable.

Most of the logboat widths are from 50cm to 1m in both Ireland (184) and Scotland (63). Seven Irish and none of the Scottish boats are under 40cm in width. Twenty-eight Irish and fourteen Scottish are over 1m.

The comparative percentages of width distributions correspond closely - more so than for length distributions. In each case the highest concentration is in the 40cm to 1m range.

There is a small tail at the narrower end for Irish widths (seven boats) and at the wider end for the Scottish widths (two boats).

Table 7.2: Irish and Scottish logboat widths



It is probable that the range of 50cm to 1.29m was determined by the most commonly obtainable maximum tree girth, with the occasional exception of a small number of larger trees. The Scottish series appears to have made more use of these, perhaps because there was a greater availability of trees of larger diameter. With the exception of North Ward and River Barrow 1 (which are both 1.22m in width) all logboats above 1.12m are from lakes.

#### 7.4 LOGBOAT HEIGHTS

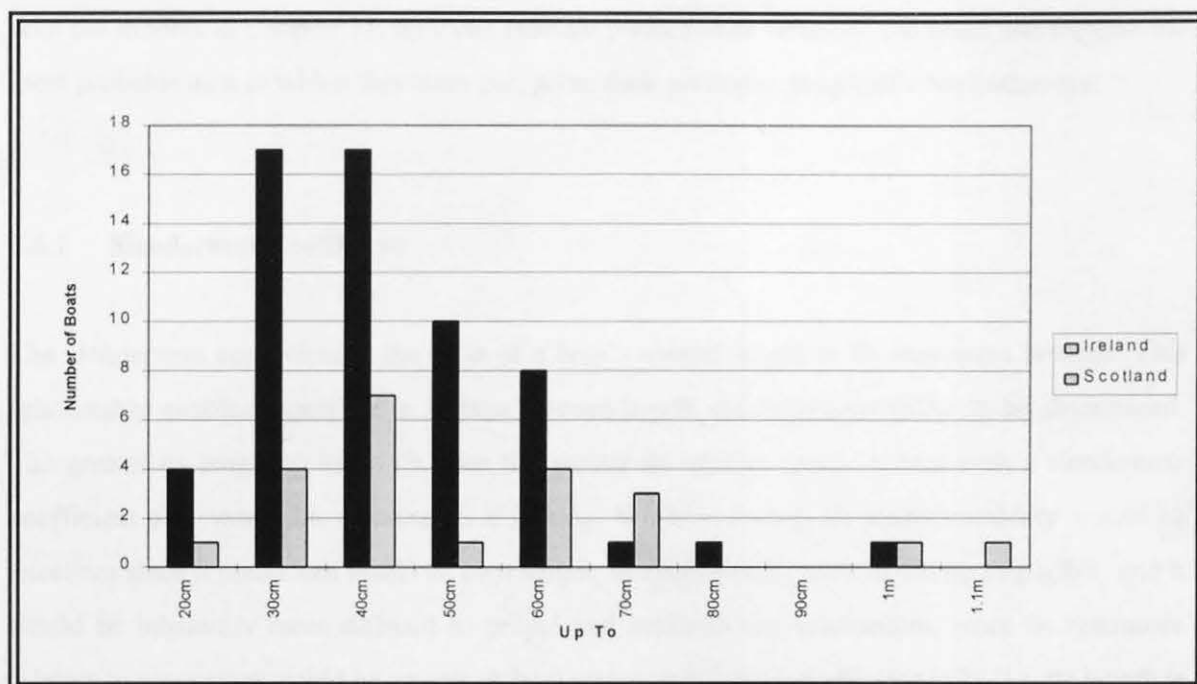
Most logboats were recovered with little of their original height remaining. Forty-three (11%) of the Irish and seventeen (11%) of the Scottish boats' heights survive or are recorded sufficiently to be of use.

These are listed in Appendix 8. The maximum height in Ireland is 1.04m (Lurgan) and 1m in Scotland (Erskine 1), while the Irish minimum is 12cm (Derrya 2), and 16cm in Scotland (Garmouth). Neither the Irish nor the Scottish recorded minimum heights could have been to the

original sheerline, because a boat of such low height would have been swamped on launching (Sections 13.3 and 13.6).

Forty-one of the Irish and fifteen of the Scottish recorded heights are between 20 and 79cm, with the greatest number between 20 and 39cm - twenty-six Irish and eight Scottish. It is probable that the majority of the recorded heights are inaccurate as they would not have been measured from the gunwale since the sides of the boat, from which height is measured, are among the first areas subject to deterioration or wear. There is no correlation between logboat height and find location.

Table 7.4: Irish and Scottish logboat heights



## 7.5 FLOOR THICKNESS

Seventy-five Irish (19%) and forty-three (28%) Scottish logboats have their floor thickness sufficiently well recorded to be used. All of them are between 3 and 20cm thick, with the exception of Friarton (Scotland) which is 30cm. This boat is unfinished which explains its excessive thickness. The floor thickness of nine Irish and six Scottish logboats are between 11 and

18cm. This considerable thickness suggests that their hollowing was not completed. There would have been excess dead-weight leading to a reduction in performance. However this would be offset by an increase in stability (Section 13.8).

## **7.6 COEFFICIENTS**

The logboats' coefficients are the ratios of their dimensions. They are of particular relevance to concepts of naval architecture (Section 13.9.1.2 para 5-10) where they are employed in greater detail. The coefficients help to indicate individual boats' performance capabilities. When used with the models in Chapter 13, they can indicate performance values of the boats and suggest the most probable uses to which they were put, given their particular geographic environments.

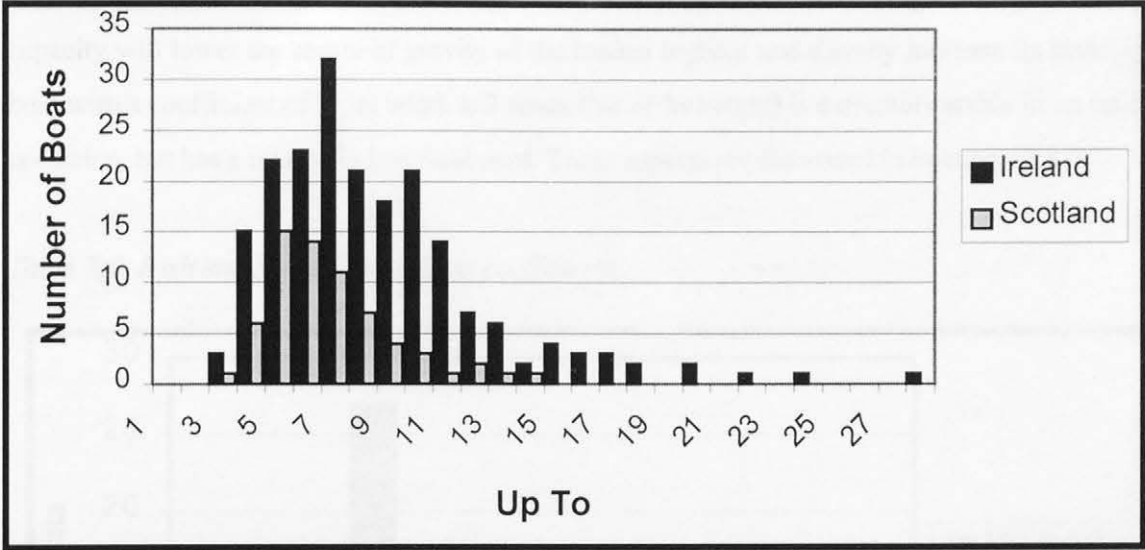
### **7.6.1 Slenderness Coefficient**

The slenderness coefficient is the ratio of a boat's overall length to its maximum breadth. This relationship enables aspects of a logboat's speed-length and manoeuvrability to be determined. The greater its length to its width, then the greater its relative speed. A boat with a slenderness coefficient of 1 would be as broad as it is long. While in theory, its manoeuvrability would be excellent since it could turn inside its own length, its speed-length ratio would be negligible, and it would be inherently more difficult to propel and maintain any momentum, since its resistance relative to movement would be greater. A boat whose slenderness coefficient is 25 (i.e. its length is 25 times its width) would have an excellent speed-length ratio, but its manoeuvrability would be greatly reduced. This is discussed in detail in Chapter 13, when the coefficient is applied to the naval architecture of the logboats.

The slenderness ratios of two hundred and fourteen (53%) Irish and seventy-one (47%) Scottish boats can be determined. These are listed in Appendix 9. Two hundred and one of the Irish boats' ratios are between 1.9 and 14.9, while all seventy-one Scottish boats are within this range (Table 7.5). The remaining thirteen Irish boats have a ratio of 15 to 28, of which Kesh 1 has the highest

ratio of 27.5. The highest Scottish value is 13 (Loch Laggan 6). The lowest Irish and Scottish values are 1.9 (Hacknahay) and 2.6 (Springfield 3) respectively. Between the ratios of 3 and 10.9 there are one hundred and seventy-eight of the Irish logboats and sixty-four Scottish boats. The largest number of boats are between 5 and 6.9 - fifty-eight Irish boats and twenty-seven Scottish boats. The largest number of boats are between 5 and 6.9 - fifty-eight Irish boats and twenty-seven Scottish boats.

Table 7.5: Irish and Scottish logboat slenderness coefficients



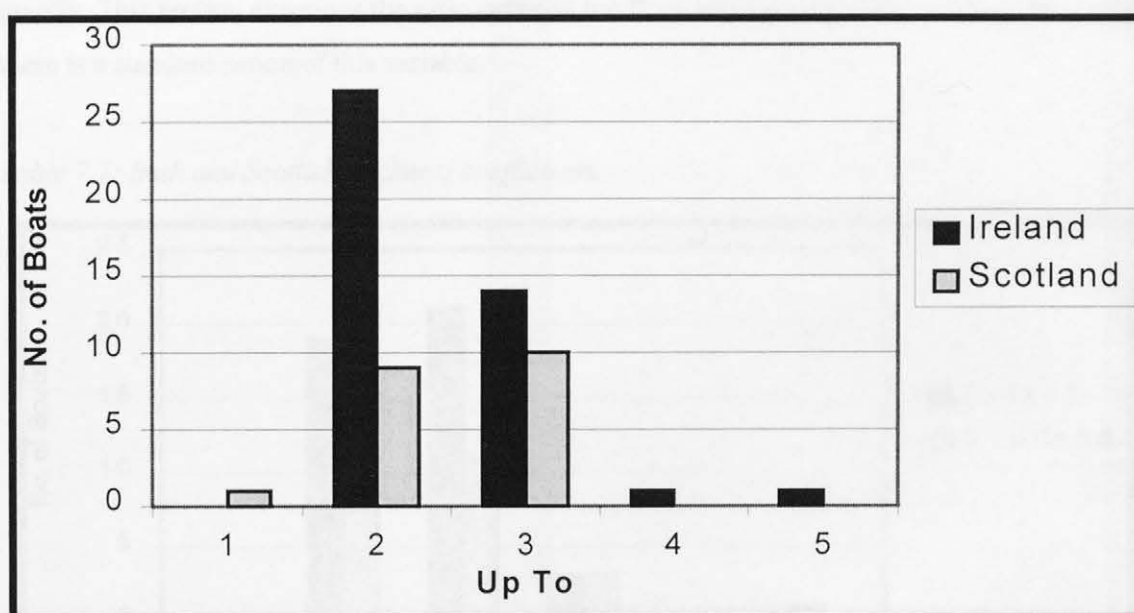
The preference, in each country, for the range of 3 to 6.9, suggests that the builders were attempting to derive maximum efficiency from speed-length ratios without compromising manoeuvrability. With values above 15, the greater slenderness reduces manoeuvrability and leads to an increase in the energy required to turn such craft (Chapter 13.9.1.2 para 5-10).

In addition, these higher ratios indicate the possibility of generating wave friction along the hull. This adds to the energy required for propulsion. While these boats' potential absolute speeds are greater than those with lower values, they are more inefficient and thus retain a lower overall speed-length ratio (Section 13.9 para 8-9).

### 7.6.2 Broadness Coefficient

The broadness coefficient is the ratio of the logboat's width to its height. This provides an indication of a boat's stability, cargo-carrying capacity and freeboard. To ascertain a boat's stability, cargo-carrying capacity and freeboard more accurately, its internal measurements are also required. However most records of boat's dimensions do not include these. A boat with a ratio of 1 is as broad as it is high. Its relatively high freeboard allows for a greater cargo-carrying capacity compared to a boat of the same width with a lower ratio. A greater cargo-carrying capacity will lower the centre of gravity of the loaded logboat and thereby increase its stability. A boat with a coefficient of 3 (its width is 3 times that of its height) is extremely stable in an unladen condition, but has a relatively low freeboard. These aspects are discussed in Section 13.8.3.

Table 7.6: Irish and Scottish broadness coefficients.



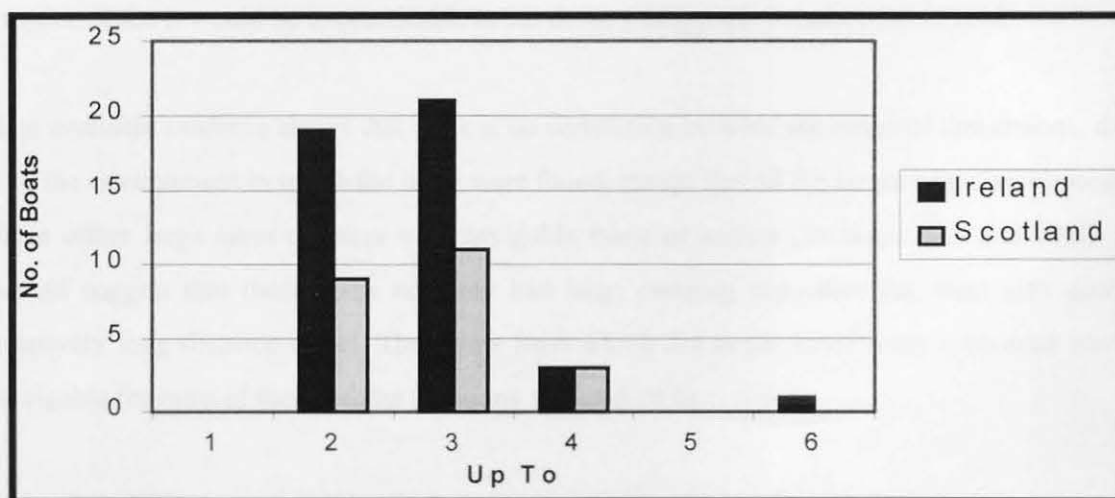
Thirty-five Irish (9%) and fifteen Scottish (10%) logboats are sufficiently well recorded to determine their broadness ratios. These are listed in appendix 10. The lowest broadness ratios are Creagh 3 and Toome 6 in Ireland, and Clydehaugh 1 and River Carron in Scotland, all of which have a ratio of 1. The highest values in either country are Unprovenanced 5 (Ireland) which has a ratio of 4, and Springfield 2 whose ratio is 2.7. All the Scottish logboats' ratios are between 1 and

3, while 91% (thirty-two) of the Irish boats are between the same values. As well as Unprovenanced 5, the two other boats above a value of 2.9 are Collinstown and Derryco, each with a broadness ratio of 3.2. Due to the high densities of oak and scots pine wood used in Ireland and Scotland (Section 13.2.3 para 1, 3-5) the Irish and Scottish logboats sit lower in the water than European ones. Lower broadness coefficients counteract this by providing a higher freeboard.

### 7.6.3 Thickness Coefficient

The thickness ratio is the ratio of the floor's thickness to that of the logboats' sides. Almost all the logboats floors are thicker than the sides, in order to reduce the excessive or unwanted deadweight higher in the boat, which would raise the boats' centre of gravity closer to an undesirable level. This would reduce their stability. However, in reality, the thicknesses of the logboats' floors varies greatly. This section examines the ratio between the floor and side thickness to determine whether there is a standardisation of this variable.

Table 7.7: Irish and Scottish thickness coefficients.



A total of forty-four Irish (11%) and twenty-four Scottish (16%) boats were sufficiently well recorded to determine this ratio. These are listed in Appendix 11. The lowest value comes from Ballinhort, Castlefreke, Fahy and Moy in Ireland, all of which have a ratio of 1. This means that their floor and side thicknesses are the same. Castlefreke and Fahy are 4cm thick and Moy is 5cm.

However, Ballinphort's sides and floor are 10cm thick, which is quite excessive, and would suggest the possibility that the boat remains in an unfinished condition.

In Scotland the lowest ratio is 1.3, which is shared by four boats, Dumbuck, Hutcheson Bridge, Kilbrinie Loch 3 and Littlehill. The highest Irish ratio (Hacknahay) is 5.3. The highest Scottish ratio is 3.8 (Friarton). The majority of both countries' logboats have ratios between 1.3 and 2.9 (thirty-six Irish and twenty-one Scottish), which suggests a general correspondence in the preference of relative thicknesses in each country. For structural purposes alone, the thicker a logboat's sides, the more durable it is. This leads to a reduced stability and reduced freeboard.

#### **7.7 LOGBOAT DIMENSIONS, DATING EVIDENCE, ENVIRONMENT AND NAVAL ARCHITECTURE**

Irish and Scottish logboats have similar dimensions, with the exception of a few Irish boats which cover a greater range. This is probably a reflection of the greater number of boats in the Irish series. The comparable dimensions are a reflection of the available tree sizes and the builders' requirements. It would be impracticable to cut down a large tree to make a small boat.

The available evidence shows that there is no correlation between the range of dimensions, dating and the environment in which the boats were found, except that all the larger boats were recovered from either large lakes or lakes with navigable inlets or outlets (Sections 10.5 and 10.6). This would suggest that these boats not only had large carrying capacities but were also used for relatively long distance travel. The rivers from which the larger boats were recovered were all navigable for most of their lengths (Sections 10.5 and 10.6).

It is often difficult to establish whether the recorded boats' heights are to the original gunwales. They may have been worn through erosion or damage and been recorded, when found, as the original heights. It is believed here that most of the heights recorded below 30cm are not to the original gunwales since this would result in very little freeboard and minimal carrying capacity.



The boats with the largest heights, such as Lurgan, River Barrow 2 and Loch Arthur, are also among the widest.

The logboats' floor thicknesses and the proportion of their thickness to that of the sides shows that in almost every instance the builders were concerned with maintaining a relatively low centre of gravity by leaving the floors as the thickest part of the boats. There are some exceptions, such as Castlefreke, where the floor and sides have the same thickness. This increased side thickness results in a more structurally sound boat, but with a higher centre of gravity, which reduces stability and causes the boat to roll more (Sections 13.3 and 13.8).

## CHAPTER 8

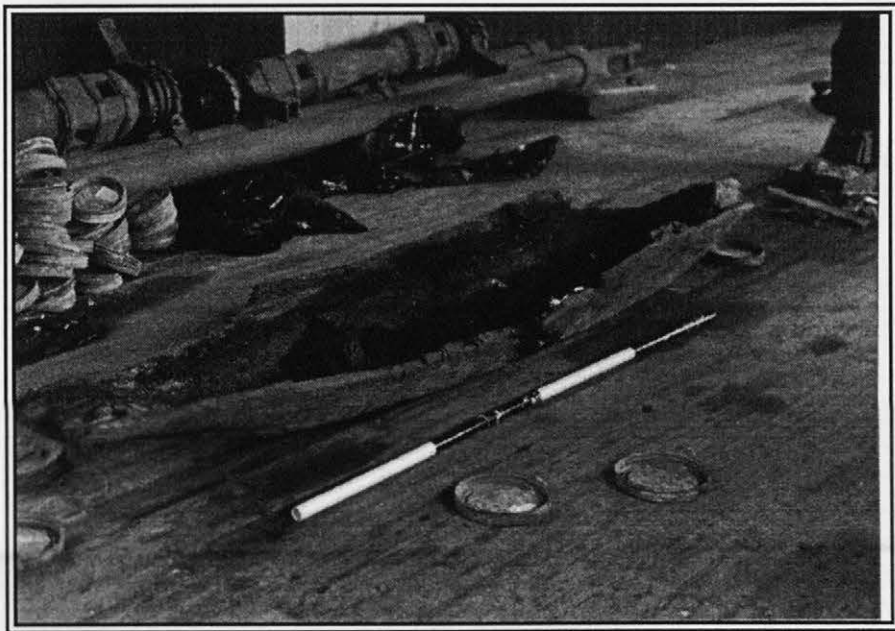
### LOGBOAT FEATURES

#### 8.1 INTRODUCTION

This chapter analyses and compares Irish and Scottish non-constructural logboat features.

#### 8.2 DUCK-BILLED PROJECTIONS

Duck-billed projections are found on five Irish logboats. They are listed in Appendix 4. They are flat horizontal rectangular projections from the boat's end at gunwale level. They are found in Bellarena, Maghery 1, Mullaghcloe, Toome 1 and West Ward 2. Their function may have been to facilitate entry to and exit from the boats. However, since there are only five boats in which this feature appears, this may not have been their intended purpose.



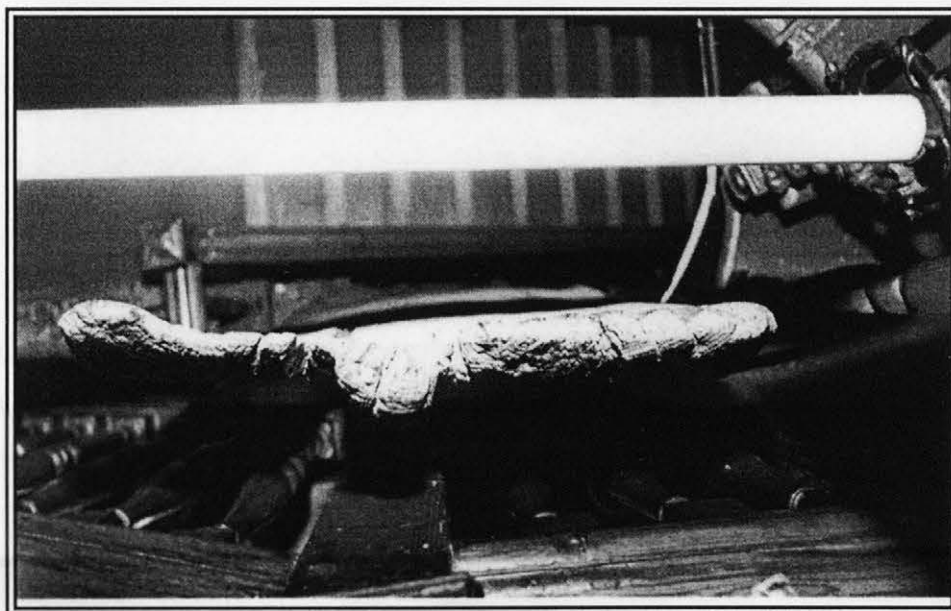
*Plate 8.1: West Ward 2. The boat's bow supports a duck-billed projection.*

Thomas' pictogram of the seige of Enniskillen (Figure 3.1) shows all the logboats with duck-billed projections from their sterns. Some of them appear to support ladders. It is very unlikely that they are skeuomorphic since there are no known parallels in other types of boat.

All the logboats found with this feature have them on the bow, except Toome 1, which has them on each end. There is no correlation to size, boat shape, or location. Although Maghery 1 and Toome are both from Lough Neagh, they were found 25km apart.

### 8.3 FALSE KEELS AND BOW EXTENSIONS

A number of the Irish and Scottish boats have been recorded as having false keels and/or bow extensions. They are listed in Appendix 4. There appear to be no similar examples in England or Wales. The first is a keel of very little depth along the boat's longitudinal axis externally, for its full length; the second –a bow extension- is a short projecting sub-rectangular block extending from one end, usually the bow, at gunwale level.



*Plate 8.2: View of Eadarloch's end, in which the cross-sectional profile shape of its false keel can be seen.*

There is one example of each type in both Ireland and Scotland. The boat from County Waterford was noted as having a 'keel' (Hughes, 1840-4: 247); this is of the first type.

Eadarloch (Scotland) has a sub-rectangular keel on its longitudinal axis which measuring 6.5cm wide by 3.3cm in depth. Lisnagonnell 4 (Ireland) has two projections of the second type; one on each end, both of which project for 20cm. The bow extensions (similar to Loch Arthur 1) also has a mooring hole horizontally through it measuring 15cm by 7.5cm. Loch Arthur 1's bow extension has been perceived to be a figurehead (Section 8.4 para 2). Loch Glashan 1 has a bow extension which projects for 3.5cm and is 5cm in width.

The false keel (under the boat) is not deep enough to provide directional stability when in motion, since uneven distribution of weight in the boat would counter this effect (Section 12.9.4 para 4-5). It is probable that they either served to prevent excessive abrasion on the underside of the hull from beaching the boats, or were skeumorphic copies of plank-built boats.

The end projecting extensions were probably intended as fenders against damage. McGrail (1978, i: 67) cites the Lurgan boat's internal longitudinal ridge as a 'keelson'. However, Section 5.2.5 shows that the boat was unfinished, so the 'keelson' was a result of the incomplete construction process.

#### **8.4 'FIGUREHEADS'**

McGrail (1978: 67) notes instances from other writers, such as Hornell, Longstaff and Durham, of ethnographic examples of figureheads associated with logboats. These are all on expanded logboats. However the only three possible examples of this from non-expanded logboats are Loch Arthur 1, Loch of Kinnordy and Errol 2, in Scotland.

Gillespie (1874: 22) noted that Loch Arthur 1's bow had a 'remarkable prolongation resembling the outstretched neck and head of an animal'. In this, Mowat (1996: 54) notes the three steps at the base of the head to strengthen it. Loch of Kinnordy's bow is so worn that it vaguely resembles a

zoomorphically-shaped head. Hutcheson (1897: 266-7) said that a circular hollow on the boat's end was used to secure a figure head. However, since this was not found, it is purely a conjecture. Loch Arthur 1's 'figurehead' is very worn and it is difficult to establish if this was its original purpose. It may simply have been a redesigned duck-billed projection.

## **8.5 MOORING HOLES**

Seven Irish and ten Scottish logboats have mooring holes. They are listed in Appendix 4. Except for Black Loch (Scotland), which has two (both in the stern), all have one hole. All the mooring holes are vertical except for Loch Arthur 1. A 12.7cm diameter horizontal hole in the extension probably served as a mooring hole. As well as being suitable for a rope, the vertical mooring holes could have been used to secure the boat by a pole or paddle stuck into the bed of the river or lake.

There appears to be no correlation between length or logboat form and the presence of mooring holes. The longest Scottish boat is the dissimilar-ended Loch Arthur 1 which measures 13.72m. The two largest Irish boats with a mooring hole, Derryinver and Lisnagonnell 4, both measure 7.62m long, and are tapered canoes in form. There also appears to be no correlation in the distribution of logboats with mooring holes.

## **8.6 NAILS**

Thirteen Irish and three Scottish boats have iron nails. All of them are used in repairs (discussed in Section 8.8). Five Irish and two Scottish boats have fewer than ten nails and two Irish and one Scottish boat have more than ten nails, while the quantity used in the remaining boats was not noted.

## 8.7 RAISED BOWS

The only boat in Scotland or Ireland with a raised bow is Cahore 1, Ireland (Figure 1.2). The sheerline of this 6.7m boat is 60cm from the bottom at its highest point, 17cm above the general line of the gunwale. As this boat has washstrakes to prevent or minimise swamping from wave action, the raised bow may have been for the same purpose. This boat was recovered from an estuary - a consideration which can not be overlooked. Both its proximity to the sea and the raised bow suggest it may have been designed specifically for use at sea, possibly for fishing. A similar feature to it can be seen in the Aran Islands' currachs and Kerry naevogs; traditional wooden-framed skin boats with raised bows (Severin, 1978: 33).

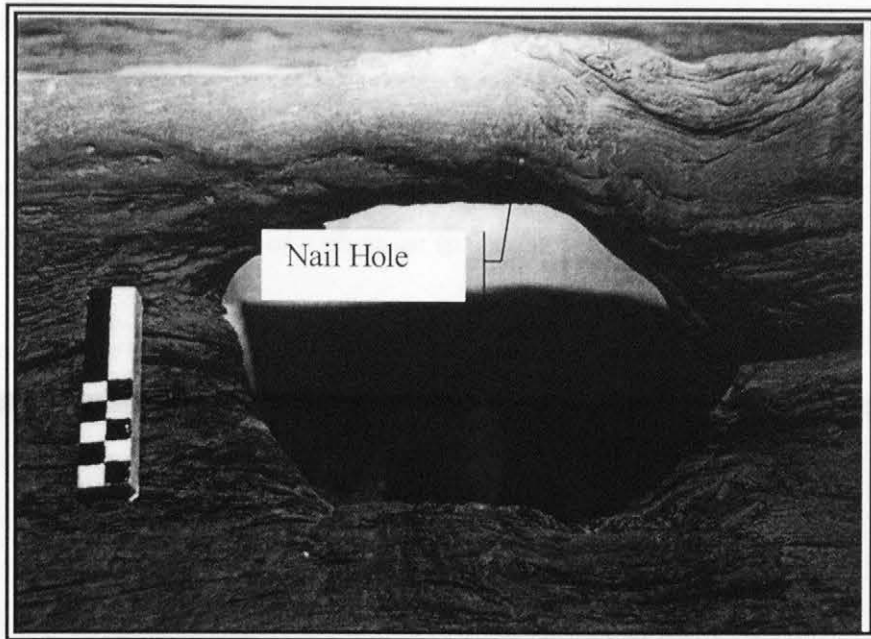
## 8.8 REPAIRS

Twenty-seven Irish (7%) and twelve Scottish (8%) boats have been recorded as repaired. There are two types of logboat repairs, preventative and post-damage. Both methods employ a pulling technique while the application of a patch is used in post-damage repairs only.

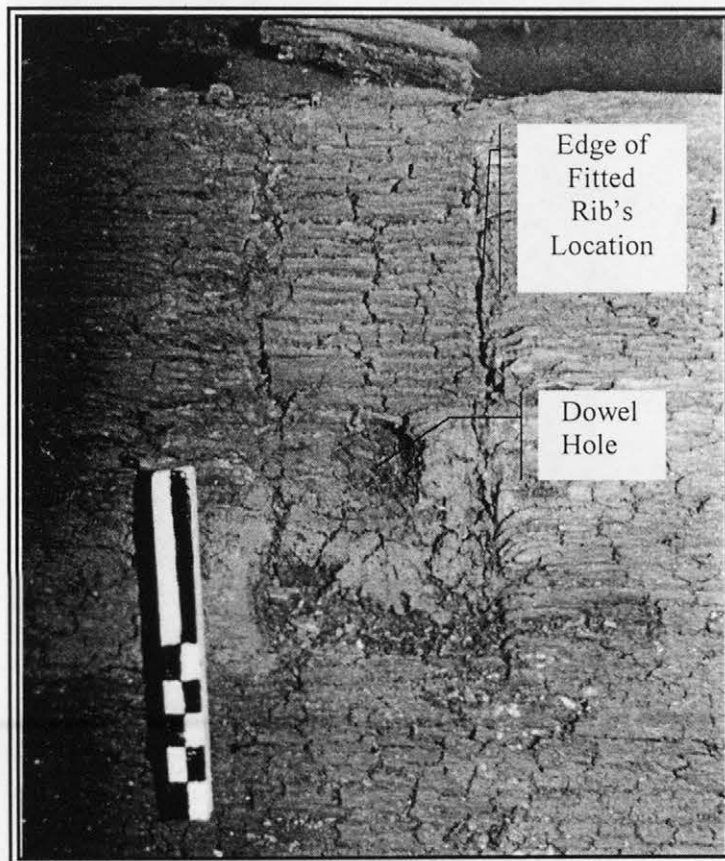
The presence of repairs suggests two scenarios, firstly longevity of an individual logboat, and secondly the use of poor quality tree trunks, such as logs with twisted and distorted grains, or the presence of knots which result in an inherent weakness in the wood. Unfortunately, the presence of knot holes in logboats is rarely recorded, and knots even less so.

Of the seventeen Irish (4%) and twenty-five Scottish (17%) boats which are recorded with knots or knot holes, four Irish (24%) and three Scottish (12%) boats have repairs noted. This may suggest that logboats with inherent or developed weaknesses in them were considered equally worth repairing.

A number of logboats may have been fitted with ribs to prevent splitting. Since splitting occurs along the grain parallel to the boats' long axis, a fitted rib whose grain is perpendicular to the boats' grain strengthens the hull, in spite of puncturing the hull with dowels.



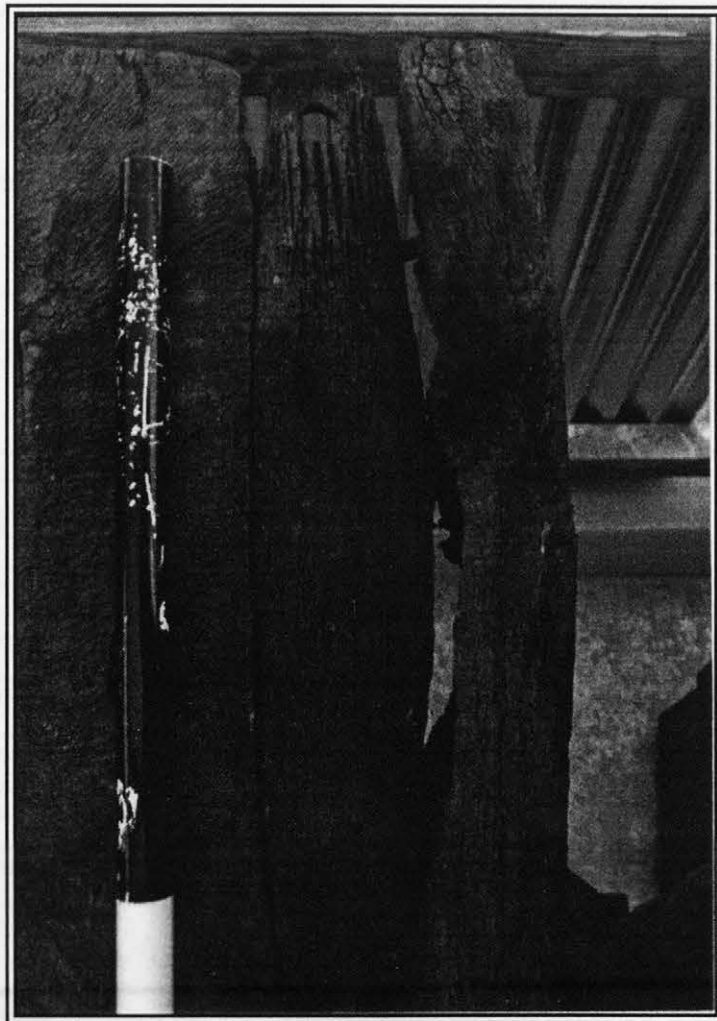
*Plate 8.3: Loch Doon 3. Detail of a repaired knot hole surrounded by small nail holes.*



*Plate 8.4: Lough Ennell 2. Detail of a fitted rib repair and dowel hole.*

The most easily identifiable preventive repair is a rib or bar of wood dowelled to the upper surface of a boat's end where the beginning of a split along the grain is first discernible. Mullynascarty (Ireland) had evidence of fitted ribs on its stern, where a previous post-damage repair had been performed on a split on the port quarter. Superimposed on this were three dowel holes across the stern which would have retained a rib or bar to prevent further splitting.

There was a wide variety of repair methods with few common features, except for the twenty-five Irish and twelve Scottish boats which were repaired using patches, with either nails or dowels.



*Plate 8.5: Mullynascarty. Detail of its repaired stern.*



One of the Irish repaired boat's details (Portadown 1) were not recorded. The remaining Irish boat repairs used a pulling together technique, of which Kilturbid, Lough Gara 8, and Lough Ennell 1 had fitted ribs or bars. Derrymore had an 'iron staple' (Seaby, 1960: 59) which was hammered into the bow to prevent a split from worsening. The method of pulling a split together in the Claggaranagh boat is very unusual and has no recorded duplicate. It is split in two places from the bow to the boat's floor. Small alder wedges of 1.6 to 3.2cm in length were driven into the floor on either side of the splits and were used to stitch the splits together.

The eleven Scottish logboats, whose number of repairs are noted, have either one or two repairs. Of these, six (55%) have two repairs (e.g. the River Clyde boat), and five (45%) have one repair (e.g. Dowalton Loch 3). Eighteen (67%) of the Irish repaired boats have one repair and seven (26%) have two repairs. The remaining three logboats (11%), Lough Ennell 1, Ballinphort and Clooncunny 2, have three, four and six repairs respectively.

*Table 8.1: Methods of repair.*

| Method of Repair                    | No. of Irish | Example     | No. of Scottish | Example            |
|-------------------------------------|--------------|-------------|-----------------|--------------------|
| Single wooden patch & dowels        | 11           | Bellarena   | 4               | Dumbuck            |
| Single wooden patch & nails         | 9            | Annagh      | 3               | River Clyde        |
| Single wooden patch, nails & dowels | 3            | Derrya 1    | 0               |                    |
| Double wooden patch & nails         | 1            | Kilturbid   | 0               |                    |
| Recessed patch & dowels             | 1            | West Ward 9 | 2               | Buston 1           |
| Lead patch & nails                  | 0            |             | 1               | Clydehaugh 2       |
| Metal patch & nails                 | 0            |             | 1               | Kilbrinie Loch 1   |
| Plugged knot hole                   | 0            |             | 1               | Dowalton Loch<br>3 |
| Double wooden patch & stitch        | 1            | Ballinphort | 0               |                    |
| Recessed patch & stitch             | 1            | Ballinphort | 0               |                    |

## 8.9 RIBS

There are two types of ribs; integral ribs (transverse ribs left in the solid) and fitted ribs. They are listed in Appendix 4..

### 8.9.1 Integral Ribs

Hornell (1946: 187) notes that transverse ribs effectively provide no extra strength. He suggests they are solely skeuomorphic. Clark (1952: 187) states that since a number of integral ribs did not extend up the sides, they could not be considered as skeuomorphic. The possibility remains that they may have initially extended to the sheerline as skeuomorphs and that the part of them on the floor was found to serve a useful function. As a result they may have been retained. They definitely provided no additional strength to the hull. The greater thickness of either end of the boats, does not prevent radial splitting of the log. The reason why ridges fail here is because they are aligned with the grain of the log and thus have no effect on strength and durability.

Integral ribs vary in height, so that when they are as high as the gunwales, for example the Clapton logboat (England), they are termed bulkheads. There is no evidence for bulkheads in the Irish or Scottish boats. However, they may have been used as footrests when rowing such as the River Barrow 2 logboat; but thwart rests and/or thole pin holes must be present before this can be considered conclusive. River Barrow 2 also had corresponding thwart rests. Another possible function of integral ribs would be to hold planking above the boat's floor and to create a bilge area, which could keep its occupants' feet dry. However this would entail a composite component for which there is no evidence.

With one exception, Church Island 1 (County Sligo), all Irish and Scottish logboats' integral ribs are transverse. When Church Island 1 was examined underwater, with virtually no visibility. The presence of what may have been an internal ridge running along the longitudinal axis was noted.

There is a very unusual integral rib in Crevinish 1, County Fermanagh. It is U-shaped in plan with each end terminating at the chines and pointing towards the stern. This unusually shaped ridge may have been designed to serve some indeterminate function. The only similar feature to this appears to be from the Doon 2 boat (County Clare), which is discussed in Section 8.9.2 para 6.

### 8.9.2 Fitted Ribs

McGrail (1978: 58) notes that fitted ribs are often used in modern expanded logboats to retain their shape. Again Ellmers (1973: 31) suggests that their use in non-expanded logboats have skeumorphic origins. However, as McGrail (1978: 58) suggests, they could have been used to support washstrakes, thwarts or used as footrests. They were also used to support extensions; the only example of this from Ireland or Scotland is Cloocunny 2 (County Sligo). It is not unusual for fitted ribs also to be used to strengthen the hull, such as Kilturbid (Ireland), where a split had occurred in the boat's floor. The rib was used to close and tighten the resulting gap. It may also be possible that fitted ribs were put in boats to prevent any possible development of weakness (Section 8.8 para 3-4).

As with transverse ridges, ribs may have been used to support planks, but again evidence for this does not survive.

McGrail (1978: 59) divides fitted ribs into four categories:

- a) single-piece ribs with a double curve, which 'are symmetrical and most extend from sheer to sheer';
- b) alternating half-ribs plus side-timbers, 'L-shaped grown timbers with vertical arms on alternative sides';
- c) separate half-ribs, 'L-shaped half-ribs, which do not extend to the centre-line or the top edge of the boat'. He cites Buston 1, Ayrshire, as having similar oak or birch fittings as an example; however, they extend to the gunwales;
- d) paired alternating half-ribs which 'fasten together by three near-horizontal treenails'.

The categories which concern the Irish and Scottish boats are:

- a) the single-piece ribs with a double curve (Clooncoe 1, County Leitrim);
  - b) the separate half-ribs of which Buston 1 is the only evident example in either Ireland or Scotland;
  - c) the paired alternating half-ribs. The only example of this is from Lough Gara, Co. Sligo.
- Two other types of fitted ribs are:
- d) single-piece ones which do not extend up the sides (Kilturbid) (Section 8.8 para 3-4),
  - e) paired half-ribs which are set end to end on the centre-line and extend up to the gunwales, of which Cloocunny 2 appears to be the only example in the Irish or Scottish series.

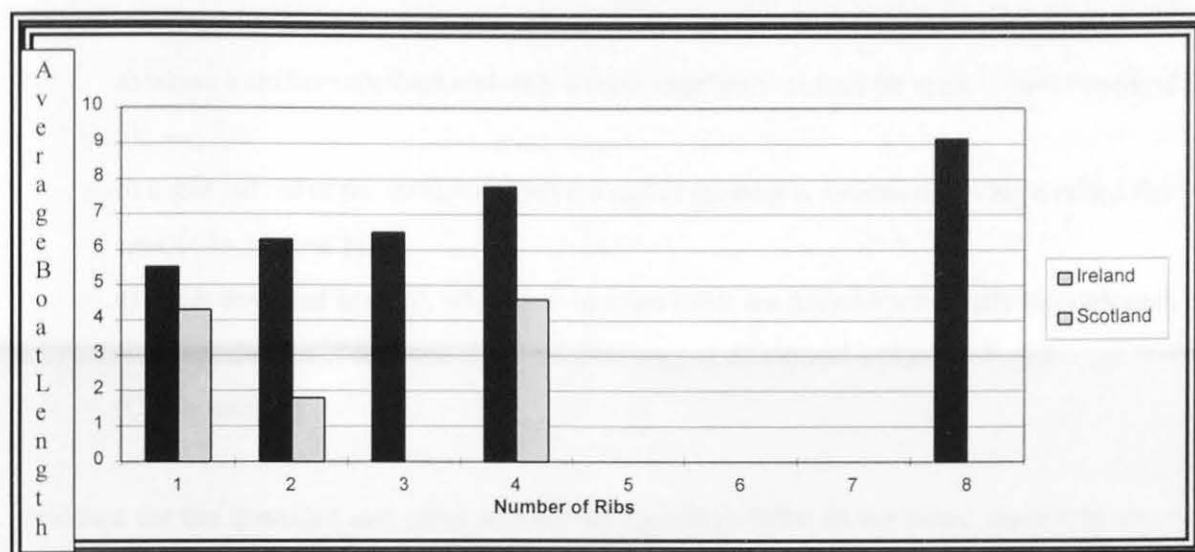
Most of these boats have evidence of fitted ribs in the shape of transverse dowel holes and, less frequently, indentations in the floor where they were previously located.

The Doon 2 (Ireland) logboat contains evidence for a fitted rib which is similar to Crevinish 1's unusual transverse ridge. This fitted rib placement, located in the bow was noted in the National Museum of Ireland's 'Topographical Files' as 'roughly cut grooves...[which] were cut in the base and sidewalls of the vessel'. They 'were set at an obtuse angle to one another, the apex pointing toward the bow'.

### **8.9.3 The Archaeological Evidence**

There are a total of forty-two Irish (10%) and fourteen Scottish (9%) logboats which have fitted or integral ribs, of which only two Irish boats (Ballinhort and Cahore 2) and one Scottish boat (Buston 1) have both. Of these, twenty-five Irish boats have fitted ribs and nineteen have solid ribs, or evidence of them. In Scotland there is evidence for nine boats with fitted ribs and six with solid ribs.

Table 8.2: Average Irish and Scottish logboat lengths and the number of ribs.



The greatest number of ribs in one boat in the Irish series is eight, Clooncoe 1, whereas it is four in the Scottish boats, (Cambuskenneth, Dalmuir, Dernaglar Loch and Loch Kinord 2). When the Irish boats' lengths are considered there is a positive correlation between the numbers of ribs and length. Table 8.2 indicates an average length of 1.8m for Scottish boats with two ribs, since the only boat with two ribs (Kilbrinie Loch 4) measures 1.8 m in length and does not survive to its full extent.

However there is a tendency for the Irish boats to be slightly longer than those of the Scottish for the same number of ribs. Both countries have the same average length of 5.4m for one rib. From this point the ratio increases to an average length of 7.3m and 5.9m for four ribs in the Irish and Scottish series respectively.

### 8.10 SEATS

Apart from thwart rests which are discussed in section 9.2.1, there is evidence for other types of seats in both countries, all of which are situated in the logboats' ends.

There are three types:

- a) where a sufficiently thick end with a level upper surface may be used, (Unprovenanced 5);
- b) a seat cut out of the solid, in which the end of the boat is hollowed leaving a raised flat area, (Cloontarsna 1);
- c) a seat dowelled in place, where two or more holes are drilled horizontally through each side near the end of the boat. They are then pegged, to support a plank or board (Clooncunny 2).

Evidence for the dowelled seat often survives as horizontal holes in the sides, since they rarely retain the dowels.

There appear to be only two Irish boats with level ends large enough to be used as seats. While this can be considered dubious evidence for a seat, the raised area provides greater comfort than kneeling, and the elevated position may provide greater leverage when propelling the boat. Seats cut out of the solid survive in seven Irish and one Scottish boat. Brockish is quite unique since its seat is cut out of the solid on the starboard side at the stern while the portside which is completely hollow retains a boulder. This may have been used as ballast. The Loch Arthur 1 logboat has three steps situated on the back of a 'figure-head' which could have been used as a seat.

Three Irish and one Scottish boat have evidence for dowelled seats. Although this form of seat can be seen to be thwart rests, they are considered to be such only if they directly affect the actual construction of the hull walls. The Irish examples are Clooncunny 2, Fahy, and Mullan Lower 1, and the Scottish example is Closeburn. Fahy differs from the others, but is similar to the Hasholme logboat in so far as it has a dowelled plank, covering a fitted transom, which could have served as a seat.

## **8.11 STRAKES**

There are three types of strakes; side extensions, washstrakes and running strakes, which are listed in Appendix 4. Side extensions have already been discussed as a constructional feature in Section 5.4.3 para.1-3.

### **8.11.1 Washstrakes**

Similar to extensions, washstrakes consist of an increase in the height of the sides, by using planks to prevent the boat swamping. They differ from extensions in that they are not situated along the full length of the sides, but are restricted to either end. The only possible evidence for these came from two Scottish boats, Erskine 1 and Buston 1. Erskine 1 had a 90cm long bent piece of wood which was dowelled to the starboard side. Buston 1 had a 'sort of gunwale' dowelled to the sides, which projected beyond the stern and measured a few feet in length (Mowat; 1996: 14).

### **8.11.2 Running Strakes**

Running strakes or external longitudinal timbers serve the double function of protecting the sides of the boats from wear and damage, also increasing the boat's stability. They are secured to the sides on or adjacent to the waterline. Claddagh River (Ireland) is the only possible example in which it was noted that two pieces of wood were attached to the sides with iron nails.

## **8.12 CONCLUSION**

With the exception of false keels, figure heads, integral ribs, and possibly duck-billed projections all other logboat features serve particular functions. There are no concentrations in the distribution of logboats with any of the features (Section 10.6). Neither is there any correlation with the environment in which they were used nor with their form (or boat typology),(Section 10.6).

The only features which show a tendency to increase in quantity proportionately with boat size are ribs. When logboat endurance is considered, the only essential feature is a repair. Unlike preventive repairs, the post-damage repairs show a remarkable diversity in the materials and manner in which they were applied. The implication of this is that while there is consistent uniformity in the manner of boat construction and little variation in the boat forms, there is no universal way of repairing them.

The two most enigmatic features are duck-billed projections and figureheads. The duck-billed projections are not known in other types of boat. Since they are cut from the solid and project from the boat's exterior, they would be too much trouble to incorporate if they were simply skeumorphic. The two bow projections called figureheads are crude in outline. If the builders intended them as figureheads, it seems reasonable to assume that they would have carved them in more definite shapes. However it may be possible that these features have been worn from their original forms.



## CHAPTER 9

### PROPULSION

#### 9.1 INTRODUCTION

Various methods have been used to propel logboats. These are: rowing; sailing; paddling; and punting. Practical experiments (Section 12.9.4) have shown that logboats were not sculled. Rowed and sailed logboats require distinctive features incorporated into them, which are listed in Appendix 4. Paddling and punting require no features on the boat and can only be determined by direct evidence of poles or paddles found with the boats.

#### 9.2 ROWING

Three types of features provide evidence for rowing; thwart rests; footrests; and thole pin holes. Quite often the only surviving part of the logboat is the bottom. Hence, evidence for rowing is often dependent solely on the existence of footrests.

Outside of Scotland and Ireland, only two boats may have been rowed. The first is from Vaaler Moor, Germany and the other was found in Polada, Italy (McGrail, 1978, i: 77).

Seaby (unpublished) listed eleven rowing logboats from Northern Ireland. He appears to have been the first to classify them in a distinctive group, irrespective of boat form. He suggests that it was the latest type to develop and that they pre-date the second half of the sixteenth century AD. From the dated evidence (Table 9.1), rowing logboats are not a late development. The two earliest Irish dated rowing boats are River Foyle and West Ward 6, both of which have been radiocarbon-dated to  $510 \pm 30$  AD. However, Erskine 6 (Scotland) has been dated to the first century BC. A total of seven Irish and one Scottish rowing logboats have been dated, 14% and 13% of the rowed logboats respectively.

Table 9.1: Dated Logboats with Rowing Features.

| Boat Name   | Date      | Reference Table |
|-------------|-----------|-----------------|
| Ireland     |           |                 |
| Aughamullan | 590±100AD | Table 4.2       |
| Bannmouth   | 605±30AD  | Table 4.2       |
| Copney      | 1365±30AD | Table 4.2       |
| Inch 3      | 1188±22AD | Table 4.1       |
| Levaghery   | 833±52AD  | Table 4.2       |
| River Foyle | 510±30AD  | Table 4.2       |
| West Ward 6 | 510±30AD  | Table 4.2       |
| Scotland    |           |                 |
| Erskine 6   | 45±50BC   | Table 4.2       |

### 9.2.1 Thwart Rests

Thwart rests by themselves are not sufficient evidence to show that the boat was rowed. They must be accompanied by either footrests, thole pin holes, or both (Sections 9.2.2, 9.2.3 and 9.2.5, and Tables 9.2 and 9.3). There are thirty-two Irish and nine Scottish logboats which have evidence for thwart rests. Thwart rests consist most commonly of internal opposing blocks of wood which are left proud of the boats' sides and are an integral part of the hull (Type 1; Table 9.2). There are sixteen Irish and eight Scottish examples of these. A board is then placed on the opposing rests, such as Baronscourt (Ireland). The other less common practice is where the side is partly hollowed, leaving a flat ledge, of which there are twelve Irish and one Scottish example (Type 2; Table 9.2), such as Ballinderry 3 (Ireland).

A further seventeen Irish and ten Scottish boats have evidence for thwart rests which have no associations with other rowing features.

### **9.2.2 Footrests**

Footrests are fashioned in a variety of manners. With the exception of using fitted ribs for this purpose, such as Fahy (Type 1; Table 9.2), the remainder are carved out of the solid. The bar or ridge variety is a simple integral transverse rib left proud of the bottom for the width of the floor, of which the only example is River Barrow 2 (Type 2, Table 9.2). The most prolific type of which there are fourteen Irish and two Scottish boats, is a pair of blocks left proud of the floor, for example West Ward 6 (Type 3; Table 9.2). They are either D-shaped, triangular or square. The remaining two types of footrests are a pair of L-shaped blocks, Inch 3 (Type 4; Table 9.2), six Irish and none from Scotland, or a pair of hollowed depressions (Termonbacca 2), of which there are one Scottish and two Irish examples (Type 5; Table 9.2).

In total there are twenty-five Irish and four Scottish logboats which have evidence for this feature.

### **9.2.3 Thole Pin Holes**

There are two types of thole pin holes or mounts. The first (Type 1; Table 9.2) is where the gunwale thickens slightly to accommodate the hole in which the pin is mounted, for example Coleraine. The second (Type 2; table 9.2) is an inward protrusion of the gunwale where the hole is drilled directly through to its underside, for example West Ward 6. In Ireland there are four boats of the first type and twelve of the second type. The two Scottish boats whose thole pin holes are sufficiently well recorded are of the second variety. In total twenty-two Irish and five Scottish logboats are recorded with thole pin holes.

### **9.2.4 Literary Evidence for Rowing**

The only literary evidence for rowing comes from Lucas (1963: 60) which records the Papal Nuncio being rowed in a logboat in Lough Derg, County Donegal, in 1517. However, McGrail (1978: 74-5) suggests that the record which was originally translated from Italian may have been a

'general reference to some form of propulsion' (McGrail, 1978 i: 75). But section 4.4.2 shows that rowing logboats were definitely used in Ireland from *circa* 500 AD, so it is quite probable that the Papal Nuncio was rowed.

### 9.2.5 Archaeological Evidence

Thirty-eight and eight Scottish logboats have direct evidence for rowing (Table 9.2). Of these, seven Irish boats have all three features such as Glassaneeran Upper 2 (Ireland), whereas no Scottish boat has all features. Two Irish and one Scottish boats have footrests and thole pin holes (Levaghery; Ireland, and Bowling 2; Scotland), while nine Irish have thwarts and thole pin holes (Ballinderry 3). Three Irish boats (Creagh 1) have a combination of thwart and footrests. Twenty-eight Irish and sixteen Scottish boats have just one of the features (Aughamullan, Ireland, and Erskine 1, Scotland).

*Table 9.2: List of Logboats with Thwart Rests, Footrests and Thole Pin Holes.*

| Boat Name      | No. of Thwart Rests/Type | No. of Foot Rests/Type | No. of Thole Pin Holes/Type |
|----------------|--------------------------|------------------------|-----------------------------|
| <b>Irish</b>   |                          |                        |                             |
| Aughamullan    |                          |                        | 2/Type Unknown              |
| Ballinderry 3  | 2/Type 2                 |                        | 2/Type 2                    |
| Ballynahinch 3 |                          |                        | 6/Type Unknown              |
| Ballyscullion  |                          | 4/Type 4               |                             |
| Bannmouth      |                          | 4/Type 4               |                             |
| Baronscourt    | 4/Type 1                 | 4/Type 3               | 4/Type 1                    |
| Beltoy 2       | 4/Type Unknown           | 4/Type Unknown         | 4/Type 1                    |
| Callow         |                          | 8/Type 3               |                             |
| Claggarnagh    |                          | 2/Type 5               |                             |
| Clooncunny 1   |                          | 10/Type 3              |                             |

Table 9.2 (continued): List of Logboats with Thwart Rests, Foot Rests and Thole-pin Holes.

| Boat Name            | No. of Thwart Rests/Type | No. of Foot Rests/Type | No. of Thole Pin Holes/Type |
|----------------------|--------------------------|------------------------|-----------------------------|
| Coleraine            | 2/Type 2                 |                        | 2/Type 1                    |
| Collinstown          | 2/Type 2                 |                        |                             |
| Copney               |                          | 2/Type 3               |                             |
| Creagh 1             | 1/Type 1                 | 1/Type 4               |                             |
| Creagh 3             | 1/Type 1                 |                        |                             |
| Deerpark             | 1/Type 2                 | 2/Type 3               | 2/Type 2                    |
| Derries Lower 4      | 4/Type Unknown           |                        |                             |
| Derryad 2            | 10/Type 2                |                        |                             |
| Derrybroughas        | 4/Type 1                 |                        |                             |
| Derryco              | 10/Type 2                |                        |                             |
| Derryinver           | 12/Type 1                |                        |                             |
| Derrymore            | 14/Type 1                | 17/Type 3              | 9/Type 2                    |
| Drumleague           |                          |                        | Present/Unknown             |
| Dunshaughlin 1       | 10/Type 2                |                        | 8/Type Unknown              |
| Edenacrannon 2       |                          |                        | 2/Type 1                    |
| Fahy                 |                          | 2/Type 1               |                             |
| Glassaneeran Upper 2 | 4/Type 2                 | 4/Type 3               | 4/Type 2                    |
| Inch 3               |                          | 4/Type 4               |                             |
| Irishtown            |                          | 2/Type 3               |                             |
| Kinnegoe             | 2/Type 1                 |                        | 2/Type 2                    |
| Lemonfield           | 2/Type 2                 |                        | 2/Type Unknown              |
| Levaghery            |                          | 2/Type 4               | 1/Type 2                    |
| Lisnagonnell 4       | 3/Type 1                 | 5/Type 3               |                             |
| Lough Ennell 1       | 6/Type 1                 |                        |                             |
| Maghery 1            | 4/Type 1                 | 10/Type 4              | 10/Type 2                   |
| Moy                  | 2/Type 2                 |                        |                             |
| Mullaghcloe          |                          | 8/Type 3               |                             |

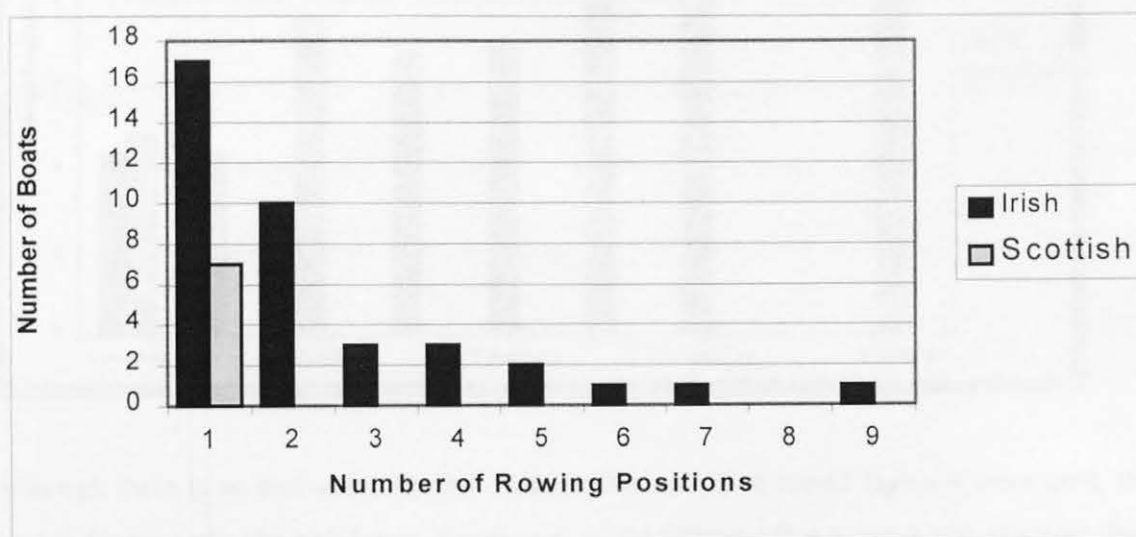
Table 9.2 (continued): List of Logboats with Thwart Rests, Foot Rests and Thole-pin Holes.

| Boat Name               | No. of Thwart Rests/Type | No. of Foot Rests/Type | No. of Thole Pin Holes/Type |
|-------------------------|--------------------------|------------------------|-----------------------------|
| North Ward              | 2/Type Unknown           |                        |                             |
| Portanure               | Present/Unknown          |                        |                             |
| Portmore                | 12/Type 1                | 12/Type 3              |                             |
| River Barrow 2          | 14/Type 1                | 14/Type 2              |                             |
| River Foyle             | 2/Type 1                 |                        | 3/Type 2                    |
| Termonbacca 1           | 2/Type 1                 |                        |                             |
| Termonbacca 2           |                          | 2/Type 5               | 2/Type Unknown              |
| Town parks              | 4/Type 1                 |                        | 4/Type 2                    |
| Unprovenanced 6         | 4/Type 1                 |                        | 4/Type 2                    |
| West Ward 2             | 2/Type 2                 |                        | 2/Type 2                    |
| West Ward 6             | 2/Type 2                 | 2/Type 3               | 1/Type 2                    |
| Whitewood 3             |                          | 2/Type 3               |                             |
| Whitewood 4             |                          | 6/Type 3               |                             |
| <b>Scottish</b>         |                          |                        |                             |
| Black Loch              |                          |                        | 1/Type Unknown              |
| Bowling 2               |                          | 2/Type Unknown         | 2/Type Unknown              |
| Buston 1                |                          |                        | Present/Unknown             |
| Buston 3                | Presence Noted/ Type 1   |                        |                             |
| Dowalton loch 1         |                          |                        | 2/Type 2                    |
| Eadarloch               |                          | 2/Type 3               |                             |
| Errol 2                 | 2/Type 1                 |                        |                             |
| Erskine 1               | 8/Type 1                 |                        |                             |
| Erskine 6               |                          |                        | 1/Type 2                    |
| Glasgow, Clydehaugh 1   | 1/Type 1                 |                        |                             |
| Glasgow, Clydehaugh 4   |                          | 2/Type 3               |                             |
| Glasgow, Rutherglen Br. |                          | 2/Type 5               |                             |

Table 9.2 (continued): List of Logboats with Thwart Rests, Foot Rests and Thole-pin Holes.

| Boat Name        | No. of Thwart Rests/Type | No. of Foot Rests/Type | No. of Thole Pin Holes/Type |
|------------------|--------------------------|------------------------|-----------------------------|
| Kilbrinie Loch 3 | 1/Type 1                 |                        |                             |
| Loch Doon 3      | 2/Type 1                 |                        |                             |
| Loch Glashan 1   | 1/Type 2                 |                        |                             |
| 'Orkney'         | 1/Type 1                 |                        |                             |
| River Clyde      | 2/Type 1                 |                        |                             |

Table 9.3: Number of recorded rowing positions in Irish and Scottish logboats.

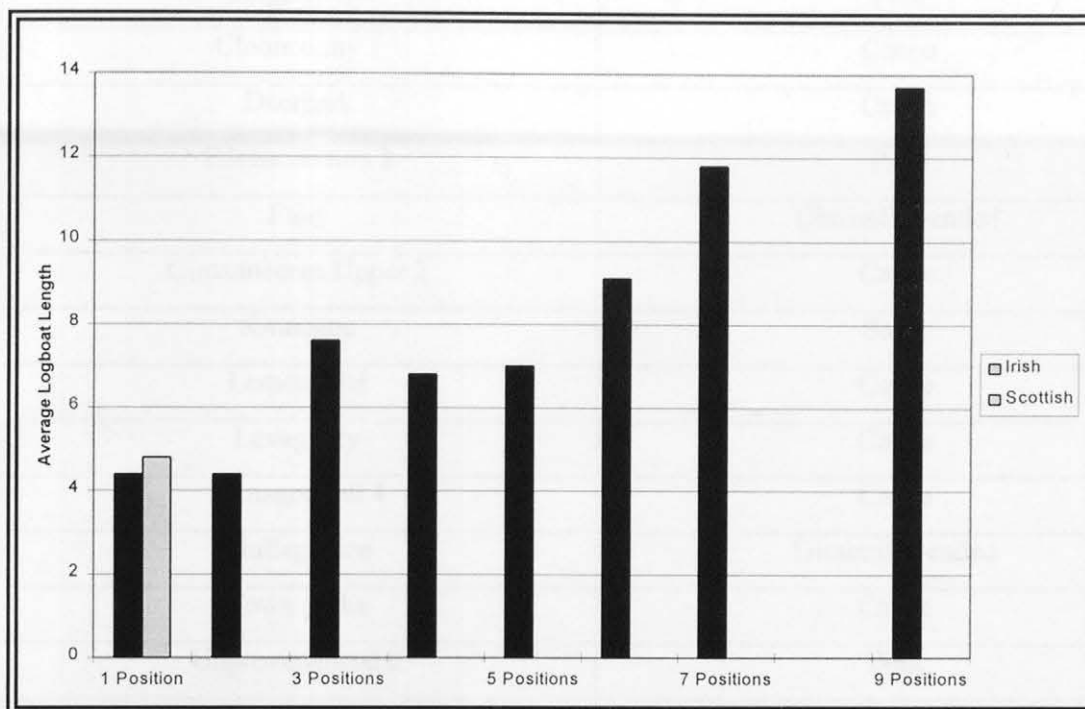


All the Scottish boats have just one recorded rowing position, while the largest grouping in Ireland is those boats which have one or two positions (54%) of which there are eleven in each group. The remaining nineteen boats (46%) have between three and nine positions, of which River Barrow 2 and Derrymore have the most, with seven and nine positions respectively.

An examination of the Irish boats' lengths show that, except for boats with four positions, there is a positive relationship between the number of rowing positions and length. The average length for boats with up to two positions is 4.4m (Beltoy 2). If boats with three and four positions are combined, the average length is 7.2m (Callow); up to six positions, the average length is 8.1m; and

for the remainder with nine positions the length of the Derrymore 13.71m. In Scotland the average length is 4.8m for the boats with one rowing position, which is slightly longer than the Irish counterparts.

Table 9.4: Number of rowing positions and average logboat lengths.



Although there is no preference for the circumstances in which rowed logboats were used, they tend to favour particular hull forms. Twenty-one of the Irish and five Scottish rowed boats' forms are recorded.

Table 9.5: Known Rowed Logboat Forms.

| Boat Name      | Boat Form |
|----------------|-----------|
| Aughamullan    | Canoe     |
| Ballynahinch 3 | Canoe     |
| Ballyscullion  | Canoe     |
| Bannmouth      | Canoe     |
| Baronscourt    | Canoe     |



Table 9.5 (continued): Known Rowed Logboat Forms.

| Boat Name                  | Boat Form        |
|----------------------------|------------------|
| Beltoy 2                   | Canoe            |
| Callow                     | Canoe            |
| Claggarnagh                | Punt             |
| Clooncunny 1               | Canoe            |
| Deerpark                   | Canoe            |
| Edenacrannon 2             | Punt             |
| Fahy                       | Dissimilar-ended |
| Glassaneeran Upper 2       | Canoe            |
| Kinnegoe                   | Barge            |
| Lemonfield                 | Canoe            |
| Levaghery                  | Canoe            |
| Lisnagonnell 4             | Canoe            |
| Mullaghcloe                | Dissimilar-ended |
| Town parks                 | Canoe            |
| Unprovenanced 6            | Punt             |
| West Ward 2                | Canoe            |
| Buston 1                   | Dissimilar-ended |
| Dowalton Loch 1            | Dissimilar-ended |
| Eadarloch                  | Punt             |
| Erskine 6                  | Canoe            |
| Glasgow, Rutherglen Bridge | Punt             |

The most frequent Irish form is the canoe, fifteen (38% of all canoe forms; Section 6.3), three are punts (10% of all punts; Section 6.3), two are dissimilar-ended (12% of dissimilar-ended boats; Section 6.3) and one is a barge (50% of barges). In Scotland, two are punts (67% of punts; Section 6.3), one canoe (10% of canoes; Section 6.3) and two dissimilar-ended boats (9% of dissimilar-ended boats; Section 6.3).

### 9.3 SAILING

Evidence for sailing is derived solely from mast steps. This consists of a large oval or sub-rectangular hole set through the boat's floor. In all cases they are surrounded by a raised area or ridge which emulates the shape of the hole. The purpose of the raised area is to strengthen the boat and prevent the bottom splitting, a result of excessive stress on this area from the wind pressure exerted on the sail. An additional purpose for the raised area is to support the mast without the aid of rigging. This requires much greater properties of strength from the boat's bottom than with the use of stays. If stays were used such large holes would have been unnecessary (Sections 12.9.1 para 6-7 and 12.9.4 para 3). The mast would have been a permanent fixture, since there would have been great difficulty in plugging such a large hole if the mast was removed.

None of these boats were found with evidence for leeboards or outriggers, which is considered to increase a sailed logboat's stability. Experimental archaeology (Section 12.9.4 para 3) shows that leeboards, keels, and outriggers were not a necessary component of indigenous sailed logboats. Their use would have hindered the boat's overall performance. Such apparatus would have detracted from the boat's manoeuvrability, speed and directional stability. A logboat's weight is concentrated in the bottom of the hull. This natural ballast provides a sufficiently low centre of gravity for a sailed logboat. It enables the boat to outweigh the force of the wind hitting the sail, even on a reach, so that it maintains an up-right state.

Five Irish logboats have mast steps. They are all basic non-expanded boats. Outside Ireland evidence comes from such places as Oceania (McGrail, 1978 i: 77-8). Of the various methods of securing the mast in the boats, Haddon and Hornell (1938: 10) note only one comparable form of mast mounting, in which cup-shaped hollows are cut in bosses on the bottom of these logboats. All the Oceania examples are expanded logboats which use outriggers. Elsewhere in Europe, the only evidence for sailing comes from Denmark, where Rasmussen (1953: 18, 19, 25, fig.4, fig.131) cites tentative evidence from the Hasselo logboat. This basic logboat had a section of the thwart cut away to hold a mast. However, the boat's bottom at this point had disintegrated considerably, which made it impossible for him to determine how the mast was secured. The ethnographic

evidence shows that masts were further secured by rigging which was fastened to the boats sides through holes, or to the outriggers.

Dingle currachs, which are quite slender, have mast steps incorporated in to their construction. Severin (1978: 24) sailed a small two-man currach. He found it 'wobbled alarmingly' and could not be sailed when pointed up-wind. However, it appears that it was successful on both running (when the wind is astern) and reaching (when the wind is on the side). This slender boat, with no keel or centreboard and light hull, was obviously capable of performing on a reach. If such light-hulled boats with a narrow beam could be sailed without outriggers, then heavier logboats could easily be sailed without any form of stabilisers.

McGrail (1978 i: 78) suggests that the Hasselo logboat could be sailed 'within a limited range of conditions', namely that the boat could only run before the wind. Lothrop (1932: 234) noted that only a small sail could be used. The greater the sail area, the more heeling force is applied to the boat, and the sturdier the mast step and any possible rigging must be.

However, a 5m long and 78cm wide sailing logboat was made in July 1995 by the writer (Section 12.9). Sailing experiments were conducted where the boat had a 2m by 2m square-rigged sail, which was hoisted 2.5m above the water level. The bottom of the sail was *circa* 20cm above the gunwales. Sections 12.9.3, 12.9.4 and 12.9.5 show that through practical trials, sailed logboats with a square-rigged sail could perform just as easily on a reach as well as on a run, with absolutely no loss of stability, manoeuvrability or directional stability. The hull itself acted both as the keel and centre board. It has also proven that this method is the most efficient means of propulsion. Other propulsion methods were used on the same boat. Over a short distance, paddling generated the greater speed, but more energy was expended. The sailing trials were performed in light winds (Force 1). If there was a stronger wind, the boat would have out-distanced the paddled boat. Short journeys (for example, travelling between the shore and an island) would have been more practical by paddle in these boats.

However, the question that now arises is that since this method of propulsion is so efficient, why then have only five of a total of four hundred and four recorded Irish logboats (and a possible sixth

from Denmark) evidence for sailing. It is possible that previously recovered logboats that no longer survived had mast steps, which were overlooked by their examiners.

The form of four of the five boats are recorded, both Crevinish 1 and Unprovenanced 1 are dissimilar-ended, Derry 2 is a tapered dissimilar-ended boat, and Drinagh is a canoe. Ballinphort's form was not noted. The longest boat is Unprovenanced 1 which measures 3.3m and has a slenderness coefficient of 4.7, the widest boat relative to its length. At the other end of the scale is Crevinish 1, which is 10.5m long and has a slenderness coefficient of 15.4, which is very slender.

The cross-section of the mast is reflected by the dimensions of the maststep. This means that the thickest and strongest part of the mast would have absorbed the stress of the wind on the sail.

The most suitable location for the mast may have been between the mid-point of the boat and its bow-most third. Those boats with the masts in the stern-half of the boat were most probably only sailed before the wind, since the criteria upon which they could reach is that it is necessary for the wind to catch and propel the boat from the bow-half, which in turn pulls the boat forward. With the mast situated towards the stern, all directional stability would be lost on a reach. This would cause the boat to either continually slew off course, or generate excessive pressure on the steering oar, so that the helmsman would be unable to effectively maintain directional stability.

A minor compensation for a sail situated towards the stern is that there would be sufficient room for a crew to sit forward of the sail and direct the helmsman on the correct course. With the sail towards the bow, the helmsman's and crew's visibility may have been impeded by the sail.

The parameter for a sufficient environment in which a sailed logboat can be used is that there is a large body of water to use the sail. All Irish sailed logboats are from large lakes, except for Drinagh, which were recovered from a bog (a previous lake of unknown size). Unprovenanced 1's find location is not known. None of the boats survive much beyond floor level. However a sufficient amount remains to indicate the original shape and extents of them. The find locations indicate that a sufficiently large body of water was required for this method of propulsion to be of

any value, since the use of a sail would have been very impractical in changing wind directions in narrow or small bodies of water.

None of the sailed logboats share the same geographical locations, which shows a general and not local knowledge of sailed logboats. A question of the lack of evidence for more of them arises considering these five boats constitute only 1% of the total from the Irish series. An insufficient recording procedure of logboats that are no longer extant, which may have had mast steps, may be a suitable answer for explaining their relative scarcity.

#### **9.4 PADDLING AND PUNTING**

There are no features associated with paddling and punting. The majority of both Ireland's and Scotland's logboats were probably paddled, with a small proportion punted. When paddles or poles are found in association with the boats, it can be concluded that they were either paddled or punted. Other logboats which have evidence for sailing and rowing may also have been either paddled or punted. Section 12.9.4 shows that paddling is a very efficient propulsive method, and that sailing is even more efficient in terms of the required energy input to propel a logboat.

In Ireland, there are four instances of paddles found associated with logboats. Of these, a paddle was found near the four boats from Lough Doon, which suggests that at least one of them may have been paddled. However, it is equally possible that the paddle was not used in any of these boats. In Scotland there are three sites which share have the same circumstances as Lough Doon. There are two boats from Bowling, six from Loch Doon, and seven from Loch Laggan. The Loch Laggan boats had a possible punt pole found near them. Barhapple Loch 2, Kilblain 1, Loch Glashan 1 and Milton Island all had a paddle, or part of one, found with the boat, while Black Loch had a possible punt pole.

Since paddles and punt poles are not fixed features of the boats, the numbers of Scottish and Irish boats found with them would not be a true representation of the frequency of their use. It may be

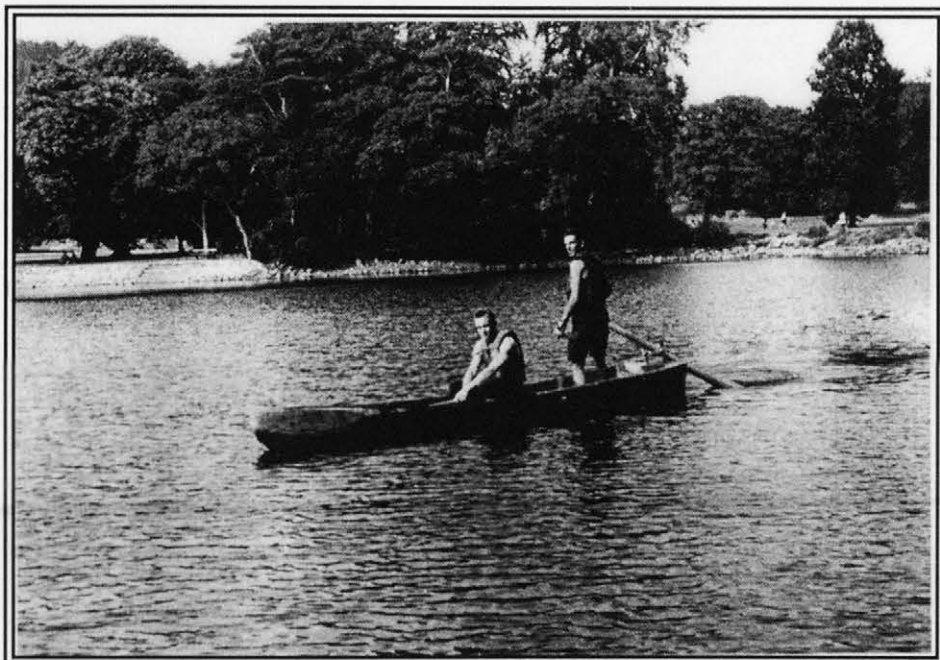
safe to conclude that logboats which do not have evidence for sailing or rowing were punted or paddled.

There is no preference for particular boat forms used with paddle or punt poles. It is not surprising that the above boats are all from lakes, considering the current of riverine contexts would have washed the paddles or poles away. Poles would not have been used in deep water.

## 9.5 SCULLING

In order to scull, the oar is suspended from the stern of the boat with the oar blade vertical to the water. It is then moved in a figure-of-eight pattern with the blade permanently underwater, which propels the boat forwards.

There is no evidence for this propulsive method in logboats. Practical experimental evidence in sculling a logboat (Section 12.9.4 para 3) has ascertained that it is an extremely impractical propulsion method. As a result it is safe to conclude no logboats were ever sculled.



*Plate 9.1: An attempt at sculling Daire*

## 9.6 SYNTHESIS OF PROPULSION METHODS

Tables 9.4 and 9.5 present the available evidence for the different methods of propulsion. The manner in which three hundred and fifty-eight Irish and one hundred and thirty-four Scottish logboats were propelled is not recorded. They were most probably paddled or punted (Section 9.4), since both of these methods require no additional features on the boats while all other methods do. As a result, it may be concluded that the portion showing 'unknown' propulsion methods in the table used one of the two methods.

Table 9.6: Recorded and unrecorded propulsion methods.

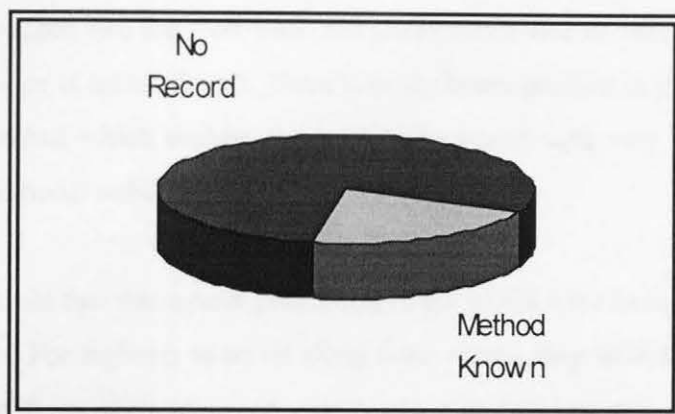
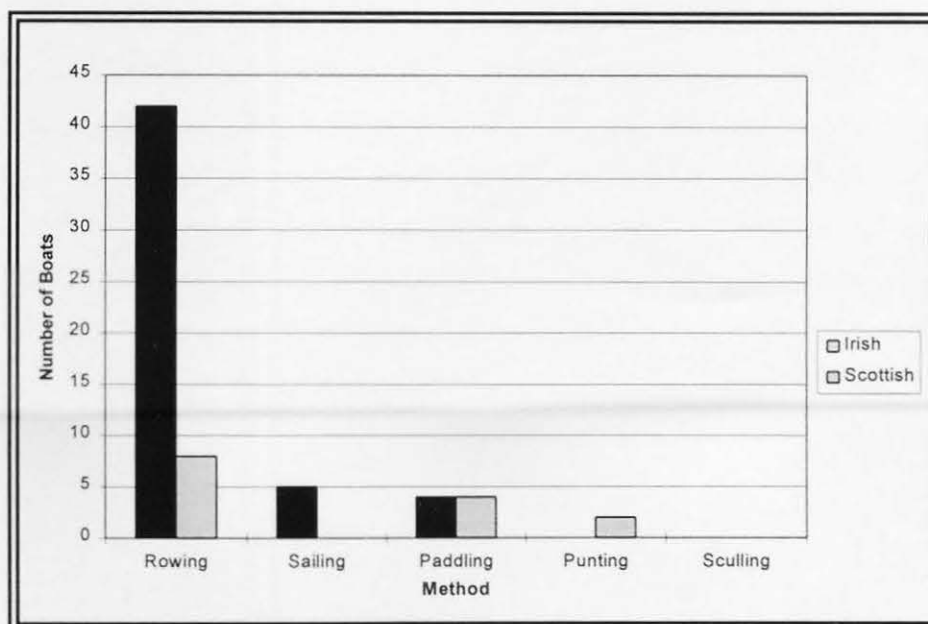


Table 9.7: Irish and Scottish propulsion methods.



Of these two methods, the majority of the boats would have been paddled rather than punted, since this is a more efficient means of propulsion (Section 12.9.4). Those boats which have other propulsive methods may also have been paddled or punted. Punted logboats would have required relatively shallow water.

Logboats that travel down-river can utilise the current. However difficulties can be encountered when they travel up-river. The current may have proven too excessive to go against. This may have been overcome by having a larger crew and thus a greater propulsive force. Alternatively, the boats may have been towed (or tracked) by animals, such as cattle. However, this introduces dynamics other than naval architecture. If the tow-line is attached to the boat's bow, the boat will inevitably be dragged into the river bank and could be shoaled in shallow water. The boat slews away when the line is set too far aft. There is an optimum position in the boat's length where the line can be attached which enables the boat to be towed with very little steering required to maintain its directional stability.

There is little doubt that throughout prehistory, rivers would have been obstructed by fallen trees and other debris. For logboats to travel along these routes, they would have been equipped with tools to remove these obstructions. A disadvantage to logboats was that they could be easily carried to circumnavigate obstructions.



## CHAPTER 10

### LOGBOAT DISTRIBUTION

#### 10.1 INTRODUCTION

This chapter considers the distribution of logboats in Ireland and Scotland. Both countries are divided into regions which are determined by the water catchment areas. The boats' distributions are examined within the context of the rivers and lakes in each region and how they may be related to determine variations in size, form or features. This facilitates determination of how concentrations of boats, both within each region and on a national basis, may relate to each other. Further comparative analysis of distributions between the two countries is investigated.

#### 10.2 REGIONAL BOUNDARIES

In order to examine the distribution of logboats, it is necessary to divide each country into regions. Each region is based on water catchment areas, which also takes into account topographical variations.

The navigability of rivers has been assessed from Petermann's Hydrological Survey of the Britain and Ireland (1883) in which he states their navigability, as well as field work to view their navigability to logboats. It is believed that previous changes to the nature of rivers such as drainage, weirs etc. has to some extent altered the conditions of rivers from when they were used by logboats. Climatic variations and seasonal changes may also have induced altered river conditions. Hence the observations cited in this chapter may vary from the previous situation. Further to this, it is believed that short stretches of unnavigable water would not have affected unnavigability between larger unnavigable sections.

#### 10.3 REGIONAL BOUNDARIES IN IRELAND

Ireland is divided into six regions which total twenty-six individual water catchment areas. The various catchment areas within each region generally share similar topographies, which are based on Petermann's map (1883).

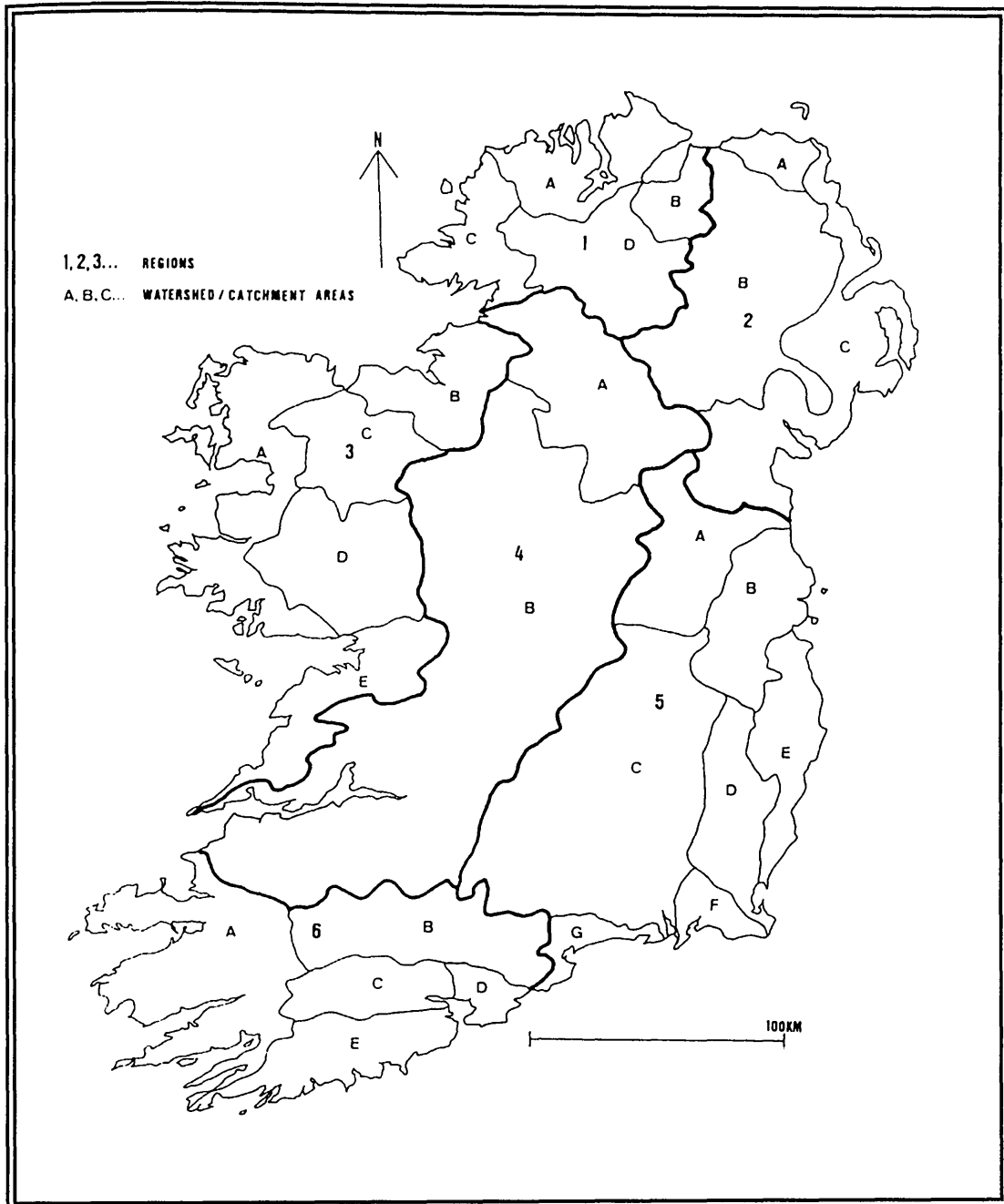


Figure 10.1: Ireland's Regional Boundaries.

### 10.3.1 Region 1: The Foyle Basin and Donegal Highlands

An area of pre-Cambrian rocks, west of which are the Donegal Highlands (330m above sea level). Its northern coast consists of a series of bays and sea loughs. There are four water catchment areas. The Foyle is the largest, draining into the sea at Lough Foyle (Figure 10.1: 1D). To the north-east is the Roo drainage area (Figure 10.1: 1B), to the north west the Swilly area (Figure 10.1: 1A). The Foyle is bordered on its western flank by West Donegal (Figure 10.1: 1C) which has a series of small rivers draining into the Atlantic Ocean.

The Foyle is the primary catchment area in this region; the Finn and Mourne rivers are secondary catchments, all of which are navigable. Many small non-navigable tributaries flow into the Foyle, Finn and Mourne Rivers. Lough Derg, situated on the south-western fringe of the basin, is the largest lake (approximately 14 square km). The many other lakes each measure 1 square km or less. Most of these are located at the headwaters of small tributaries in the Donegal Highlands. Except for the Roo river, all other rivers on the region's western fringe are not navigable (Petermann, 1883: 1).

### **10.3.2 Region 2: The North-East Basalt, Lagan-Glyde Region**

The northern edge of this area consists of the Antrim Plateau which rises to over 350m above sea level. It is cut by the deep glen of the Bush River (Figure 10.1: 2A). The largest watershed, the Bann (Figure 10.1: 2B), is situated to the south of the Bush catchment area. It centres on Lough Neagh, where Oligocene Clays overlie the Basalt. Topographically, the Bann runs through a wide flood plain. This area is bounded on the west by hills from which the rivers run eastward into the lough.

Secondary basins are the Blackwater and Main. All these rivers drain into Lough Neagh except the Lower Bann which flows from it. The entire length of the Lower Bann is navigable, while much of the Upper Bann, Main, Blackwater, Ballinderry, Callan and Moyola Rivers are navigable for small craft. After Lough Neagh, the largest lakes are Lough Beg and Portmore Lough (7.3 and 4.4 square km respectively). The remaining lakes, most of which are situated on the south-western fringe of the region, are above the navigable limits of the rivers. These are all 2 square km. or less. Five small unnavigable rivers drain directly into the sea from the Bush basin. The Bush itself is navigable (Petermann, 1883: 1).

To the east of the Bann catchment area the principal rivers, all of which are navigable, are the Lagan, Fane, Glyde and Dee Rivers (Figure 10.1: 2C). All have unnavigable tributaries. Several other small rivers drain into the sea. A few lakes are mainly at, or close to, the headwaters of the rivers, and are 2 square km or less in area (Petermann, 1883: 1).

This area is bounded by the Mourne Mountains which rise (over 600m above sea level) to the east.

### 10.3.3 Region 3: West Ireland

The West Ireland region comprises most of eastern Connaught. It contains five water basins. The Arrow Basin to the north-east drains into Sligo Bay (Figure 10.1: 3B). This area includes Loughs Melvin and Gill to the north, and Lough Arrow to the south. Further south is the Moy river which flows into Kilalla Bay (Figure 10.1: 3C). The southern part of the region, drained by the Corrib southwards into Galway Bay, includes Loughs Mask and Corrib (Figure 10.1: 3D). The western extent of the Region contains a series of small unnavigable rivers in west Clare, Mayo, and Galway, which run westwards into the Atlantic Ocean (Figure 10.1: 3A).

The Moy, Corrib and Kinvarra basins are the three main basins. To the west, a series of small non-navigable rivers run westwards to the coast. Many of these rivers have small lakes of 0.2 to 3 square km. The largest lake is Carrowmore Lough which is approximately 11 square km. The Moy river is navigable for half of its length, and runs to the north (Petermann, 1883: 1).

Loughs Conn (29 square km) and Cullin (12.3 square km) are the basin's two largest lakes. All other rivers flow into either Lough Conn or Cullin, or the Moy itself.

The Corrib basin is dominated by Lough Corrib (130 square km) and Lough Mask (60 square km) which are joined by a navigable river of 6 km in length. The three main rivers are the Robe, which flows into Lough Mask, and the Black and Clare Rivers which flow into Upper and Lower Lough Corrib respectively. They are navigable for much of their lengths. River Clare flows through two lakes, Clookeen and Turloughmore, which are on the river's lower reaches. None of the tributaries are navigable. The Kinvarra Basin, to the south of the Corrib, contains several small unnavigable rivers which disappear into the karst bedrock, and several small turlough lakes, of which Coole Lough (2.5 square km) is the largest (Petermann: 1883: 1).

### 10.3.4 Region 4: Erne Basin and West Midlands

This region consists of two basins. The Erne (Figure 10.1: 4A) is situated to the north and the Shannon (Figure 10.1: 4B) to the south. The largest lakes in the Erne Basin are Loughs Erne Lower and Upper. Lough Gowna, to the south, borders on the Shannon Basin. The highlands of West Fermanagh overlook Lower Lough Erne.

The topography of the Upper Lough Erne - Lough Gowna area consists of drumlins. The Drumlin Belt which traverses north central Ireland in an east-west alignment passes through the

northern part of this area creating its many small lakes and rivers. The largest lakes are Loughs Erne Lower (170 square km), Erne Upper (40 square km), Gowna (20 square km) and Oughter (35 square km). These are connected by the River Erne which drains to the north-west into Donegal Bay. The several navigable rivers which flow into the above lakes are the Erne, Arney, Colebrooke and Annalee Rivers. These rivers and lakes form an immense network of navigable waterways, interspersed with the smaller lakes of 3.5 square km and less (Petermann, 1883: 1).

The Shannon Basin dominates the West Midlands. With a length of 365 km, it is the single largest water catchment area in Ireland. Its northern half has an abundance of lakes. It has a similar geology to that of the Erne Basin.

The northern Shannon's main tributaries are the Inny, Suck, Brosna, Deale and Maigue Rivers. To the south the navigable rivers are the Boyle, Little Brosna, Ardultagh, Gurney, Deal, Feale and Casheen. The principal lakes are Loughs Allen (25 square km), Gara (15 square km), Key (10 square km), Bofin (15 square km), Sheelin (15 square km), Derravarragh (20 square km.), Ree (195 square km), Owel (10 square km), and Ennell (25 square km) in its northern half, and Loughs Derg (135 square km) and Gurney (10 square km) to the south.

### **10.3.5 Region 5: The East Midlands-East Coast**

The east Midlands contain the Barrow (Figure 10.1: 5C) and Slaney (Figure 10.1: 5D) Basins. This region is bordered to the east by the Wicklow Mountains. To the north are the Boyne (Figure 10.1: 5A) and Liffey (Figure 10.1: 5B) Basins.

Along the eastern edge of the Wicklow Mountains, several small rivers flow onto the coastal plain and into the Irish Sea. The Avoca, Liffey and Vartry are the only navigable rivers here (Figure 10.1: 5E). (Petermann, 1883: 1)

The Boyne borders the southern part of the Drumlin Belt. In this there are several lakes of which Lough Ramor (10 square km) is the largest, followed by Lough Lene (5 square km). The Boyne River itself is navigable to logboats for most of its length. There are also several small isolated lakes with no navigable outlets such as Whitewood Lough (0.5 square km).

The Barrow basin is the Region's largest. Its sub-tributaries are the Nore and Suir Rivers; all three rivers are navigable. There are no lakes of any size in this basin. Some of the tributaries are navigable to a limited extent in their lower reaches.

### **10.3.6 Region 6: South West Munster**

This region contains three Basins, the Blackwater (Figure 10.1: 6B), Lee (Figure 10.1 6C), and Bandon (Figure 10.1: 6E) rivers, which run from the mountains of West Cork eastward, before flowing in a southerly direction into the Atlantic Ocean. The Blackwater is the northern-most river, and the Bandon the southern-most river. The largest basin, the Blackwater, is navigable for most of its length, as are the Lee and Bandon rivers. Their tributaries are unnavigable with the one exception of the Bride River, in the Blackwater Basin. There are no lakes of any note in the basins. Those that are, measure 1 square km or less. They are located in the Lee and Bandon Basins at the headwaters of tributaries near the Basin's western boundaries. To the west are the mountains of Kerry from which a number of small unnavigable rivers drain westwards into the Atlantic Ocean (Figure 10.1: 6A). Of these, the Laune River is the only one with a catchment area of any noteworthy size. None are navigable since they flow directly into the Atlantic from mountains of over 900m above sea level. (Petermann, 1883: 1).

There are also numerous small lakes of which Muckcross Lake (20 square km) is the largest.

## **10.4 REGIONAL BOUNDARIES IN SCOTLAND**

The regions of Scotland are divided by water catchment areas, and variations in both the country's topography (Fig. 10.2), which are based on Petermann's map (1883).

### **10.4.1 Region 1: Northern Scotland**

This region consists of six water catchment areas. In the north coastal area, a series of small unnavigable rivers drain into the Pentland Firth. The Shin (Figure 10.2: 1C), Brora (Figure 10.2: 1B), Cromarty (Figure 10.2: 1D), Ness (Figure 10.2: 1F) Nairn and Findhorn (Figure 10.2: 1E) basins all drain eastward. The northern section of the region is mountainous, rising to over 850m above sea level (Figure 10.2: 1A). To the south, and centred on the Great Glen, the mountains average 1000m. above sea level. This is an area of deep glaciated valleys, highland lochs and bogs.

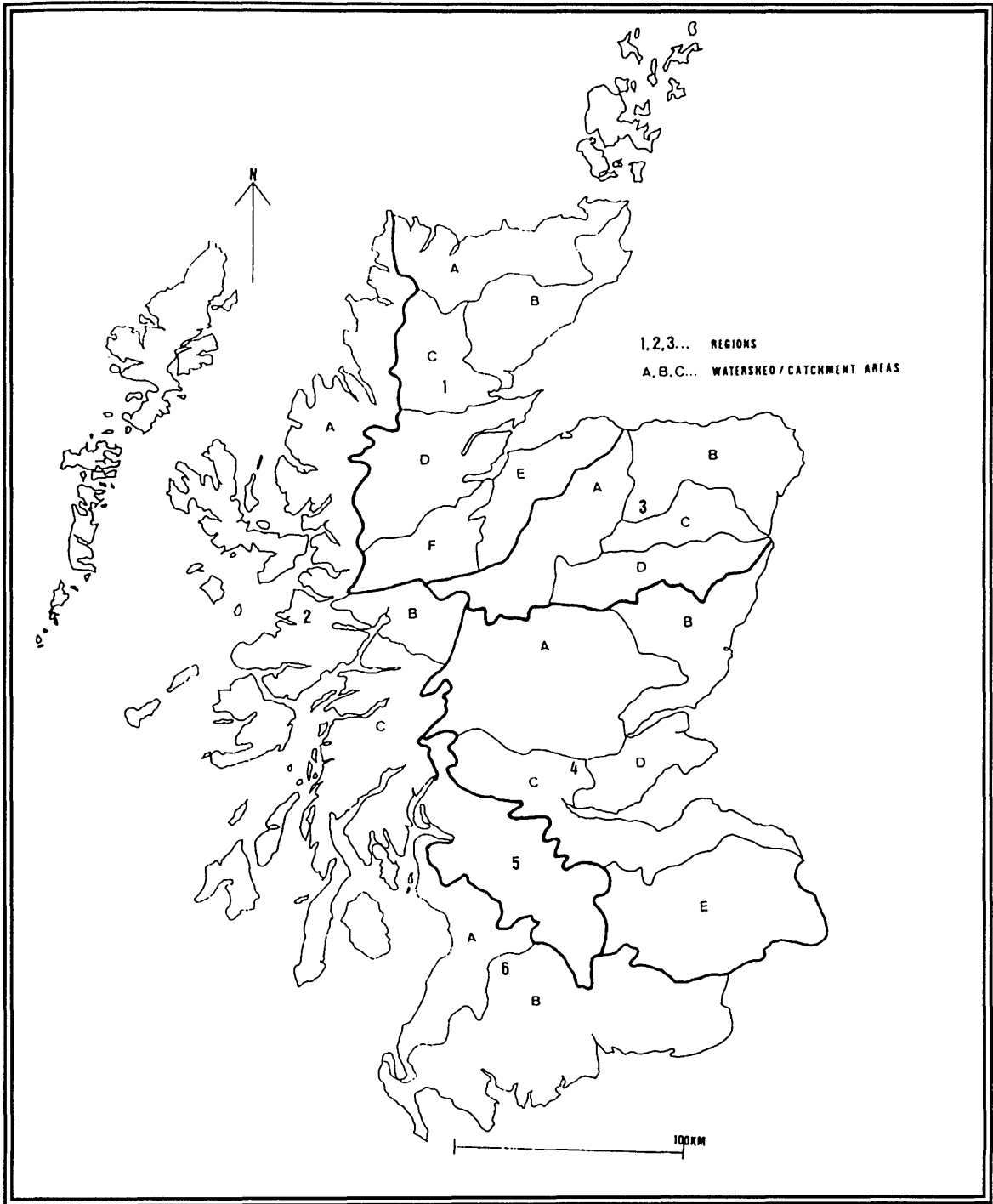


Figure 10.2: Scotland's Regional Boundaries.

#### **10.4.1 Region 1: Northern Scotland**

This region consists of six water catchment areas. In the north coastal area, a series of small unnavigable rivers drain into the Pentland Firth. The Shin (Figure 10.2: 1C), Brora (Figure 10.2: 1B), Cromarty (Figure 10.2: 1D), Ness (Figure 10.2: 1F) Nairn and Findhorn (Figure 10.2: 1E) basins all drain eastward. The northern section of the region is mountainous, rising to over 850m (Figure 10.2: 1A). To the south, and centred on the Great Glen, the mountains average 1000m above sea level. This is an area of deep glaciated valleys, highland lochs and bogs.

The Brora Basin has three navigable rivers, the Brora, the Helmsdale and the Nairn. Its twelve remaining rivers are not navigable. Several lochs are situated at the headwaters of the rivers, of which Loch Badenloch (6 square km) is the largest. The Shin basin includes the River Shin and Loch Shin (20 square km). The few remaining lochs measure 2 square km or less. Apart from the Shin the only other navigable river in this basin is the Carron. The larger basin, the Cromarty, is drained primarily by the Conon river, into Cromarty Firth. Its only other navigable river is the Bealey. All lochs in this basin are located at the headwaters of rivers. The largest is Loch Fannich (8 square km). The remainder are 3 square km or less.

The Ness basin contains Loch Ness (30 square km). The only navigable river is the Ness itself. All its other rivers (none of which are navigable) drain into the loch.

#### **10.4.2 Region 2: West Scotland**

This is an area of highlands which rise to 1000m above sea level in the north and 500m to the south. It extends from the north-western coastline, south to Kintyre (Figure 10.2: 2A and 2C). The region includes the Western Isles, and the Lochy Basin to the east (Figure 10.2: 2B). The entire region, with the exception of Lochy, drains westwards via short rivers from the highlands to the sea.

The Region contains large lochs such as Lochs Awe (35 square km), Shiel (20 square km), Morar (20 square km) and Lochy (15 square km). The remaining lochs, which are situated at the headwaters of rivers, are generally quite small, 3 square km or less.



### **10.4.3 Region 3: North-East Scotland**

The four water catchment areas, the Spey (Figure 10.2: 3A), Deveron (Figure 10.2: 3B), Don (Figure 10.2: 3C) and Dee (Figure 10.2: 3D) basins are to the east of Region 1. Its mountains rise to approximately 1000m, and descend eastwards to relatively low-lying hills and glacial deposits of 150m. Both the Spey and Deveron Basins drain to the north, and the Don and Dee to the east.

The Spey, Deveron, Don and Dee Basins consist almost entirely of their namesake rivers and tributaries. Apart from Loch of Skene (5 square km), Loch of Strathbeg (9 square km), Lochs Einich (8 square km), Garten (10 square km), Inish (5 square km), Kinord (7 square km), Morlich (7 square km) and Muick (10 square km), and the remaining lochs are 2 square km or less in size. These rivers are navigable. Mowat has suggested agricultural drainage has reduced or obliterated lochs in this area, that 'the resultant general lowering of the water table has caused the...disintegration of other boat remains' (Mowat, 1996: 121).

### **10.4.4 Region 4: Tay-Forth**

Region 4 incorporates the Tay (Figure 10.2: 4A) and Forth (Figure 10.2: 4C) basins, and the smaller North and South Esk (Figure 10.2: 4B) and Leven (Figure 10.2: 4D) basins. The Tay runs from the highlands on its north-western border of up to 1000m to the low-lying coastal area of Esk and Leven. Both the Esk and Leven basins consist of a series of rivers which drain into the North Sea. Of these the largest are the North and South Esk, and Leven rivers.

Both the Tay and Forth rivers are navigable for most of their lengths. Except for the Earn, Eden, North and South Esk, Isla, and Tyne Rivers and part of the Leven, none of the other rivers are navigable. The four main lochs of the Tay Basin are Lochs Tay (25 square km), Ericht (20 square km), Rannoch (15 square km) and Earn (9 square km). The Forth's principal lochs are Lochs Katrine (12 square km), Voil (7 square km) and Ard (4 square km).

Both the Esk and Leven Basins consist of a number of small unnavigable rivers. The only significant loch is Loch Leven (16 square km) which has no navigable inlet or outlet.

### **10.4.5 Region 5: Clyde**

The Clyde Region (Figure 10.2: 5) is quite unusual in Scotland, since it consists mainly of one river. The narrow basin runs from the south-east to the Firth of the Clyde. Its other main feature

is Loch Lomond. The underlying geology is hard limestones, mudstone and shales. The river is navigable for most of its length. Few of its tributaries, such as the Kelvin and Leven rivers, are navigable to any extent. Loch Lomond (38 square km) is the only significant loch.

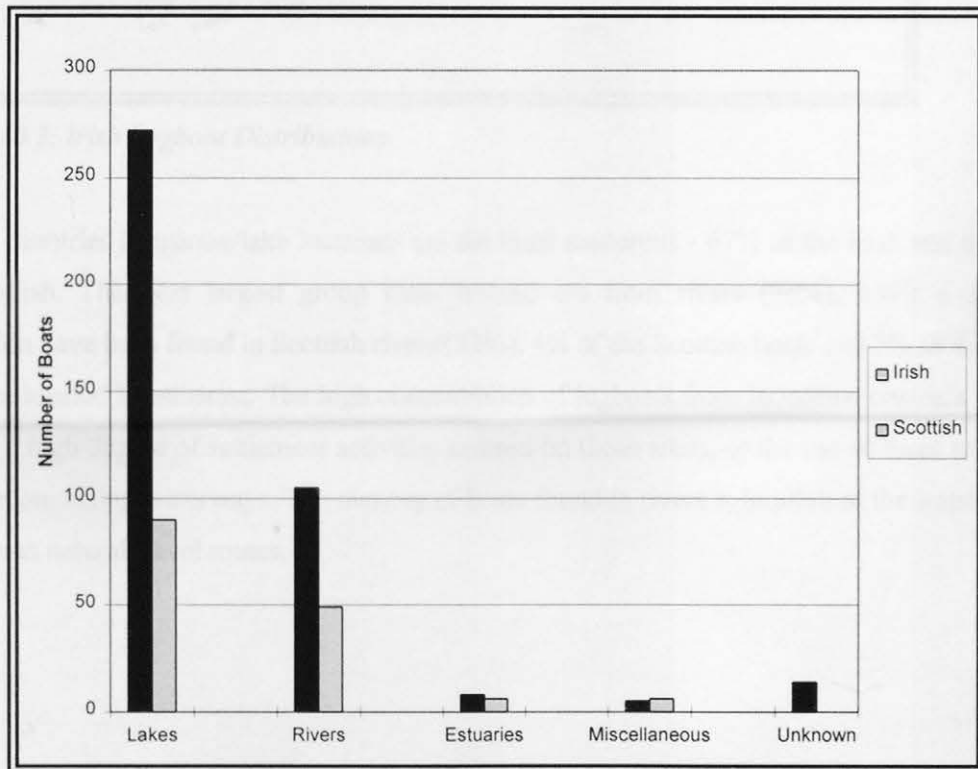
#### 10.4.6 Region 6: Dumfries, Galloway and Ayrshire

This region is drained by a series of rivers, of which two of the main ones are the Irvine and the Water of Ayr in Ayrshire flowing to the west (Figure 10.2: 6A). The Cree, Dee, Nith and Annan rivers all flow to the south into the Solway Firth. Of these, the Nith is the largest (Figure 10.2: 6B). While the above rivers' tributaries are not navigable, the principal river are to some extent. The region's low-lying land includes numerous small lochs of 4 square km or less.

### 10.5 NATIONAL DISTRIBUTIONS

Of the logboats whose find locations are known, Table 10.1 and Figures 10.3 and 10.4 show that most have been found in lacustrine conditions. Lacustrine conditions includes bogs which were formerly lakes.

Table 10.1: Logboat Find Contexts.



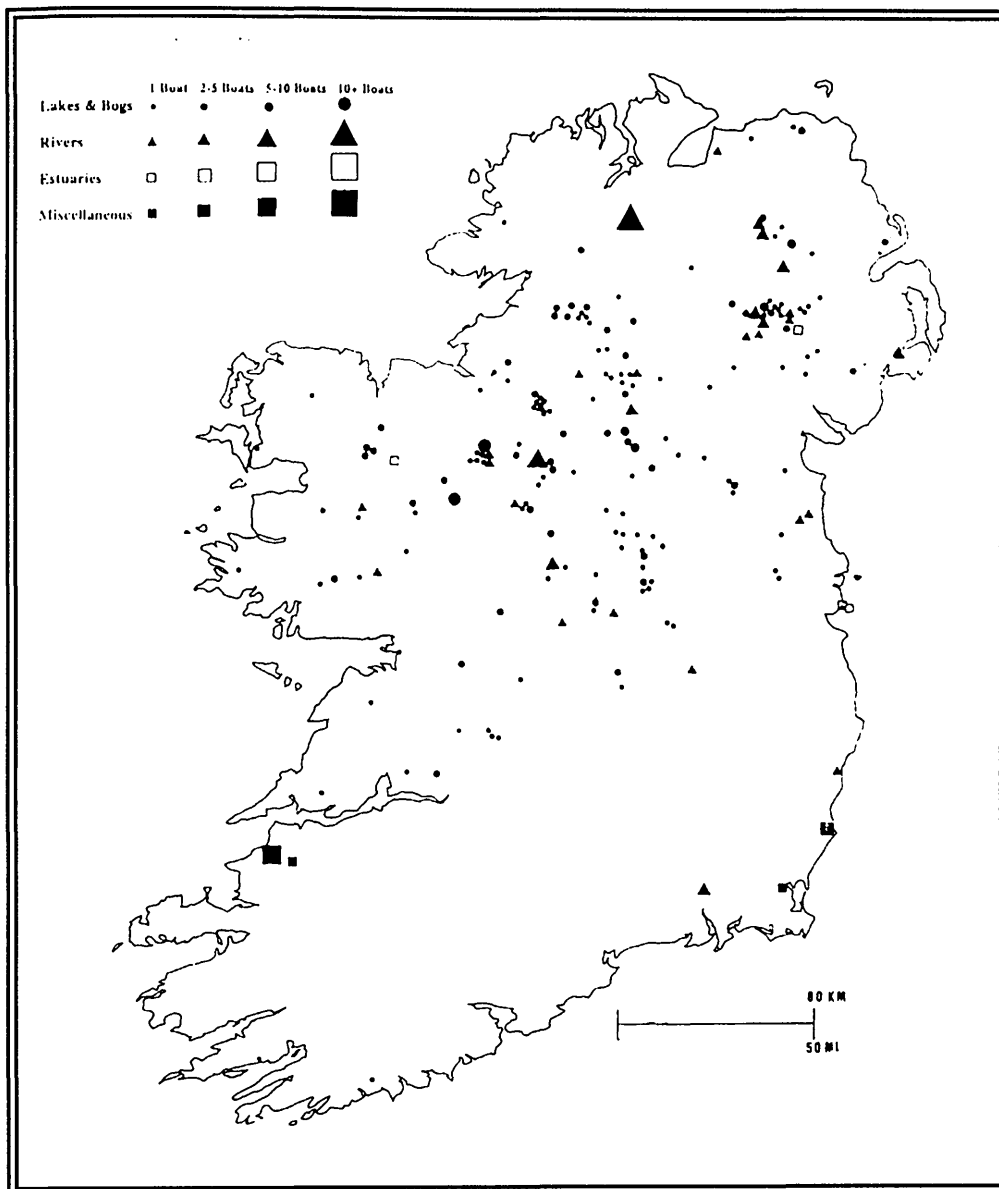


Figure 10.3: Irish Logboat Distributions.

In both countries lacustrine/lake locations are the most numerous - 67% of the Irish and 61% of the Scottish. The next largest group from Ireland are from rivers (26%), while a similar proportion have been found in Scottish rivers (32%). 4% of the Scottish boats and 2% of the Irish boats are located in estuaries. The high concentration of logboats from lacustrine contexts would suggest a high degree of settlement activities centred on those areas, or the use of lakes to travel via interconnecting waterways. The number of boats found in rivers is implicit of the importance of rivers as natural travel routes.

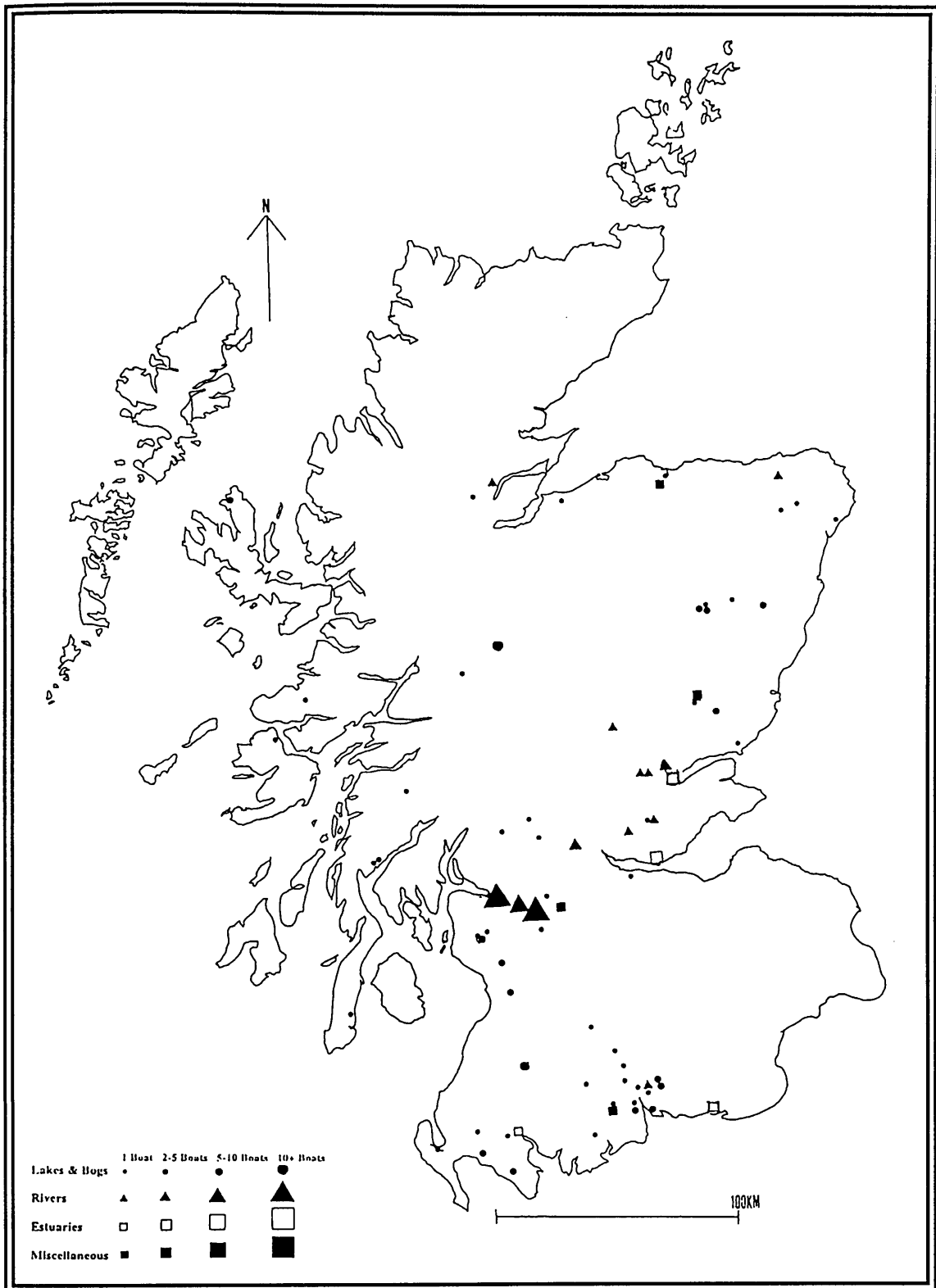


Figure 10.4: Scottish Logboat Distribution.

The logboats from Scottish and Irish estuaries probably reflect the high concentration of natural resources associated with environments such as fishing and wild fowl. The proportionately small number of boats located in Irish estuaries when compared with those from Scottish estuaries does not mean that less importance is attached to them, but that they tend to be smaller and that the

Scottish estuaries are all sited on the main natural routeways into the hinterland. The Shannon estuary is the only main Irish routeway that compares with the Scottish in this manner, and it also has the highest concentration of logboats found in estuarine conditions.

Both the Irish and Scottish distributions contrast to the distribution of the English and Welsh boats, where approximately 70% of the logboats are from rivers and 25% are from lacustrine contexts.

1% of the remaining logboats have been discovered on land, with no noted body of water in their vicinities, either now or apparently in antiquity. Of the fourteen Irish boats of unknown origin, eight were recorded as being from a particular county and six are without any provenance.

## **10.6 Regional Distribution**

The regional distributions of the logboats allows a closer examination of the context of boat finds, comparisons with the national pattern, and determination of why the proportions of find contexts differ between regions. Tables 10.2 and 10.3 summarise the regional distribution of the Irish and Scottish logboats.

In Ireland Region Ir3, which consists principally of lakes connected by navigable rivers, is representative of the national pattern. The majority of the boats are from lacustrine contexts followed by those from rivers (Tables 10.1 and 10.2). The eastern half of the region includes several large lakes which effectively provide the region with an extensive transport network. Such topography provides for almost continuous communication throughout the province of Connaught, from Sligo Bay in the North to Clew Bay in the west. Along the western seaboard only six boats were found (twenty-eight in the remainder of the region). This area consists of small unnavigable rivers and numerous (mainly small) lakes, in contrast to the rest of the region's topography and distribution.

Region Ir1 differs from Region Ir3 in its topography of sparse small lakes and several large navigable rivers. The majority (thirteen) of the logboats are from the River Foyle, all within 2km of its junction with the River Finn. The Foyle divides the east of the region from its western half. The Finn, to a lesser extent, further divides the west of the region between north and south.

Table 10.2: Find Contexts of Irish Logboats on a Regional Basis.

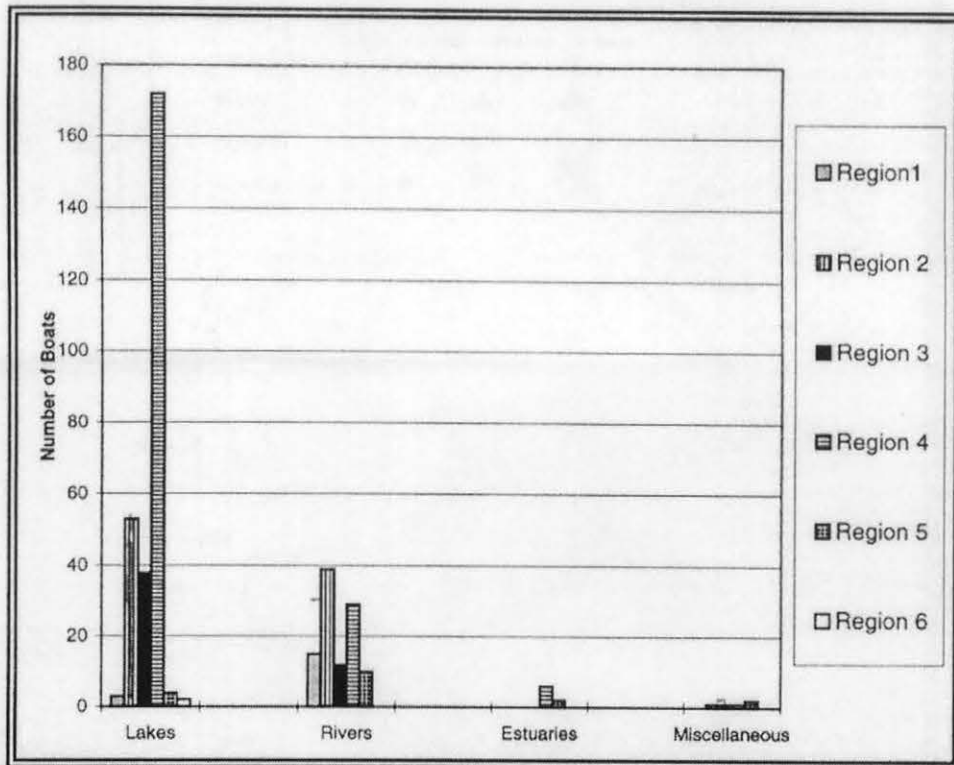


Table 10.3: Find Contexts of Scottish Logboats on a Regional Basis.

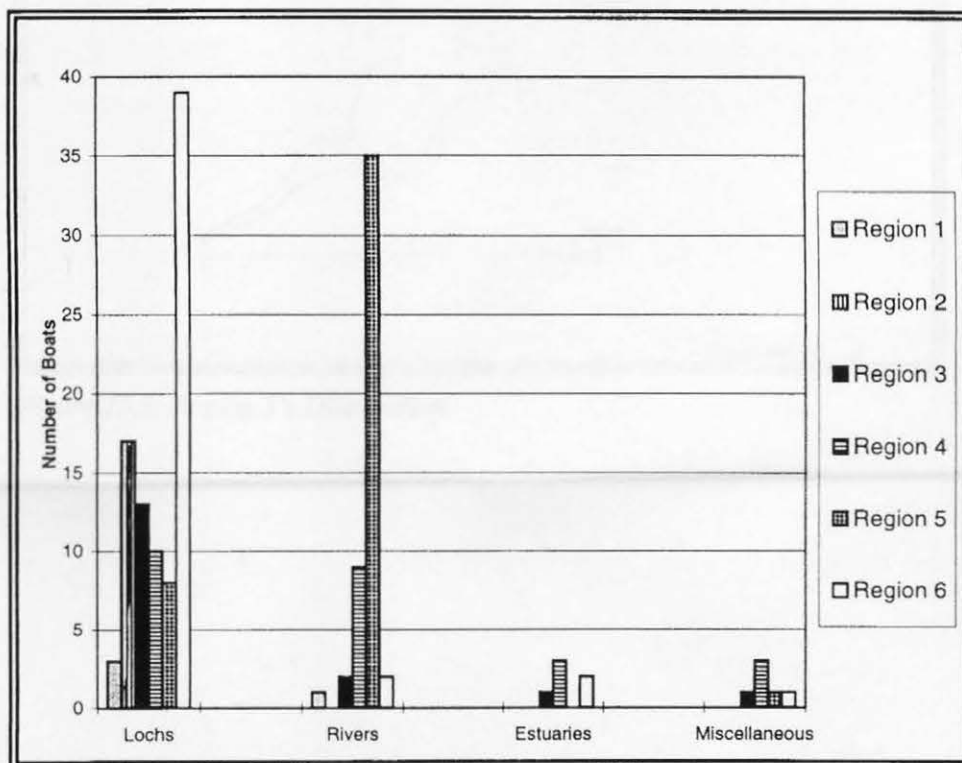




Figure 10.5: Region 3's Distribution.

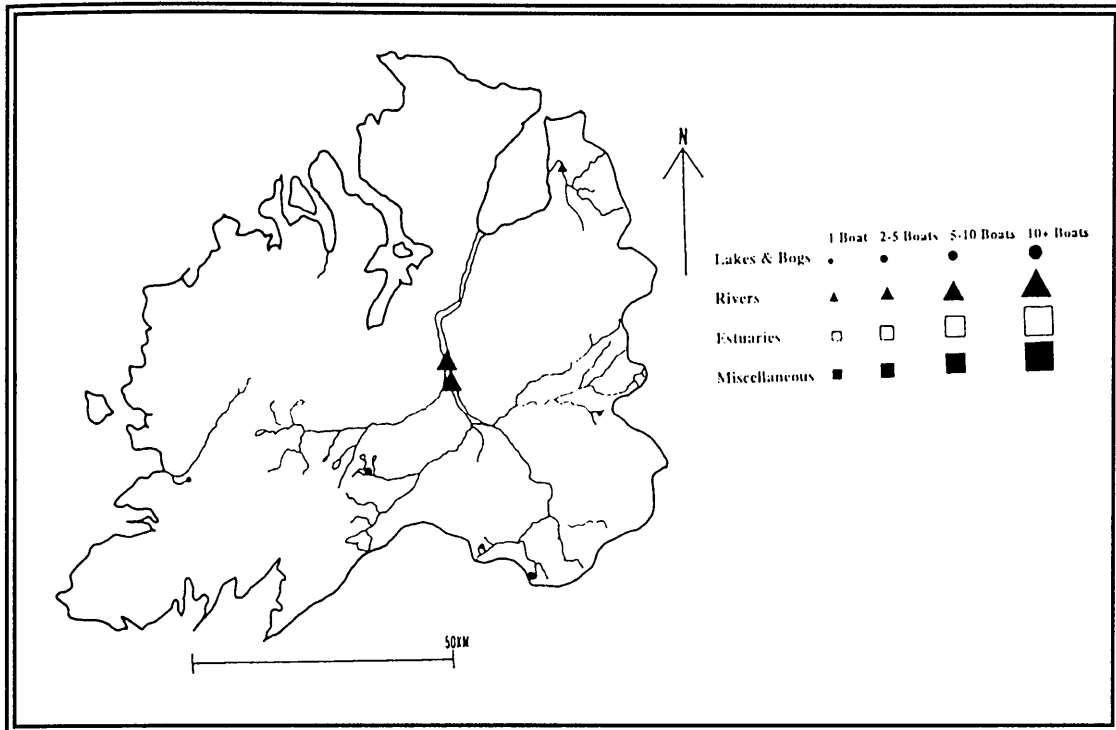


Figure 10.6: Region 1's Distribution.

All boats recovered from Lough Neagh were found on the edges of the lake. This would suggest that either the large area led to unsafe wave-generation for the boats which would use the security of the foreshore, or that modern activities such as fishing, scuba-diving, etc., have failed to recover any logboats in the more central areas of the lake. The lakes average depth is 9m (Oxford Island Visitor's Centre; *pers. comm.*), which may have precluded the discovery of other logboats in it.

In the east of the basin, the two boats from Lough Mourne and five from Whitewood Lough were in small lakes with no navigable inlets or outlets. However, it is significant that there are crannogs sited in both lakes, to which the boats were probably directly associated.

The boats from the Lagan, Glyde and Bush Rivers, were probably used to ferry passengers or goods across. Similarly, three of the four boats from the Quoile at Downpatrick would have been used in the same manner. The fourth boat (Inch 2) was abandoned in an unfinished state.



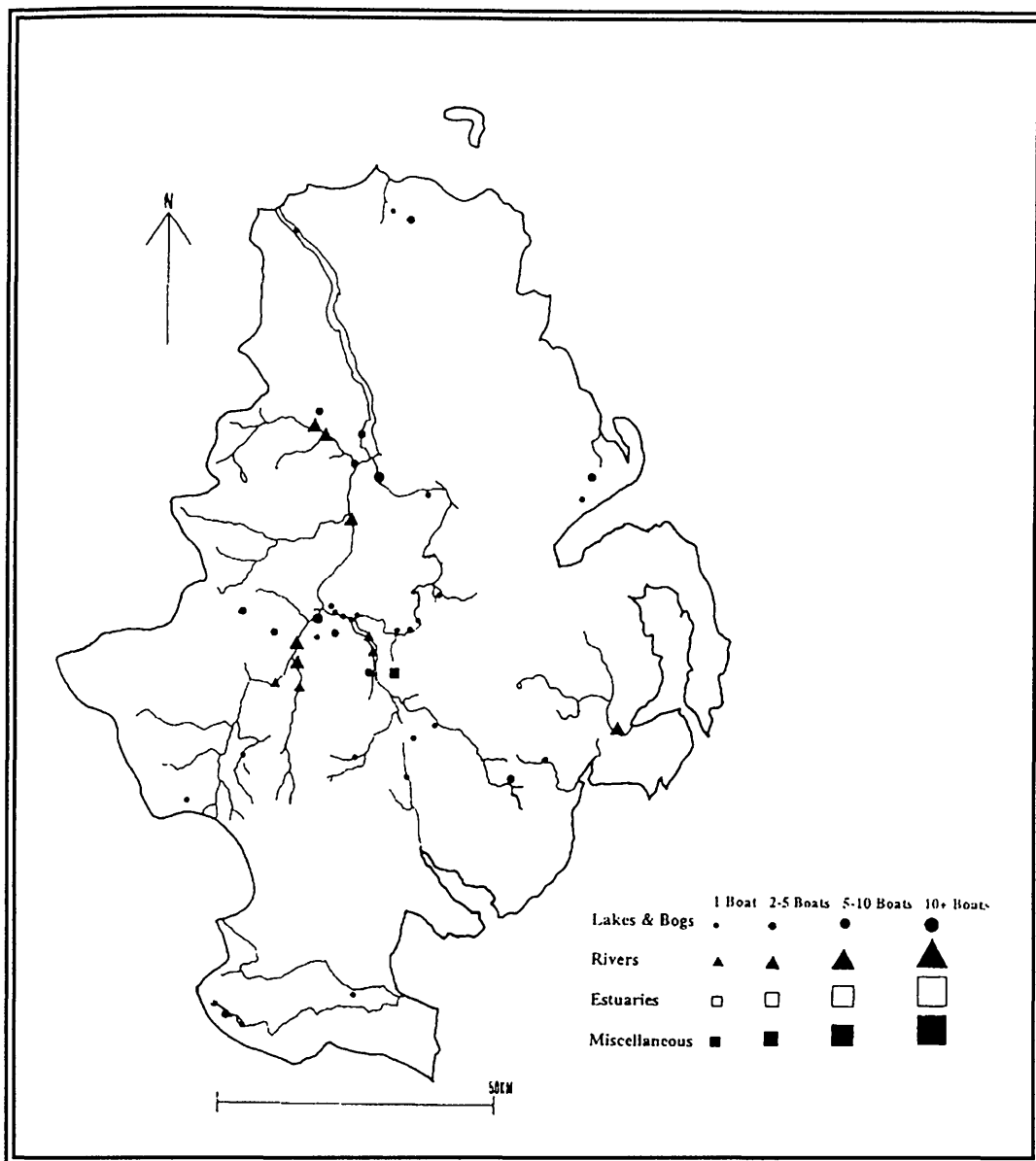


Figure 10.7: Region 2's Distribution.

In Region Ir4, as many as one hundred and seventy-two of the boats are from lacustrine contexts, twenty-nine from rivers and six from estuarine conditions. The northern half of the region is composed of lakes of many sizes, most of which are linked via relatively short river courses, or at least separated by short distances of land. This area consists of an intricate network of navigable waterways, most of which is composed of lakes. Such a topographical situation explains the large proportion of the logboats from lakes. The logboats from rivers demonstrate the occurrence of longer distance travel and communication from lake to lake. The River Shannon connects the region's northern area with a large portion of Ireland's western and midland regions. Logboats have been recovered from several of its tributaries. This one large region alone would have

enabled very effective communication via water between the northern and southern halves of Ireland.

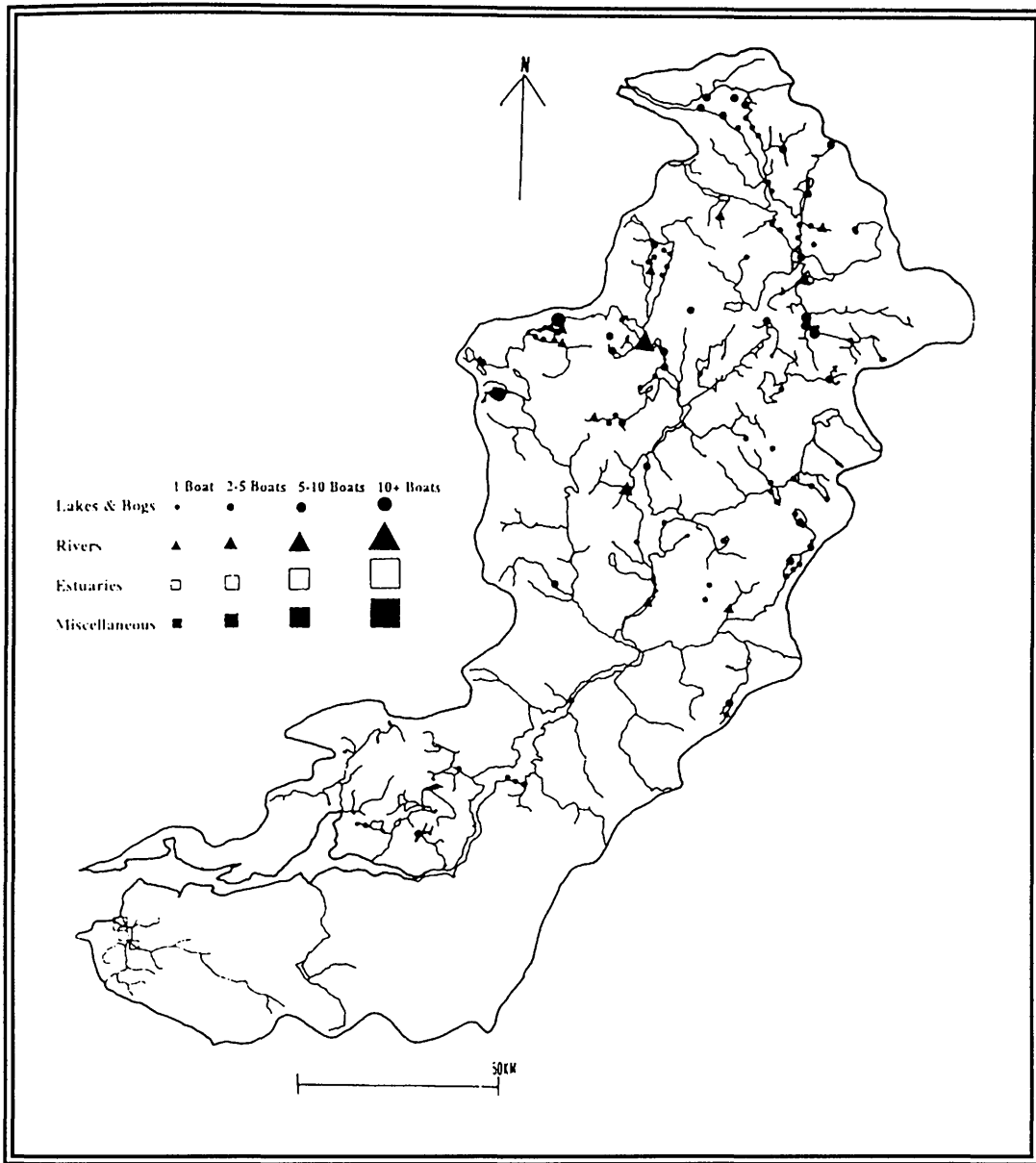


Figure 10.8: Region 4's Distribution.

The Shannon is also a significant barrier between the east and west of Ireland. Water transport would have been essential to bridge this barrier. Concentrations of logboats in one location (similar to those from the River Foyle) would suggest a ferry point. Recent excavations in the river Shannon have uncovered nine logboats (O'Sullivan; *pers. comm.*). this may indicate such a ferry point.

The only concentration of logboats found in estuarine conditions are located within the lower tidal reaches of rivers which flow into the Shannon Estuary. Fifty-one boats from the outlets

of the Casheen and Deal rivers into the estuary have been found in this area. The rivers are bounded on either side by large areas of low-lying marsh and bog. It is probable that the logboats would have facilitated travel through these conditions. Alternatively they may have been used to exploit abundant natural resources usually associated with estuaries, such as wild fowl, fish and reed beds.

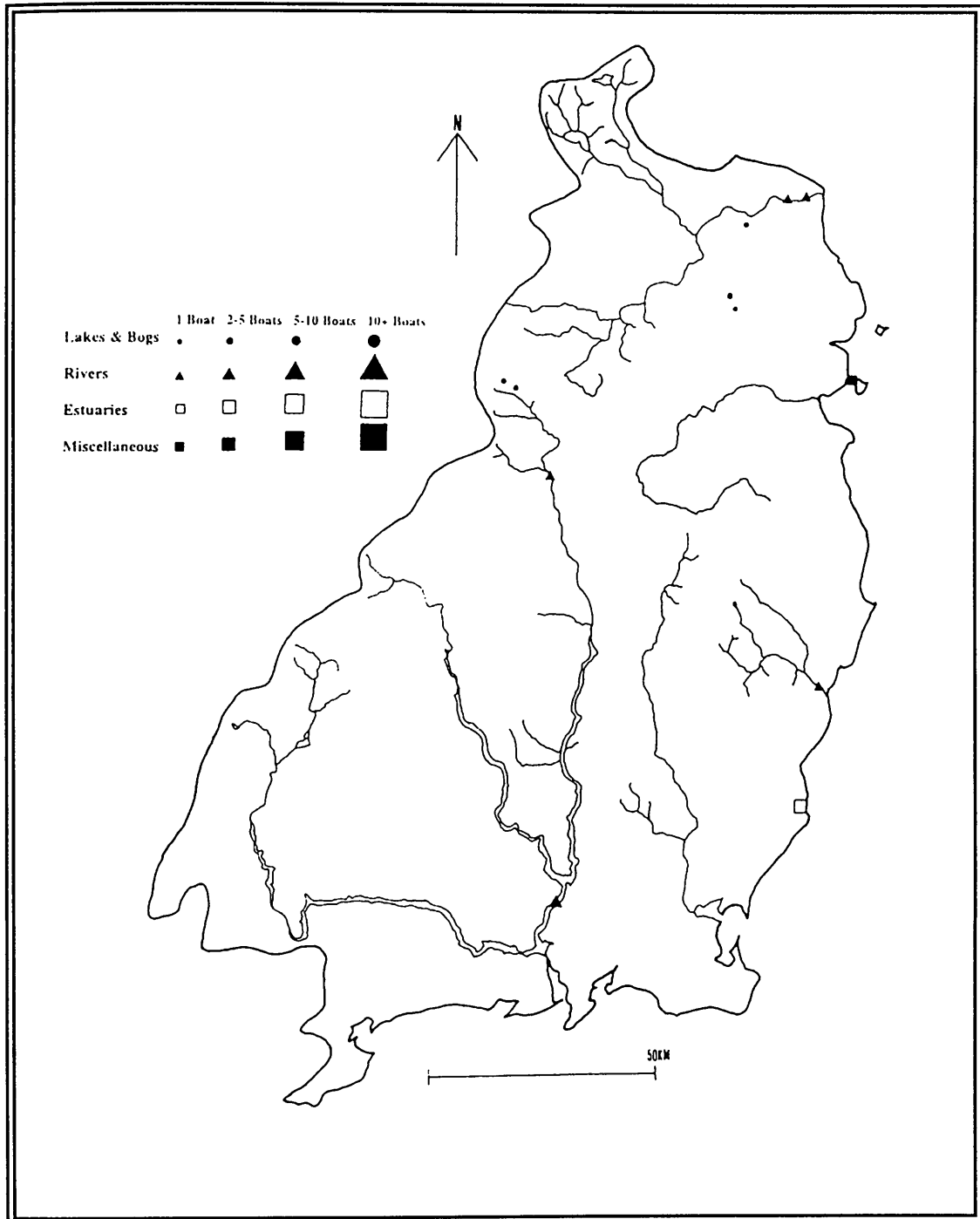


Figure 10.9: Region 5's Distribution.

Although Region Ir5 includes approximately one-sixth of Ireland, only eighteen boats have been recovered in this area. Its five main water basins consist almost entirely of rivers and their tributaries. Ten of the boats here were found in rivers, four in lakes and two in an estuary. This reflects the small number of lakes and the preponderance of rivers. The estuary, which has since disappeared, was very small. The river which fed into it would have been unnavigable since the topography of the land rises sharply from where the boats were found.

Disappointingly few logboats have been discovered in this region. Both the lengths and the navigability of its rivers lead to an expectation of a greater number of boats. However, it is possible that special circumstances may have led to an early cessation of logboat building in this region; such as lack of suitable timber for logboat construction, as well as the effects of industries requiring large quantities of wood as raw material (Section 4.6 para 2-3). It may be coincidental, keeping with the national distribution which favours lakes. As a result it is likely that since there are fewer lakes in the region, there are fewer logboats.

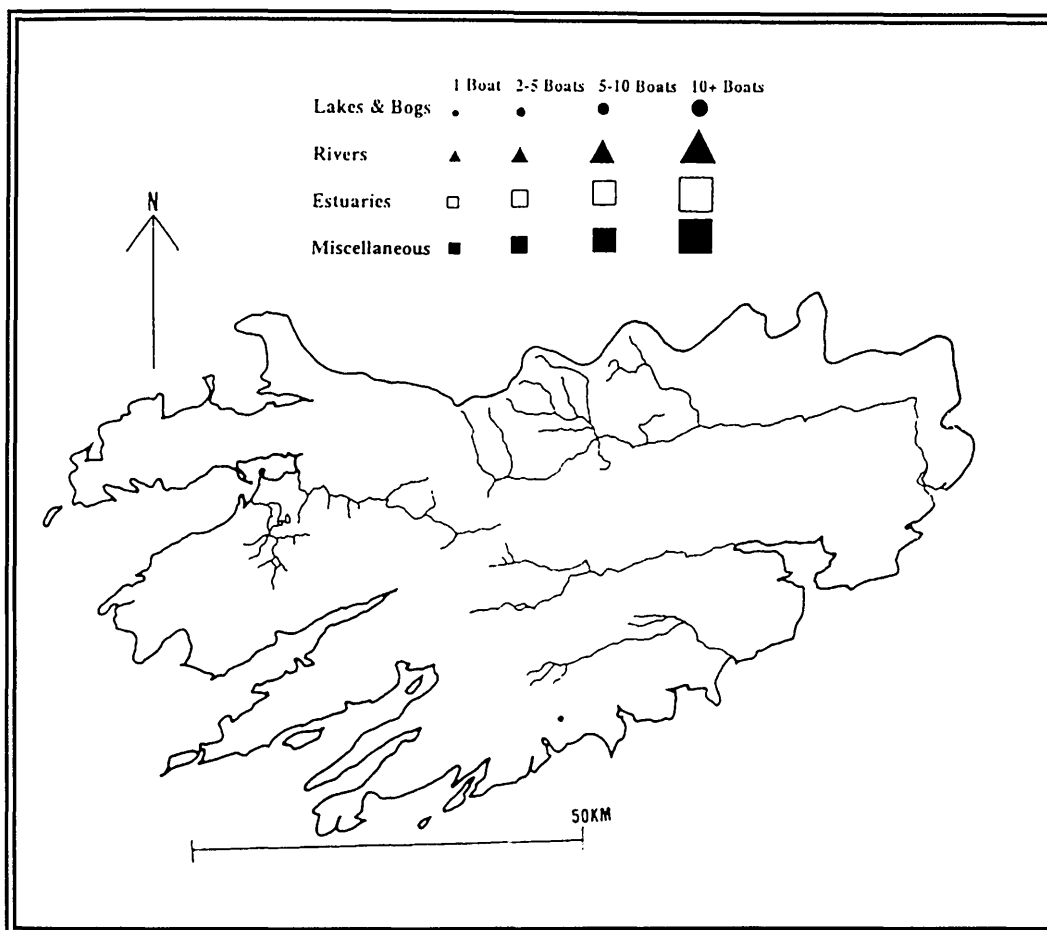


Figure 10.10: Region 6's Distribution.

The discovery of only two logboats in Region Ir6 may be attributable to the rough topography of its mountains which provided for its general inaccessibility to logboats.

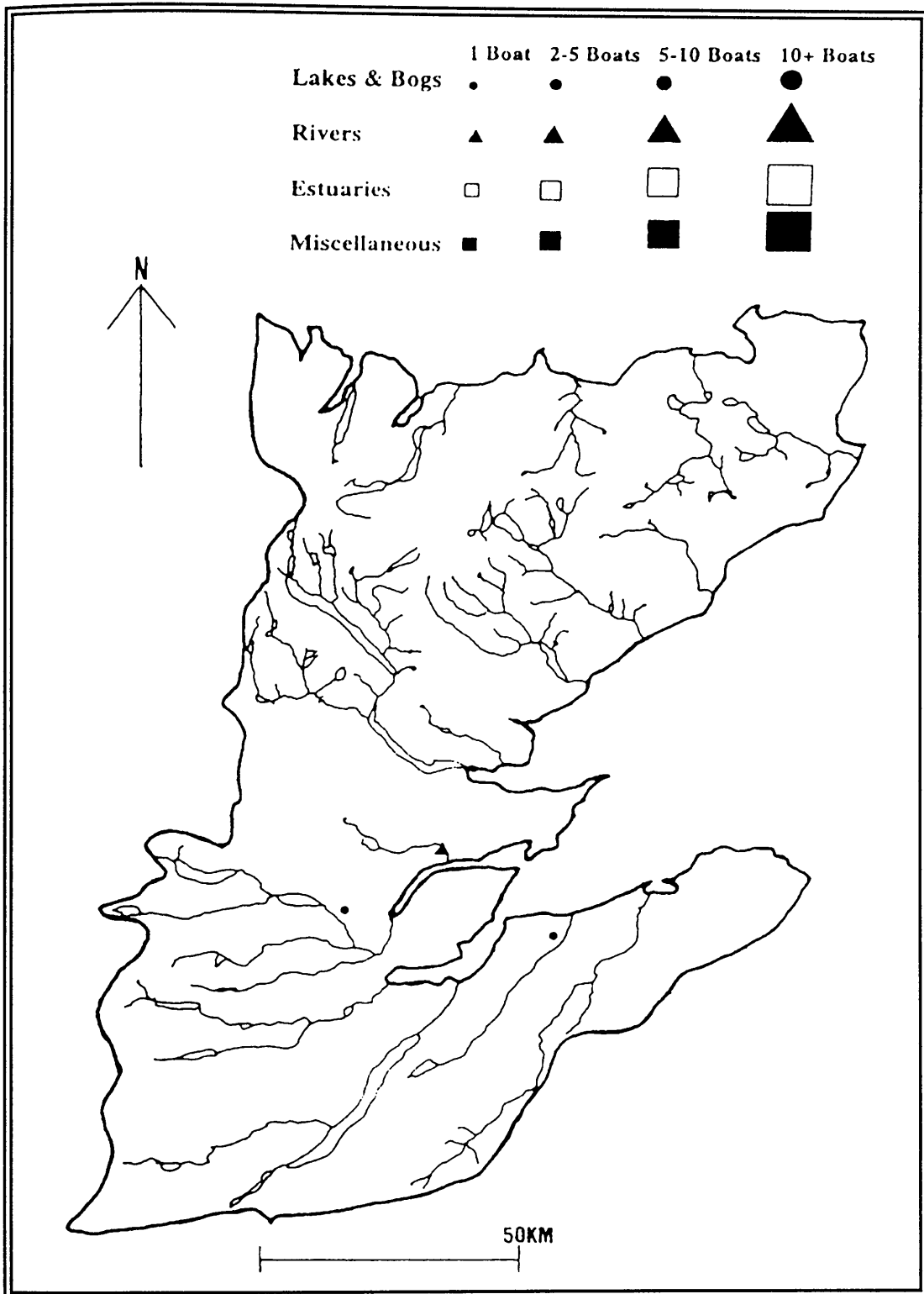


Figure 10.11: Region 1's Distributions

In Scotland, the topography of Region Sc1 has given rise to the scarcity of logboats there; with just four boats recorded, three from lochs and one from a river. Except for Region Sc2's fractured coastline and islands, it is similar to Region Sc1. The use of its larger lochs is evident in the fact that all seventeen logboats found there are from lacustrine contexts.

Like Region Sc1, few of its rivers are navigable to any extent. The distribution pattern would suggest a concentration of activity centred on lochs.

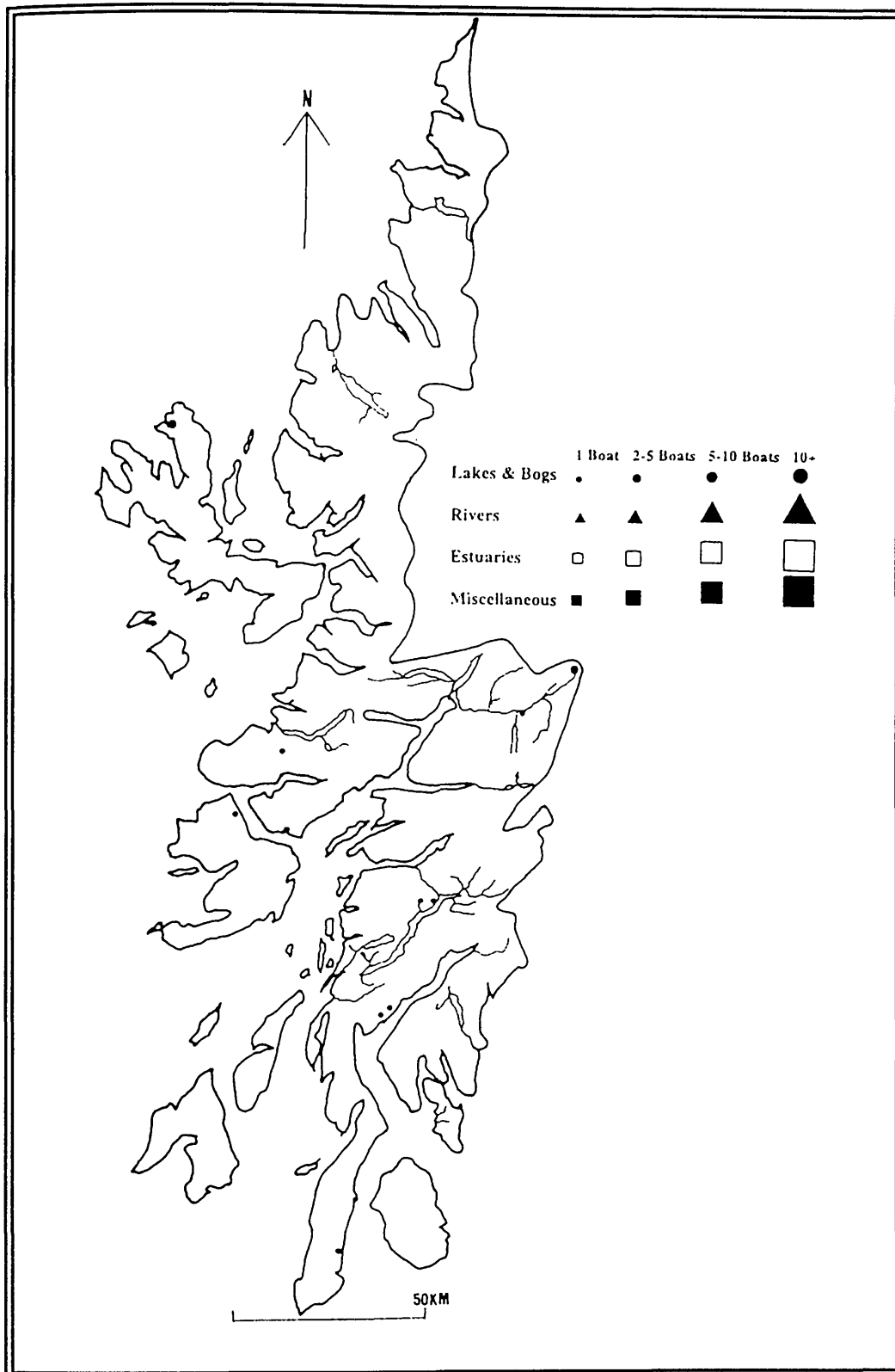


Figure 10.12: Region 2's distribution

In Region Sc3, despite the scarcity and small size of lochs, as many as thirteen of its seventeen Logboats are from them. The most plausible explanation for the recovery of such few boats here is that modern agricultural practises may have reduced the size of, or completely drained, former lochs. This may have led to boats' decay and lack of discovery. Just one logboat has been recovered from one of its main rivers, the Spey.

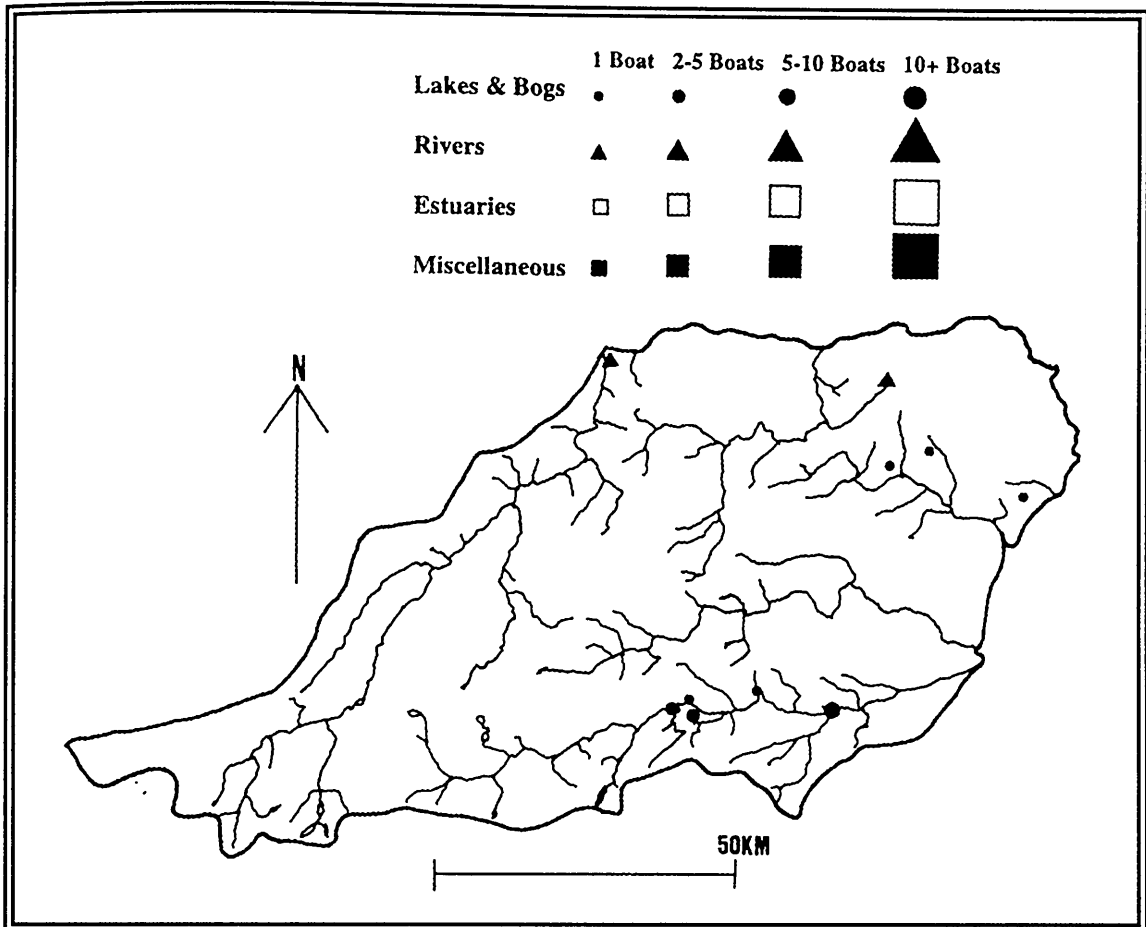


Figure 10.13: Region 3's distribution

Region Sc4 has ten logboats from lochs and nine from rivers. The emphasis of boat discoveries from both the Tay and Forth Rivers is a direct result of dredging operations (Mowat, 1996: 121). It is possible that other rivers in this region which have not had the benefit of industrial activity may still yield logboats.

Loch Lomond and the River Clyde are Region Sc5's main features. Despite other small lochs in this region, as many as thirty-five of the Region's forty-four logboats are from rivers, most of which were from the Clyde itself. The number of the Clyde's boats suggest that the river was used as a busy thoroughfare throughout antiquity.

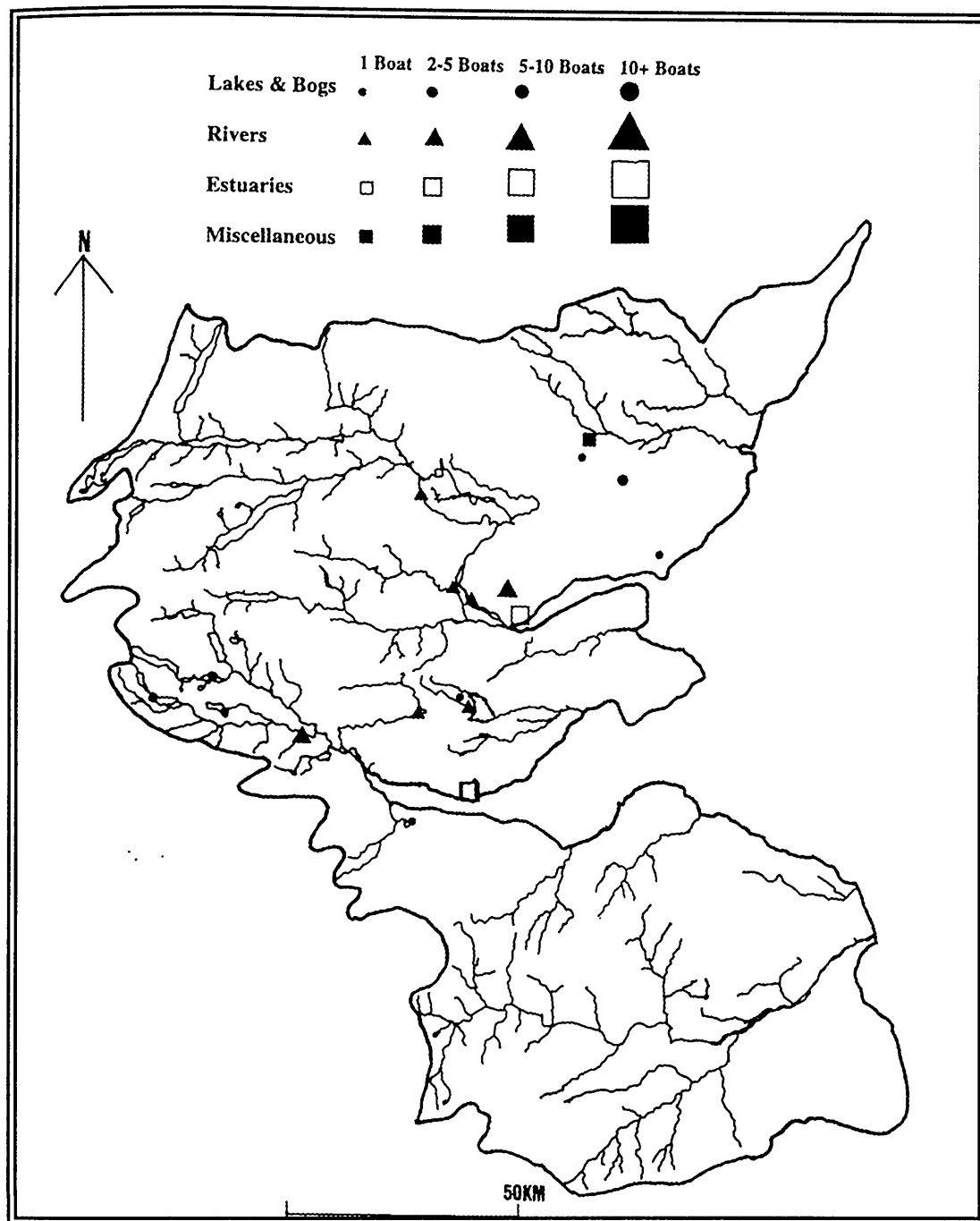


Figure 10.14: Region 4's Distributions.

Dock and drainage works uncovered most of the logboats (Mowat, 1996: 121). They tend to be tapered or dissimilar-ended in form. Unlike the concentrations on the River Foyle and River Quoile which are canoe form and are more conducive to ferrying, the Clyde boats form and relatively larger sizes suggest they were used as cargo boats. (Section 13.9.1.2 para 12).

The six logboats from lochs were all located on the southern fringe of the region, an area of small lochs with no navigable inlets or outlets, although they have evidence of adjacent settlement.



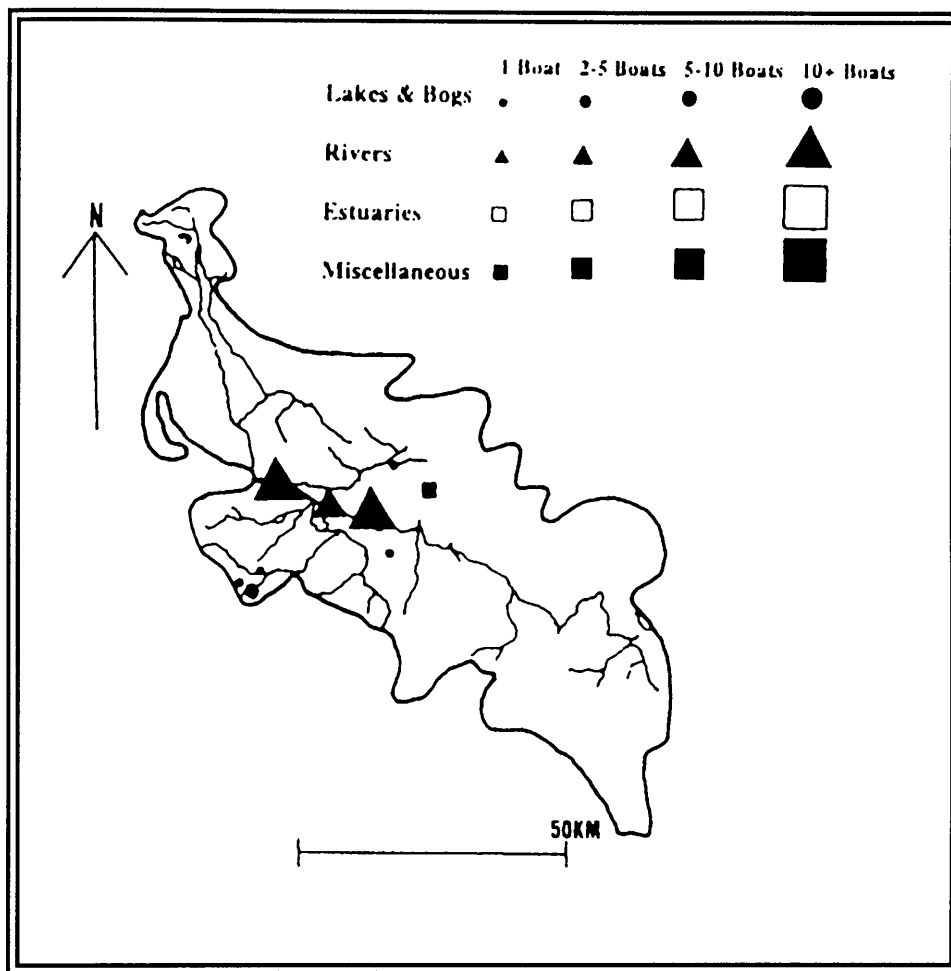


Figure 10.15: Region 5's Distribution

Thirty-nine of Region Sc6's forty-four boats were found in lacustrine contexts. Despite the navigability of the Dee, Annan and Nith Rivers, only two logboats were recovered from them. All the lochs which contained logboats are small and tend to be located at or near the headwaters of rivers or their tributaries from which there are no navigable outlets. These logboats appear to be connected with settlement rather than communication, where there are a significant number of lochs which are shared by both logboats and crannogs and/or shore-front settlements.

considered too inconsequential to be recorded. Alternatively, the original course of the rivers may have been altered through the development of town or cities on their banks. Similarly lake drainage and modern agricultural practises could have contributed. This would suggest the possibility that any trace of their existence has been obliterated. Such discrepancies could affect regional distribution patterns.

## 10.8 SOCIAL CONTEXTS

In Section 4.3.2 the association of logboats to archaeological sites has already been discussed in relation to logboat dates. The caution that must be exercised has been shown. In this section its application is used in broader context, to present possible relationships the distribution of logboats and archaeological sites (shore-front and island sites, and crannogs) This section is less concerned with the contemporaneity of the boats and sites. It examines how the sites can be used in conjunction with the logboats to reflect the use of waterways an indicator of the relevance of social activities centred within this environment.

Table 10.4: Number of Irish Logboats within 1km of Sites on a Regional Basis.

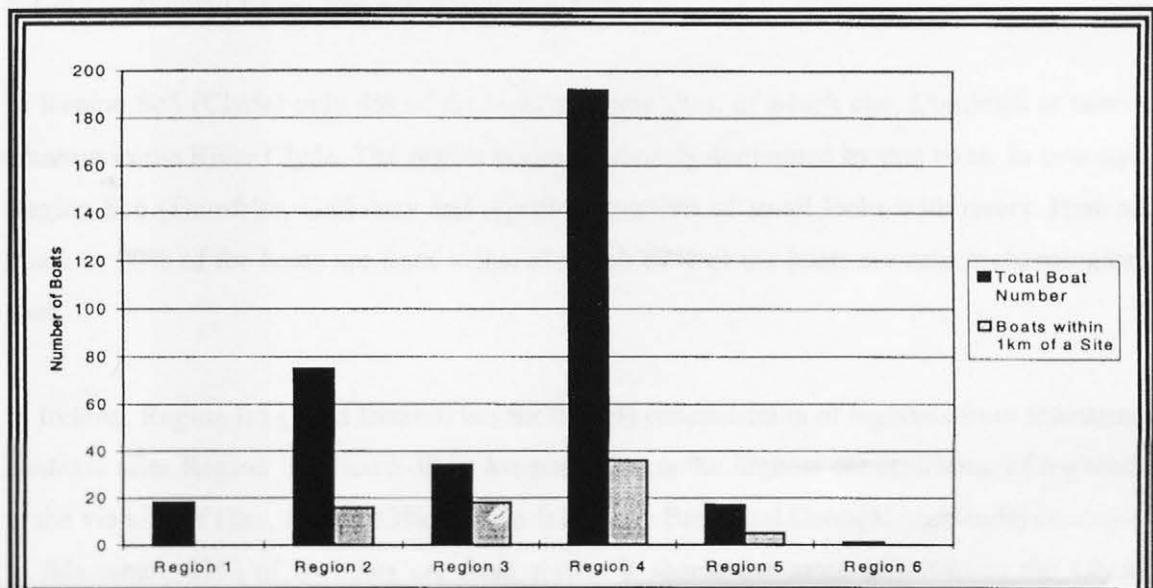
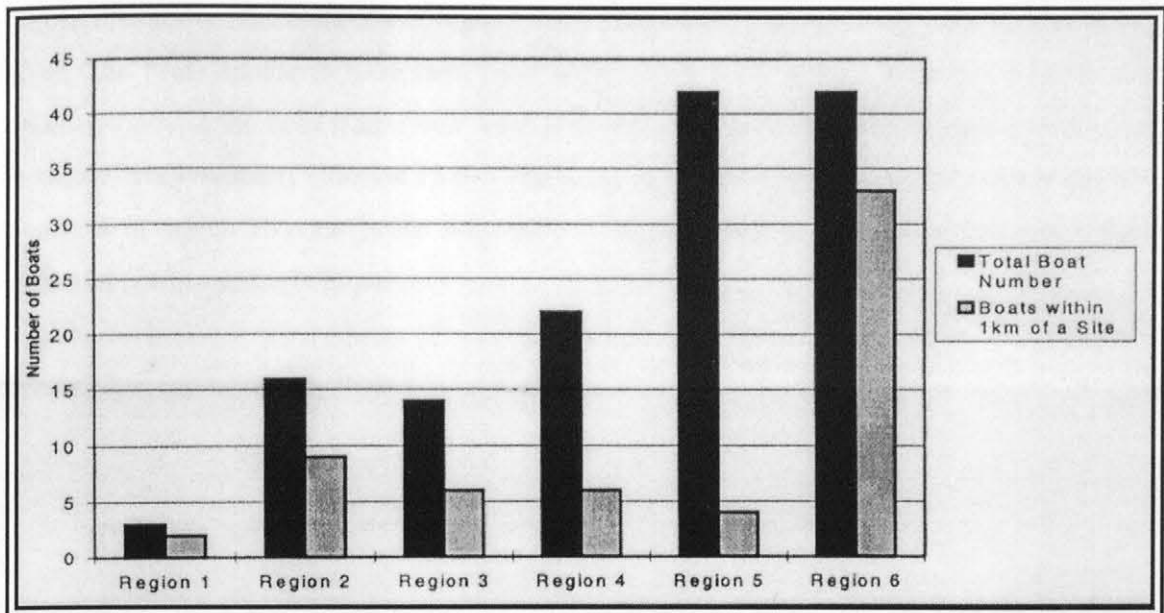


Table 10.1 has shown the geographical context in which the logboats have been found. In Ireland, there are seven boats from Table 10.3 which are located in rivers and close to archaeological sites. They are Downpatrick, Inch 1, 2 and 3 in Region Ir2, Clonlisk in Region Ir4, New Ross and River Barrow 2 in Region Ir5. In Scotland there are two boats from rivers found near an archaeological site. They are Cambuskenneth in Region Sc4, and Dumbuck in Region Sc5. The remainder are from lacustrine contexts.

Table 10.5: Number of Scottish Logboats within 1km of Sites on a Regional Basis.



When the above tables are placed within the context of Section 10.6, the regional distributions, it can be seen that those regions which have a much higher proportion of boats within 1km of an archaeological site are dominated by lacustrine contexts. In Region Sc4, six (43%) of the boats are near sites in lochs (crannogs), except for the boat from the River Forth at Cambuskenneth which was found near an abbey.

In Region Sc5 (Clyde) only 4% of the boats are near sites, of which one, Dumbuck is near a crannog in the River Clyde. The region is almost entirely dominated by this river. In contrast, Region Sc6 (Dumfries, Galloway and Ayrshire) consists of small lochs with rivers. Here as much as 90% of the boats are from lochs, of which 80% of the boats are near archaeological sites.

In Ireland, Region Ir3 (West Ireland) has the highest concentration of logboats from lacustrine contexts after Region Ir6 (South-West Munster). It has the highest concentration of logboats in the vicinity of sites, almost 53%. Region Ir1 (Foyle Basin and Donegal highlands) contrasts to this where 83% of its boats are from rivers. It shares the same affinities to the Clyde Region. Region Ir5 (East Midlands and Coast) has lakes, but none of any note. The region is dominated by the Barrow, Nore and Suir Rivers. Here, only 24% of the boats have been found in a lacustrine context, of which 17% (three boats) are within 1km of a site and 12% (two boats) are from rivers.

It must be concluded that there is a definite correlation between logboats, lacustrine and social contexts. Whereas within a riverine and estuarine context, there are very few sites which

provide a possible social context. A vague exception is perhaps the River Foyle in region Ir1, whose distinctive concentration of logboats indicates a well used routeway which crossed the river. The boats appear to have been used to provide a ferry service from one bank to the other. Otherwise the boats from rivers were probably used to carry cargo along the rivers, for example, Mullynascarty (Section 13.9.1.2 para 12). However to specify more conclusively the contexts in which riverine boats were used it is necessary to determine their individual potential performances (Chapter 13).

## CHAPTER 11

### TIMBER SUPPLY

#### 11.1 INTRODUCTION

The availability of different tree species within each region is studied on a chronological basis, to determine the influences of raw material on logboats' distribution. Also, the reason why some species of trees were favoured more than others is considered.

#### 11.2 SPECIES OF WOOD USED IN IRISH AND SCOTTISH LOGBOATS

The species of wood of one hundred and sixty-eight (42%) of the Irish logboats have been recorded. Without exception all of them were constructed of oak. However Fry (*pers. comm.*) has recently (October 1994) excavated what he believes are the remains of at least one (possibly two) logboats from beneath a burnt mound on a previous lake shore at Derrybrusk, Co. Fermanagh, which have been identified as alder (Appendix 2). O'Sullivan has recently recovered a poplar logboat at Carrigdirty Rock, Co. Limerick (O' Sullivan, A; 1996, 19).

Other species of wood have been used as component parts on boats. There are hazel dowels in two boats, Clooncoe 1 and Mullan Lower 1; yew was also used in Clooncoe 1 for fitted ribs; birch in Derryalla 1 as dowels; and poplar or willow side extensions on Garraunfadda which also had willow ribs used to secure the extensions.

Of the Scottish series, fifty-eight (38%) boats' species are recorded (Mowat; 1996: 11-81). Fifty-three (91%) of them are made from oak and the remaining five from scots pine.

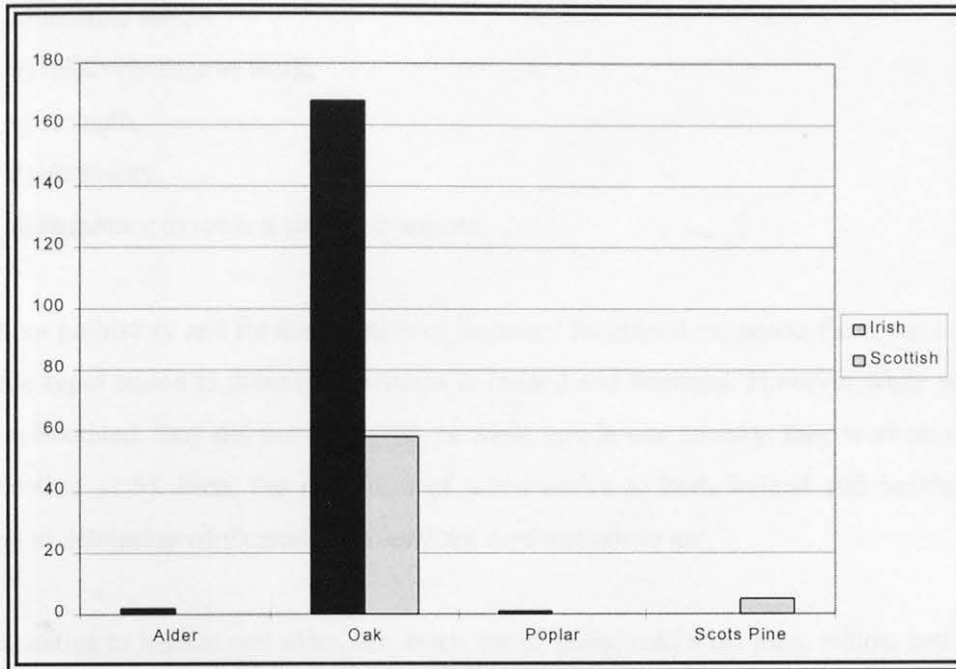
One boat, Buston 2 (Mowat, 1996: 14), has composite wood of a different species to the boat. Two of its repair patches were noted as probably birch, while there is no record of what the hull is made from.

The recorded species used to make European logboats other than oak are: alder (Clark, 1952: 286); elm (Clark, 1952: 284); lime (Anderson, 1967: 90; Johnstone, 1980: 47); poplar (Johnstone, 1980:

48); scots pine (Clark, 1952: 284); spruce or silver fir (Clark, 1952: 264); and sylvian pine (Arnold, 1988: 183).

The European logboat species are cited as a general comparable study of compatibility of species for logboat manufacture, and to assess reasons for them not being used to make Irish and Scottish logboats.

Table 11.1: Recorded Species of Wood used to make Irish and Scottish Logboats.



Mowat (1996: 126) notes that oak was used to make the English and Welsh logboats except for one each of ash, elm and pine.

### 11.3 PROPERTIES OF IRISH AND SCOTTISH WOOD

O'Sullivan states:

*'The density of the wood is the principal determining factor in the strength of the wood, and this is possibly the most important functional property of various species' (1991, 15),*

also that:

*'Species selection involves the recognition of these differences by the craftsman, and the deliberate choice based on this knowledge, of the species which has the properties that are best suited to the task to be carried out' (1991, 11).*

The determining factors of wood species favourable to logboat construction are;

- a) suitable size,
- b) relatively ease to work,
- c) strength,
- d) durability,
- e) resistance to rot in a wet environment.

Throughout prehistory and for the duration of logboats' functional existence, there were a number of native tree types suited to these requirements in Ireland and Scotland. However while some species existed in Scotland, they did not in Ireland, or while rare in one country, they were abundant in the other (Section 11.5). First, the properties of wood native to both Ireland and Scotland must be appraised to determine why certain species were used and others not.

The trees native to Ireland are: alder, ash, birch, hazel, holly, oak, scots pine, willow and yew. Those native or non-introduced species suited to Scotland are; alder, ash, aspen, birch, elm, hazel, holly, juniper, oak, scots pine, willow, yew and possibly lime to a very limited extent.

Modern alder is a small to medium sized tree which grows to a height of 15 to 27m and a diameter of 0.3 to 1.2m. They may have been larger in prehistory. They prefer loamy soils adjacent to flowing water. It is very resistant to rot in a continually wet environment only and is very light when dry. However it lacks strength and is classified as a perishable wood. (Farmer, R. H; 1972, 21-2: O'Sullivan; 1991, 17).

Ash grows to 15 to 30m high with a diameter of 0.6 to 1m. It is easy to fell and splits into planks easily. Commercially, it 'rates high in strength, hardness, durability and resistance to shock. However its resistance to rot is poor in permanently wet conditions. (Farmer, 1972: 25; O'Sullivan, 1991: 20; Smith, 1965: 23-4).

Aspen is a non-durable wood. The tree grows to a height of 12m and is 0.2 to 0.3m in diameter. (Farmer, 1972: 27-8).

Birch grows to between 18 and 25m high with a branch-free bole of up to 9m and a diameter of 0.5 to 1.5m. It is a heavy wood with the same strength as oak. However it is very prone to rot in wet conditions and is difficult to work. (Farmer, 1972: 39; O'Sullivan, 1991: 22).

Elm is 38 to 45m. high and 1 to 1.5m in diameter. It is relatively soft and strong, but prone to rot. (Farmer, 1972: 71; Smith, 1965: 27).

Hazel exists in a wide range of habitats, both wet and dry. It is light and easy to split, but is quite soft. (Farmer, 1972: 71; O'Sullivan, 1991: 24).

Holly grows to 9m high and has a diameter of up to 0.6m. Its wood is quite strong and hard. However its grain is irregular. (Farmer, 1972: 87).

According to Taylor (1981: 51) juniper 'does not rank highly as a source of timber'. It is relatively easy to work, lacks sufficient strength, is not durable and is quite light.

Oak grows to between 18 and 35m high with a branch free bole of up to 15m. It grows up to 2m in diameter. It is very durable. 'Prehistoric oaks...would have been among the larger trees in the prehistoric landscape. It has great strength properties... excellent load bearing capacity and is fairly resistant to rot'. (O'Sullivan, 1991: 25).

Scots pine is noted by Smith (1965: 30) as 'admirably suited' for modern boat work. He equates its qualities to that of oak. It is dense, quite strong, hard and durable. It is slightly less heavy than oak, and like oak does not absorb water readily. Its grows to long straight-grained lengths. Taylor (1981: 53) notes that 'it was probably an important tree where others would not thrive'.



Willow favours waterlogged soils and grows up to 21 to 27m in height and 0.9 to 1.2m in diameter. It is soft and easily worked. However it lacks durability. (Farmer, 1972: 212; O'Sullivan, 1991: 28).

Yew which grows up to 20m. in height, has a slow growth, with a gnarled trunk. It is heavy and close-grained, quite hard yet flexible (O'Sullivan, 1991: 28).

The properties of the various tree species would have been known to craftsmen and wood-workers throughout prehistory and can be traced to medieval records which evaluate the properties of the different tree species, from their trunks to the branches and the fruits they bear. (Anderson, 1967: 85-387; Davies, 1979: 4-6, McCracken, 1971: 59-132; Mitchell, 1986: 165-6; Rackham, 1980: 7, 285).

The tree species used to construct European logboats other than those mentioned above are elm, lime, poplar, spruce or silver fir and sylvian pine, of which lime and poplar are the only species properly suited to logboat construction and use (Farmer, 1972: 170-1). The other species may have been used due to a lack of local availability of suitably sized lime and poplar.

#### **11.4 SUITABLE WOOD SPECIES FOR LOGBOATS**

Of the tree species native to Ireland and Scotland, it can be seen in Table 11.1 that just three species, oak, poplar, scots pine and possibly lime were appropriate to logboat construction. Lime was admirably suited to this task. However lime did not exist in Ireland and had a very limited distribution in Scotland, if it grew there at all. Both oak and scots pine are recorded as used for logboats in Scotland, of which the greater proportion was oak (91%). In Ireland alder and oak and poplar are the only definitely recorded species used for logboats. The fact that scots pine was not used can be attributed to its relative scarcity (Section 11.5.1). Because of the lightness of lime, it is the most ideal choice of wood since the boats would have a greater buoyancy, be easier to manoeuvre (relative to its hull shape), and carry greater loads. It is also easier to work than other woods of a similar size, less likely to split and weighs relatively little. While oak and scots pine are very heavy woods, their one big advantage over lime is that they absorb a very limited amount of water and swelling is reduced to minimum (Smith, 1965: 29, 31). This is an important criterion, since the more water the wood absorbs, the less is its freeboard and the less robust they become.

Table 11.2: Irish and Scottish Native Wood Species and their Suitability to Logboat Construction.

| Wood          | Ease to work | Suitability | Strength | Durable  | Rot Resistance | Weight | Size |
|---------------|--------------|-------------|----------|----------|----------------|--------|------|
| Alder         | good         | good        | good     | moderate | good           | light  | Good |
| Ash           | good         | good        | good     | good     | poor           | light  | Good |
| Aspen         | good         | poor        | poor     | poor     | poor           | light  | Poor |
| Birch         | poor         | good        | good     | poor     | poor           | heavy  | Good |
| Elm           | good         | good        | good     | poor     | poor           | light  | Good |
| Hazel         | good         | poor        | poor     | poor     | poor           | light  | Poor |
| Holly         | poor         | poor        | good     | good     | good           | heavy  | Poor |
| Juniper       | good         | poor        | poor     | poor     | poor           | light  | Poor |
| Lime          | good         | good        | good     | good     | good           | light  | Good |
| Oak           | good         | good        | good     | good     | good           | heavy  | Good |
| Scots<br>Pine | good         | good        | good     | good     | good           | heavy  | Good |
| Willow        | good         | good        | poor     | poor     | good           | heavy  | Poor |
| Yew           | poor         | poor        | good     | good     | good           | heavy  | Poor |

The four species of woods used as components in Irish and Scottish logboats are birch, hazel, poplar or willow and yew. The properties of poplar and willow are very alike, and they are easy to confuse (in the archaeological record). One boat (Garraunfadda, Ireland) had side extensions, which were secured with willow withies. The side extensions were identified as either poplar or willow. Since willow withies were used, it is very likely the extensions were made from willow.

Birch was used as treenails (or dowels) and for repair patches, hazel as treenails, and yew as fitted ribs. Birch is neither durable nor resistant to rot. Hazel is weak, non-durable but resistant to rot. Willow is weak and non-durable and easily rots. Yew is strong, flexible, durable and resistant to rot. Since both birch and hazel are not suitable choices of woods for boats, it may be that these woods were easily accessible at the time and were thus incorporated in the boats. The use of birch as two repair patches in the Buston 2 boat (Scotland), would suggest a poor choice of wood, whereas birch treenails by the nature of their use are compressed into a tight fitting area, and thus may have been suitable to the particular task.

The willow extensions on the Garraunfadda boat are resistant to rot, their use here would not require much structural strength and as such were probably sufficient to their task. The lighter willow wood would also have maintained the lower boat's centre of gravity and kept the original stability (Section 13.8).

The yew used in Clooncoe 1 (Ireland) as fitted ribs is a very good choice of wood since it is strong, flexible, durable and very resistant to rot, which would be the requirements of fixtures requiring structural strength.

The qualities of oak and scots pine have been discussed above. Alder is not very strong and lacks durability except when it is kept continually wet. Despite the fact that it is both light and resistant to rot, it is a very unusual species to use for the Derrybrusk boats, since oak would have been an abundant raw material. Both the discovery of the poplar logboat and its date of 4800BC (O'Sullivan: *pers. comm.*), establishes that if more soft wood logboats had been made, they do not necessarily decay out of the archaeological record, and thus present a bias towards oak boats.

## 11.5 WOODLAND AND LOGBOAT DISTRIBUTION

From Section 10.4, it can be seen that oak and scots pine, lime and poplar are the most suitable tree species for logboat manufacture, since they contain all the necessary properties from which to make a successful logboat.

Of the above species, alder, oak, poplar and scots pine were available in Ireland. Although different species of tree were locally available, the builders sought those species best suited to logboat construction. Scots pine to a very limited extent was confined to upland areas. Mitchell (1987: 166) notes that Scots Pine was ranked along with oak, hazel, holly, yew, ash and apple as first quality or noble trees. O'Carroll (1994: 60, 62) notes that it is 'plausible...that Scots Pine remained a native species in Ireland in limited stands in different areas within the country.' She refers to their identification from medieval layers in excavations of King John's Castle, Limerick, Cork and Waterford Cities. Its scarcity in the archaeological record would tend to support the hypothesis of the confinement of Scots Pine which made it inaccessible. There would certainly have been a plentiful supply of substitutes.

Logboats are generally lowland boats, since the greater concentration of navigable waterways is located there. As such the obvious tree species in Ireland for logboats was oak, which is borne out by the archaeological record.

McCracken (1971: 56) notes that by 1600, forests covered twelve percent of Ireland, but as a result of intensive commercial exploitation, by 1800 this figure was reduced to two percent. The 1600 figure would have been smaller than that of the 8th century, when commercial exploitation was in its infancy.

By 1800 most of the larger areas which had been wooded in 1700 were to some extent still wooded, 'though...[it]...may have been reduced to scrubland' (McCracken, 1971: 56). During the 18th century local timber was available in insufficient quantities so that both timber and bark had to be imported to support ailing industries and 'the export of timber products ceased' (McCracken, 1971: 57). This period also saw the introduction of exotic trees and the demise of logboats.

Much can still be learnt from the distribution of the early seventeenth century as regards to the location and extent of former forests. McCracken's compilation (1971: 40-58) shows that there was still an abundance of oak dominated forests, interspersed with relatively small areas with no forests. However she notes five large areas where there was little or no forest cover. These are;

- a) Donegal (Region Ir1), where much of the topography consisted of 'mountain or covered with poor boulder-strewn soil' in which its woods were very limited (McCracken, 1971: 40).
- b) 'The plain of Mayo' (Region Ir3), was 'largely forest free, but with some wood surviving along its western margin until the mid-17th century' (McCracken, 1971: 42-3).
- c) The Aughrim area (Region Ir4), which centres on the lower reaches of the River Suck before it meets the River Shannon (McCracken, 1971: 43).
- d) North-west Clare (Region Ir3), which she notes as being 'notoriously barren' (McCracken, 1971: 43).
- e) From the Bog of Allen to the western extent of the Wicklow mountains (Region Ir5), (McCracken, E; 1971, 50).

She also notes that forest distribution and exploitation in a district 'was largely determined by geographical position. Wood near a navigable river was turned into profitable timber, whereas in less accessible areas, the timber was 'converted into charcoal' to render its transportation less costly (McCracken, 1971: 58).

It is tempting to suggest that the five areas of absent forest cover are reflected in the distribution of the logboats, since there have been few logboats discovered in these areas. The Donegal area has one boat, Tullybeg. The Mayo Plain has a boat from Bunduvowen.

In north Clare there is a boat from Inchiquin. In both the Aughrim and Bog of Allen areas, there are no boats. There are other parts of Ireland with few discovered logboats but with significant quantities of waterways, for example, the Barrow Basin. Here there is a very small number of boats confined to its lower reaches. This scarcity in such areas may be attributed to regional variations in deforestation where timber for industry is more easily accessible and may have led to a relatively early demise in forests and hence logboats' raw material (Section 4.6 para 1-3). In some of the regions where there is this lack of boats in the archaeological record, literary records of the boats themselves can be used to supplement the archaeological record (Section 3.5).

Seymour (1918: 84) refers to the Papal Nuncio, Chiericati, in about 1515 who was ferried in a 'boat made out of a hollow beech-trunk'. However, either he was mistaken in his identity of the wood species or the correct species was wrongly translated, since beech is not a native tree species. McCracken (1971: 31) says that beech was introduced to Ireland in the 19th century.

In Scotland, oak and scots pine were used to make logboats. Davies (1979: 3) notes that 'the Norsemen valued Scottish pine and oak for building their ships'. Oak was abundant almost everywhere. However none was available on the Orkney Islands, yet one logboat is reputed to have been found there. Mowat (*pers. comm.*) believes the log from which it was made may have arrived there as driftwood. While it is feasible to make a logboat from oak which is in the process of seasoning, it would also prove to be extremely difficult. As oak seasons, the wood contracts along the grain causing long splits which often can not be detected. This would have occurred in the Orkney boat and it would not have been particularly sea-worthy, despite whatever attempts may have been done to caulk it. It would still leak continually and certainly could not spend lengthy periods of time on the water.

Scots pine was abundant in the upland areas of Scotland. It would certainly have been more prolific in Scotland than Ireland. It is recorded in four of the seven boats from Loch Laggan, a highland loch. The only other recorded instance of it is from a boat from the River Tay at Friarton, a lowland area. This boat has been roughly dated to the sixth millennium BC (Section 4.3.3 para 1), a period in which scots pine was much more abundant in Scotland than oak. Because of the climatic conditions at the time, scots pine was certainly located in lowland areas.

Despite the availability of both oak and scots pine in later prehistory, there is a greater proportion of oak (91%) recorded from the logboats. Oak is more durable than scots pine, but not to such a significant degree that there would be such a large difference in the archaeological record.

Mowat (1996: 116) notes that ‘...the distribution of...[Scottish]...logboat discoveries accords well with the recorded distribution of oakwood at the present day and in the recent past, and the size of the vessel typically found with the relatively small size of trunk. that is to be expected near the periphery of the distribution of the species’ (Mowat, 1996: 116). However it is very unlikely that logboats would have been made smaller than what was required, considering there are other types of boats that would have been used if trunks of a suitable size could not be obtained.

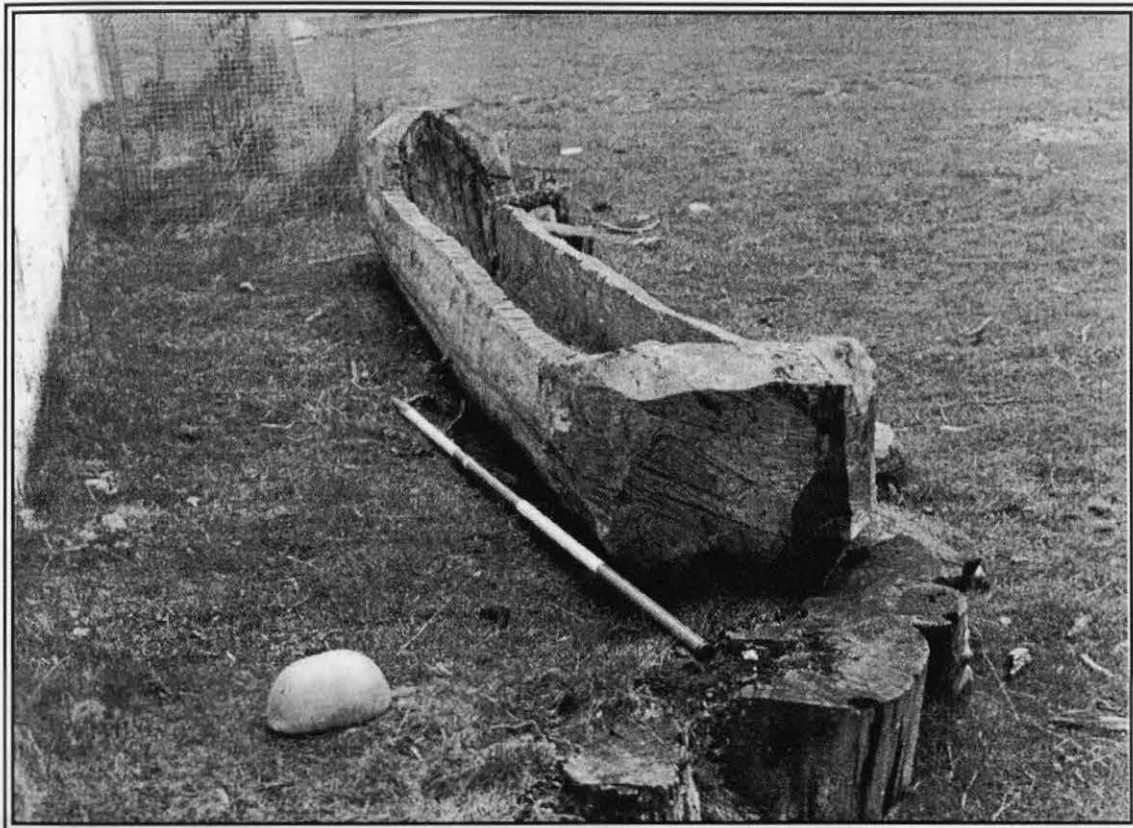
It is possible that oak was more locally available than scots pine in the areas where logboats were in greater use. With the exception of a boat from Eadarloch and another from Loch Laggan, all of the fifty-one remaining boats that were identified as oak were found in relatively lowland areas of Scotland, areas where oak was much more abundant than scots pine in later prehistory.

## CHAPTER 12

### LOGBOAT RECONSTRUCTION

#### 12.1 INTRODUCTION

Since shortly before 1960, several attempted and actual logboat reconstructions have taken place in Ireland and Scotland. Some of them, such as with the attempted use of elm by boy scouts in 1989 at Larch Hill (Ireland), have made no use of indigenous archaeological evidence. While others were specifically governed by principles of experimental archaeology in which either the manufacturing methods of logboat construction and/or performance related activities were tested.



*Plate 12.1: An attempted elm logboat*

This chapter discusses the boat reconstructions and how they may enable a better understanding of logboat construction and use.

## 12.2 RECONSTRUCTED LOGBOATS

Table 12.1 presents Irish and British logboats either replicated or built for practical tests. They are listed here to avoid subsequent confusion in the remainder of the chapter. Six (and, at present, the only known) logboat reconstructions to have taken place elsewhere in Europe are from Denmark. They are presented here since little logboat reconstructional work has taken place and all information which pertains to this is of value. In addition, several are made from soft wood, of which none of the Irish or British reconstructions use. They are included in the first half of the table.

*Table 12.1: Recently made Logboats*

| Name                       | Type    | Year | Built by                                 | Country          |
|----------------------------|---------|------|--|------------------|
| *Danish Logboats           |         |      |  |                  |
| Verup 1                    | Replica | 1978 | Peterson & Moses                         |                  |
| Verup 1                    | Replica |      | Peterson & Moses                         |                  |
| Verup 1                    | Replica |      | Moses                                    |                  |
| Verup 1                    | Replica | 1987 | Moses                                    |                  |
| Tybrind Vig                | Replica |      | Kannegard                                |                  |
| Irish and British Logboats |         |      |  |                  |
| Cruimghlinn                | Copy    | 1959 | Seaby & Hutchinson                       | Northern Ireland |
| Ravensbourne               | Replica | 1987 | Redknap & Goodburn                       | England          |
| Loch Doon 1                | Replica | 1991 | Goodburn & Institute of Maritime Studies | Scotland         |
| Llangorse                  | Replica | 1994 | Goodburn & Time Team                     | Wales            |
| †Bláthin                   | Copy    | 1994 | Gregory & Fry                            | Northern Ireland |
| †Daire                     | Copy    | 1995 | Gregory & Fry                            | Northern Ireland |

\* The primary source for the Danish reconstructions is Christensen (1990: 119-41), in which a few of the years in which they were constructed are omitted. † Both Bláthin and Daire were made by the writer. While Bláthin is a to scale version of a logboat from Derrybroughas (Ireland), Daire is an amalgamated copy of the poor remains of five Irish Logboats which had evidence for sailing (Section 9.3 para 1).

Five of the six Danish replicas were made from lime. The remaining one was made from oak. The correct tree species was used except for the Verup 1 replicas which were made from lime, since 'it



proved impossible to find an alder trunk of the required dimensions (Christensen, 1990: 139). This may have affected the time taken to construct it, because alder can have a tendency to twist along the grain while it is being worked. Lime does not react in such a manner. Similarly, the density of alder is greater than that of lime which means that a lime logboat would ride higher in the water than its alder counterpart. This in itself would undoubtedly alter aspects of performance between two boats of similar dimensions and form which are made from either species. These boats are copied from Mesolithic and Neolithic originals. As such they are included to compare construction techniques with available evidence from early Irish and Scottish logboats, since no replicas from Ireland and Britain have been made from these periods.

All Irish and British reconstructed logboats were made from oak since it is the predominant tree species used in antiquity to make logboats (Section 11.2 para 1 and 11.4 para 1-2), and was the material used to make the originals from which they were copied.

Each of the above logboats are discussed separately under the following topics which is based on the available information:

- a) construction techniques,
- b) displacement,
- c) stability
- d) performance under propulsion,
- e) manoeuvrability.

### **12.3 DANISH RECONSTRUCTIONS**

The published accounts of the Danish replicas firstly discusses construction techniques with little on displacement, stability or performance. Because of their short accounts, they are considered here together.

### 12.3.1 Construction Techniques

It has been shown (Christensen, 1990: 130) that of the forty-two logboats (found in Denmark to the date of publication), whose species have been identified, twenty were made from alder, nineteen from lime and three from oak. All the Mesolithic boats were made from lime and seventeen Neolithic boats were made from alder. These species would undoubtedly have been easier to work than oak with stone tools.

Evidence from the two Tybrind Vig (Mesolithic lime) boats shows that they were hollowed out 'by chopping out a series of transverse notches along the trunk and then splitting off the intervening wood using some form of wedge' (Christensen, 1990: 136).

This method was used to reconstruct the 1978, 5.5m long Verup 1 boat, using lime. The original boat was made from alder, which was radiocarbon-dated to 2270 bc. 'Original...polished thin-butted flint axes' were used. These were hafted using the usual as well as using a transverse-hafted axe. The hollowing process was consistent with the method described above as well as using 'dry ash wood wedges driven with mallets' (Christensen, 1990: 136). The transversely-hafted axe was necessary in the bottom of the boat. The sides of the boat were finished off with a vertically hafted axe, while a flint blade was used on the gunwales. After the interior was completed, the outside was finished by removing bark and 'some root buttresses' at the stern. Then the bow and stern were 'cut into shape' (Christensen, 1990: 139).

The second Verup 1 was constructed in the same manner as above and the same species and tools were used.

The third Verup 1 boat was made from oak. It was noted that oak was not as easy to work with stone tools, but it split 'relatively easily' (Christensen, 1990: 139).

The fourth Verup 1 boat was made from lime by using 'the standard hollowing-out method'. Mesolithic tools were used. These were 'core axes, greenstone axes and antler axes' (Christensen, 1990: 139-140).

The other logboat that was reconstructed, is a replica of the 10m long Tybrind Vig 1 (Mesolithic) boat. Like the original boat, lime was used, with flake axes and wooden wedges.

Christensen (1990: 140) also notes that 'it takes 2 experimental boat builders in the region of a week to make a logboat', which is not inclusive of making the required tools.

### **12.3.2 Displacement**

The two published instances of recorded displacement values are quite general. It was noted that the first Verup 1 boat was able to withstand completely drying-out and as a result could carry an extra person (Christensen, 1990: 139). The second instance is that the Tybrind Vig 1 replica could carry a crew of eight men (Christensen, 1990: 139).

### **12.3.3 Stability**

It was noted that the first Verup 1 replica became more unstable when it took an extra crewman, and that it 'may require ballast stones' (Christensen, 1990: 139). This is obviously due to a combination of the wood's low density and increased centre of gravity. The increased height and weight of the crew will increase the boat's and crew's combined centre of gravity, which decreases its overall stability. The addition of the stones and their relatively higher density counteracts the effects of the extra crew on the boat.

### **12.3.4 Performance under Propulsion**

The first Verup 1 replica was paddled by 2 crewmen over a distance of 15km, which was completed in five hours. Water was taken aboard due to the rough weather on the last part of the journey across open water. It was noted that washstrakes along the sides would have remedied the situation (Christensen, 1990: 139). The average speed was 3km per hour or 0.83 m per second (1.6 nautical miles per hour).

## 12.4 CRUIMGHLINN

Cruimghlinn was made from a plan was 'prepared by the [Ulster] Museum staff' (Hutchinson, 1960: 38). It was made from a one hundred and fifty-nine year old oak tree trunk, which weighed 3 tons (3048kg), (Hutchinson, 1960: 39; Seaby, 1989: 18). It was made by eight boy scouts who divided into two teams and worked two-hour shifts. The finished boat measured over 4m in length, weighed 10cwt (508kg) and took three weeks to make (Hutchinson, 1960: 38-39; Seaby, 1989: 20).

### 12.4.1 Construction Techniques

The boat's method of construction was first to remove excess wood and provide a level surface along the log's length to a depth of 'one-fifth of the way down through the bole...using a two-handed cross-saw every 30 to 38cm, then wedging off' (Seaby, 1989: 19).

The tools used were hand- and long-handled adzes, and felling axes. The outside of the hull was shaped to the given plan. A 'pulley system' was rigged to turn the logboat over so that the interior could be hollowed (Hutchinson, 1960: 39). A longitudinal 'trench' was then cut into the trunk which was gradually widened and deepened. During this process fire was used and maintained at a 'white heat' with the aid of bellows connected to a stationary bicycle (Hutchinson, 1960: 39; Seaby, 1989: 19). This proved to be a futile exercise as it had no effect on the hollowing-out process. Final trimming consisted of adzing the bottom and thinning the sides with the use of an axe once the thickness gauges had been encountered and the boat was hollowed to its required thickness.

### 12.4.2 Displacement

Seaby (1989: 20 ) notes that the boat could carry 'seven teenagers' or '450+ kilograms', which left a freeboard of 15cm.

### 12.4.3 Stability

The boat was recorded as being 'extremely stable due to the low centre of gravity' (Seaby, 1989: 20).

### 12.4.4 Performance under Propulsion

During the tests, it was found that the boat 'had a tendency to spin thus requiring a fairly specialised steering technique' (Seaby, 1989: 20). On the basis of two published photographs (Hutchinson, 1960: 39; Seaby 1989: 16), it appears that the steering technique required one person to sit on the stern and use a paddle extended over the stern as a steering oar while two people paddled, one paddle to each side.

During initial tests, the logboat listed to one side and 'further trimming' was necessary on one side with an adze (Seaby, 1989: 20).

## 12.5 RAVENSBOURNE

This boat which was made in 1988 from a 166 year old tree. It is the first replica logboat made in Britain or Ireland. It is a reconstruction of the Clapton Logboat. Its reconstructed length is between 3.7 and 3.8m, 60 to 65cm in width and between 40 and 42cm in depth amidships (Goodburn and Redknap, 1988: 7). The original is quite unusual in so far as it has a central transverse bulkhead, which is emulated in the replica. The original was dendrochronologically-dated to between 950 and 1000 AD (Goodburn and Redknap, 1988: 7).

This was a detailed experiment in which the parameters of the exercise were to:

- a) record 'the lost technology of construction',
- b) use tools identified from the original's tool marks i.e. 'a thin-bladed axe, gouge or small gouge adze, medium-sized adze and at least one auger' (Goodburn and Redknap, 1988: 7).
- c) record the time taken for construction in man hours and the amount of labour required.

d) test performance of the boat such as 'load-bearing, stability and portage'.

### **12.5.1 Construction Techniques**

After branches, bark and sapwood were removed from the felled oak trunk, the log was cut with large axes to the required length. Further wood was removed from the bottom using the score and splinter technique, and trimmed using an adze. The sides were also trimmed by axe. Two thickness gauges were bored with a wood auger into the bottom.

The estimated 1.5 ton trunk was rolled over with poles and wedges. The process of score and splinter was again used to remove excess wood from the top of the intended boat prior to hollowing. Adzes were used to trim the level down to just above the intended gunwale level. During this process, charred sticks were used to delineate the boundaries and intended shape of the boat.

A cooper's broad axe was used to trim the outside while axes were used to score and splinter the wood out of the interior and trim the sides internally once the thickness gauges were met.

During construction animal fat and raw linseed oil was applied to the surface to prevent the wood from splitting along the grain, a result of the wood drying out (Goodburn and Redknap, 1988: 9-10, 19-20).

### **12.5.2 Displacement**

The boat's 'green condition' caused a greater displacement than anticipated with one person on board. The effect of this was noted to have lessened with two people in it. It was noted that 'four moderately-built adults formed the maximum capacity in...very sheltered conditions' (Goodburn and Redknap, 1988: 20), and that 'the most practical load...[was]...equivalent to two average-sized adults with some equipment'. With one person, the freeboard was approximately 15cm.

### 12.5.3 Stability

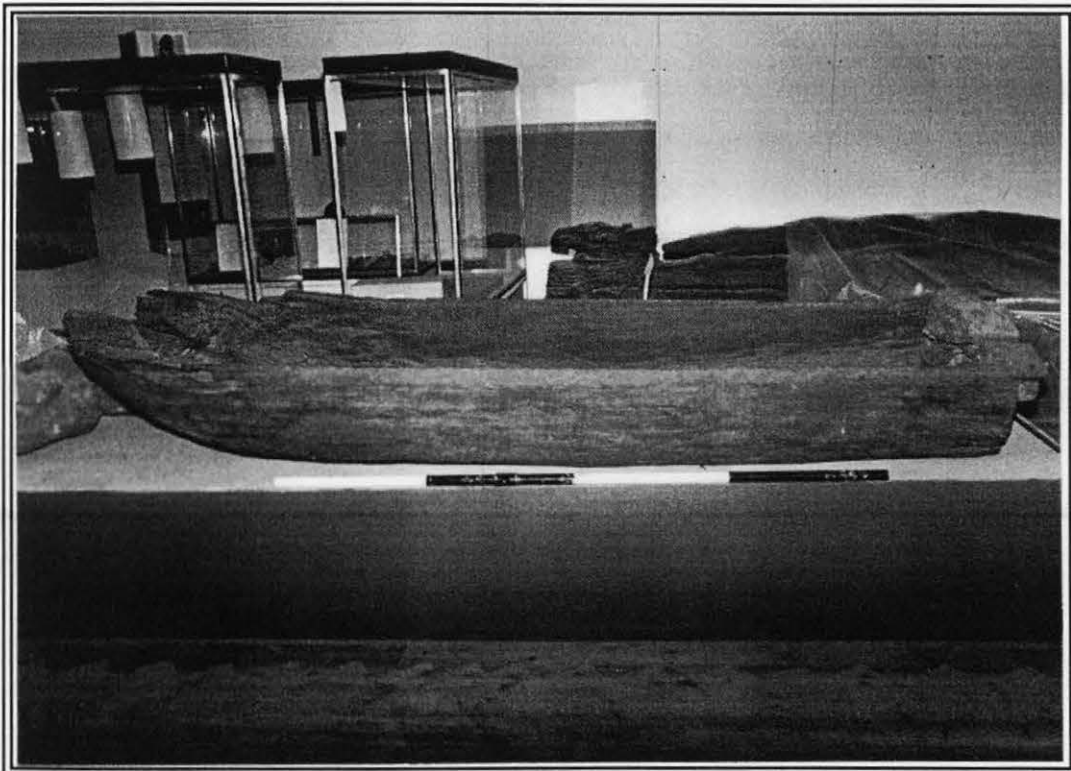
The heavy ends dampened the pitching and enabled a person to stand while punting (Goodburn and Redknap, 1988: 20).

### 12.5.4 Performance under Propulsion

The three methods of propulsion employed were punting, paddling and both in tandem. Paddling was 'most effective by one crew, sitting in the stern...from where direction could be easily controlled' (Goodburn and Redknap, 1988: 20).

## 12.6 LOCH DOON 1

The Loch Doon 1 replica was made in November 1991, by students from the Scottish Institute of Maritime Studies, University of St. Andrews, in which the writer had the opportunity to take part.



*Plate 12.2: Loch Doon 1*

The original boat which measures 3.37m in length, 85cm in maximum width and 50cm in maximum height, and has been radiocarbon-dated to 509 +/-110 ad. It was left in an unfinished state (Table 4.2). The purpose of the replica's construction was:

- a) to make the boat to its completion,
- b) to determine the time taken in its construction,
- c) to ascertain the tools required,
- d) to assess its performance in water,
- e) and the amount of skill required to make a logboat (Diploma Class, 1992: 10).

### 12.6.1 Construction Techniques

The work which took two weeks to complete was performed in teams of two to three people for 'safety considerations' (Diploma Class, 1992: 11), while the remainder recorded the construction processes involved by 'written notes, photography and video footage' (Diploma Class, 1992: 10). A three and a half ton oak trunk was used from which the boat weighed 'between six and seven hundredweight's' (The Scotsman, 30/11/91: 5).

The construction process took the form of firstly shaping the bottom of the hull. This was done by cross-cutting the trunk into scores at regular intervals with an axe and then using metal as well as wooden wedges to split off the wood to a flat plain from which the bottom was shaped. The sides were similarly shaped and adzes were used for the finer shaping of the hull. Charcoal was used to mark out the areas to be cut off (Diploma Class, 1992: 11).

The boat was then levered over so that it rested on its bottom. The scoring and splintering process was repeated to remove excess wood 'roughly to the level of the sheer' (Diploma Class, 1992: 11). The same method was used to hollow out the interior which was demarcated by charcoal. Once the bottom of the interior had been reached, axes and adzes were used to pare down the thickness of the sides and bottom to its completed form.





*Plate 12.3: Removing excess external wood*



*Plate 12.4: Paring the inside*

During the hollowing process a fire was lit and maintained to ascertain that the use of fire was not a viable method of logboat construction (Lawrence, 1992: 35). The fire which was in one of the scored hollows was fed for two hours, after which it had burned to a depth of 2mm. This consisted of the frayed wood fibres, a residue of the previous axe work (Plate 5.3).

### 12.6.2 Displacement

It was noted that the boat 'was very low in the water since the wood was still unseasoned' (Diploma Class, 1992: 12). Lawrence (1992: 47) records that one crewman of about 70Kg in weight situated 'in the stern half' of the boat still left the boat with substantial freeboard given the condition of the wood'. He notes that the freeboard was 12cm. With two crewmen at a combined weight of 151Kg, the freeboard was 8cm amidships (Lawrence, 1992: 47-48).

### 12.6.3 Stability

No aspects of the boat's stability were recorded.



*Plate 12.5: Loch Doon 1 Replica undergoing trials.*

#### **12.6.4 Performance under Propulsion**

It was found that the best manner for one paddler to propel the boat was at 50cm from the stern when he was in a kneeling position. Its estimated speed was a maximum of 2 Knots when paddled by one person (Lawrence, 1992: 47).

#### **12.6.5 Manoeuvrability**

The became 'much less...manoeuvrable' when the crew was increased from one to two people (Lawrence, 1992: 47-48), but it was easier to control in water than previously anticipated.

### **12.7 LLANGORSE**

This replica was made for the Time Team in 1994. The project which was led by Goodburn, was to make the boat in tandem with excavation and survey work in and around Llangorse Lake. At present there appears to be no published material on the results of the exercise. It appears that the aim of the project was to replicate a logboat which was recovered from this lake.

### **12.8 BLÁTHIN**

Bláthin was made by the writer (October to November 1994) from an oak tree trunk. The intention was initially to replicate a boat from Derrybroughas. However, because of the small size of the trunk, Bláthin was made to six-eighths the size of the original logboat. It was made to a length of 3.54m, a maximum width of 48.5cm and a height of 37.5cm.

The purpose of its construction was to test naval architectural models independently developed by the writer, and by Fry (Historic Monuments for Northern Ireland). The purpose of both models is to assess and determine the performance of logboats through detailed measurements of them (Chapter 13). By constructing Bláthin and recording all practical results of its use, this can be to the theoretical for the same boat. If results of both sets of tests correlate, then the model and the results of its applications are discussed in Chapter 13.

### 12.8.1 Construction Techniques

The practical tests were used to record Bláthin's displacement, stability, performance under propulsion and manoeuvrability. The method of construction was not a primary consideration, since a significant number of other boats were made for this purpose. As a result a combination of traditional woodworking and modern tools were used. These were small hand-adzes and adze-gouges, long-handled adzes or foot-edges, a wood auger, a wood plane and three chainsaws of differing guide-bar lengths.

The method of construction was very similar to that used on the Loch Doon 1 and Clapton (Ravensbourne) Replicas. The outside of the boat was completed prior to hollowing. The first step was to roughly shape the bottom and sides of the boat by horizontally slicing along the length of the log for lengths of 50 to 70cm and then vertically cutting the section off. This process was repeated until an approximately level surface remained close to the intended bottom of the hull. The log was then vertically sliced to expose the intended dimensions and shape of the sides again with the use of a chainsaw. The ends were roughly shaped by the same technique.

A Chainsaw was then used by holding it in a vertical cutting position and sliding it from side to side on low engine revolutions to further smoothen the bottom of the hull. The process was repeated on the sides and ends, after which a plane was used to finish the hull.

Once this was completed, the log was levered over so that it rested on its bottom. Excess wood was then cut off to bring the level close to the intended sheer in the same manner that was employed on the bottom of the hull.

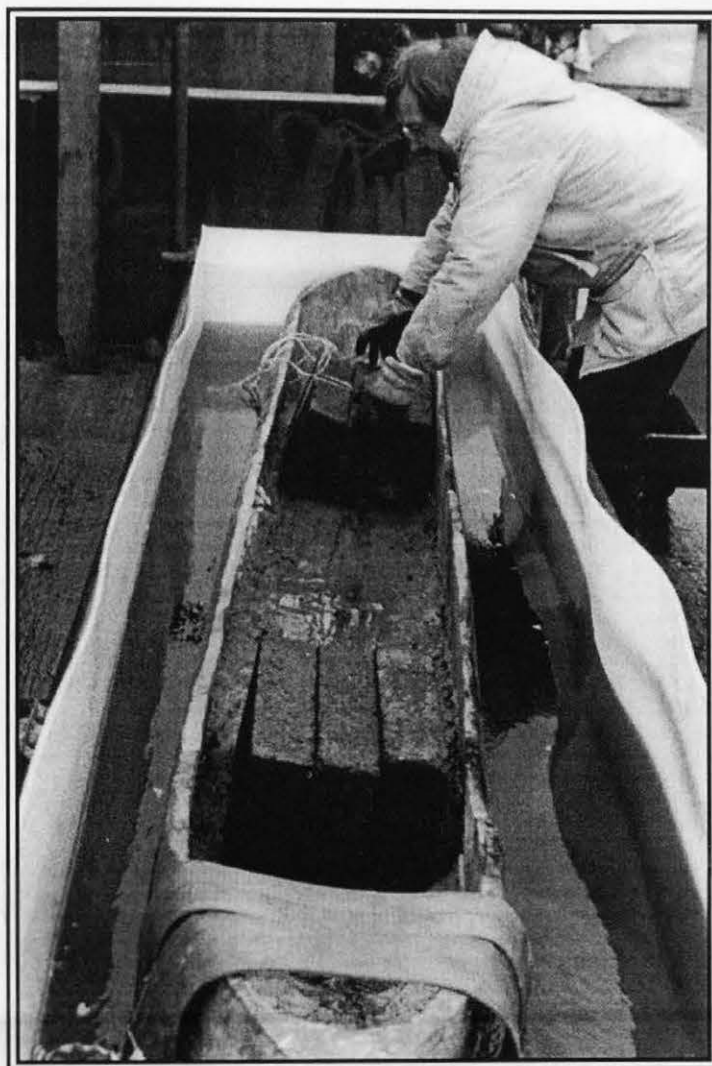
The boat was then hollowed by using a small chainsaw to vertically slice the wood along and across the grain within an area demarcated by chalk. A long-handled adze was used to hack out blocks of wood defined by the chainsaw cuts. The process was repeated until the two thickness gauges which had been drilled into the bottom of the completed hull were encountered. The floor was then adzed to a smooth surface.

The sides and ends were further sliced with a chainsaw close to the intended thickness. This was finished by a final shaving of the sides internally with an axe, while the process was repeated with hand- and gouge-adzes at the ends.

### 12.8.2 Displacement

A water tank was constructed to test the boat's displacement, from an empty or unladen state to various conditions of cargo-carrying potential, with the use of previously weighed concrete blocks.

In its unladen state, Bláthin displaced 184.5kg or litres of fresh water which left it with a freeboard of 20cm, (60% of the boat's overall height).



*Plate 12.6: Load condition tests.*

This freeboard was less than anticipated. A block of the original trunk which was used to determine the density of the wood was identified as turkey oak, a particularly dense species of oak. Its density was assessed when it was almost completely seasoned. It measured  $1253\text{kg/m}^3$ . When the density of native oak is considered in its fresh and seasoned conditions ( $1060$  and  $736\text{kg/m}^3$  respectively), it is much lower than turkey oak. If it is assumed that the difference between fresh and seasoned turkey oak is reflected by that of native oak, the fresh turkey oak would have a density of approximately  $1700\text{kg/m}^3$ . this greater density explains why Bláthin rested lower in the water (by approximately  $7\text{cm}$ ) than was previously anticipated (Section 13.3.2 para 1-4)

$56.3\text{kg}$  gave Bláthin a freeboard of  $40\%$  ( $15\text{cm}$ ) and  $126.7\text{kg}$  was required to obtain a freeboard of  $30\%$  ( $11.3\text{cm}$ ). It was found that as more weight was put into the boat, there was a positive net increase in stability, through a greater exertion of hydrostatic uplift on the surface of the hull (Sections 13.5.1 para 4-6).



*Plate 12.7: Bláthin's draught recorded at 30% and 40% freeboards.*



### 13.8.3 Stability

When the logboat was in its unladen state, the relative slenderness of the hull in relation to its height combined with its actual dimensions meant the boat was relatively unstable (Section 13.8). However the boat's stability was increased in proportion to an increase in the weight and quantity of the load.

### 12.8.4 Performance under propulsion

Because of the relatively low stability of Bláthin, it was necessary that the crew remained in a sitting or kneeling position while paddling. During the period of water trials, the weather was extremely unfavourable (force five winds). The result was that the boat could accommodate one crewman weighing 72kg safely and was dangerously close to becoming swamped with two crewmen on board. Because of the poor weather conditions, no definitive propulsion trials could be attempted at the time, and Bláthin was unfortunately no longer in a seaworthy condition several months later, since it had significant splits along its sides below the waterline.



*Plate 12.8: Bláthin undergoing open water trials.*

### 12.8.5 Manoeuvrability

No specific tests on its manoeuvrability could be done because of the adverse weather conditions. However it can be stated that in comparison to the Loch Doon 1 Replica, Bláthin was the more manoeuvrable and faster boat, despite the comparable lengths of both boats. Bláthin is more slender (a coefficient of 8.3) than Loch Doon 1 (a coefficient of 4). This gave rise to a greater speed (Section 13.9). In addition the rounded ends of Bláthin meant that there was a smoother flow of water around its hull than that generated by the box-like stern of Loch Doon 1, which created form drag. This entailed less drag and thus better speed and turning point.

### 12.9 DAIRE

Daire was made in June and July 1995. It is an amalgamated copy of evidence from five sailed logboats; Ballinphort, Crevinish 1, Derrya 2, Drinagh and Unprovenanced 1. The purpose, circumstances and methods of making Daire are exactly the same as Bláthin (Section 12.8 and 12.8.1). The reason that it is an amalgamated copy of five logboats and not one, is that none of the original logboats survive much beyond floor level. However, an indication of their sides and both ends could be discerned and their relevant aspects are sufficiently similar that they could be incorporated into the one boat.

The comparative aspects of the original boats and Daire where they are relevant to sailing are listed below in Table 12.2.

*Table 12.2: Dimensions of Sailed logboats.*

| Boat Name       | Length | Width | Slenderness Coefficient |
|-----------------|--------|-------|-------------------------|
| Ballinphort     | 8.47m  | 1.2m  | 4.8                     |
| Crevinish 1     | 10.5m  | 0.68m | 15.5                    |
| Derrya 2        | 7.35m  | 0.6m  | 12.3                    |
| Drinagh         | 3.15m  |       |                         |
| Unprovenanced 1 | 3.3m   | 0.7m  | 4.7                     |
| Daire           | 5m     | 0.78m | 6.4                     |



It can be concluded from the above table that Daire falls within the ranges of the original boats. Daire also has a midships height of 42cm.

### 12.9.1 Construction Techniques

The only manner in which the construction of the boat differed from Bláthin was the incorporation of additional features. These are a fitted washstrakes in the port bow, three seats (and accompanying thwart rests), a partial fitted transom, mast rigging features and a mast step.

The maximum obtainable length of the parent log was used which necessitated the partial use of a kinked section of the log in the bow. This resulted in a low sheer line in the port bow which was compensated for by the incorporation of a washstrake. The wood for the stake was obtained from a discarded length of the parent log by chainsaw and was further cut by the same method described in Section 12.8.1. Once it had been sufficiently shaped, it was fixed to the bow by horizontal dowels driven into auger holes and modern wood glue which seconded as caulking material. The strake was then further planed to blend into the surface of the boat.

The thwart rests were made by leaving an excess internal thickness of the sides in six locations arranged in opposing pairs of three. From this, shelf-like projections were cut with the use of a small chainsaw. Similar to the washstrake, wood was cut from the discarded parent log by chainsaw to make seats which were planed to fit comfortably between the emplacements and rest on the thwart rests.

A partial fitted transom was required to fill the hollow section on top of the stern where heartwood rot had left the wood in a sponge-like condition. The soft wood was removed by axe and chainsaw. A groove was cut into the wood into which a planed board was fitted which again came from the discarded section of the parent log. Prior to fitting, wood glue was applied to the groove as caulking material and the board was hammered into position.

The rigging features consisted of firstly an extension of the dowel which held the washstrake through the port bow and into the starboard side. Two opposing locations on the sides were left 4cm thicker than the rest of the sides. Through them, a 2.5cm diameter hole was horizontally drilled near the sheerline and a dowel which projected from either side of the hole was hammered into each one.

The mast step consisted of a bulbous projection on the floor which was cut in the solid by chainsaw. The shape and size of the projection reflected similar dimensions to the originals (Section 9.3 para 1-11). A 5cm vertical hole was centrally augered into most of the depth of the projection. This hole was further enlarged to approximately 10cm in diameter by hammer and chisel. Section 9.3 para 1-11 shows that the mast step and rigging system of Daire differs from the evidence of the originals. The reason for this was that other propulsion tests, apart from sailing were required and necessitated the removal of masts for these tests. Therefore a vertical hole going through the bottom of the boat (like those used in the original boats' mast steps) would have flooded the boat. The difference this made was purely structural and enabled practical conveniences. It did not alter any aspect of performance in any manner. The primary objective of the exercise was not boat construction, but boat performance.

The spars (mast, top and bottom yards and steering oar) were all made of poplar. Section 9.3 para 1 shows that no evidence of mast, sail or steering oar survive with the original sailed logboats. Chapter 13 details the justification for the size and materials used in their manufacture. Willow, the wood species which has been found on other logboats (Section 11.2 para 2), is the most suitable species for spars (Section 11.2 para 16). Poplar was used because

it contains similar properties to willow, was readily available and does not alter the results of the trials. The mast was 2.5m tall, 20cm in maximum diameter by its base and tapered to 4cm at its head. The top yard was 2.1m long 7cm in maximum diameter at its central point, and tapered to 4cm at either end.

The steering oar shaft was 8cm in diameter by the blade and tapered to 5cm at the opposite end. It was 1.8m long. The blade itself was approximately leaf-shaped with a maximum length of 30cm and width of 20cm. Its maximum thickness was 8cm by the shaft from which it tapered to 2cm thickness around its edge. A plane was used to shape the spars.

During construction, splits appeared along the grain of the boat's sides below the waterline. After one day in a water tank, the wood swelled from the moisture and the cracks in the boat's sides (a process of drying out in hot weather), sealed and ceased to leak further.

## 12.9.2 Displacement



*Plate 12.9: Daire undergoing tank tests.*

A purpose-built water tank was used for this experiment. In an unladen state the boat displaced 460kg (460 litres) of fresh water and had a freeboard of 26cm (it displaced 38% of its height).

To obtain a freeboard of 40% (16.6cm), Daire carried a load weighing 239.3kg. For a freeboard of 30% (12.6cm), it carried a load of 358.9kg. A freeboard of 10cm (24%) is the absolute minimum safe freeboard for use in calm water. To obtain this Daire carried a load of 430kg.

When the spares, sail and rigging were included, (an additional weight of 21.9kg), the boat lost 0.35cm of its freeboard.

Similar to Bláthin, an increase in the initial load resulted in a positive net increase in buoyancy from the greater uplift exerted on the surface of the hull (Section 13.5).

### 12.9.3 Stability

It was found that the increased weight resulted in greater stability, more positive pressure on the boat's side was required to cause the boat to heel. In its unladen state, it required four adults weighing a um of 280kg to stand on the gunwale before the boat would heel sufficiently to ship water.

In an unladen state the boat had to heel 25° before it shipped water, 21° at 40% freeboard, 18° at 30% freeboard, and 16° at 10cm freeboard.

In lake trials, Daire wobbled easily within a 7° swing to either side of its vertical axis, but immediately righted itself to a vertical condition. It proved extremely difficult to cause the boat to heel beyond 10° to either side.

In a force three wind Daire was sailed on a reach, in which it heeled by approximately 10° to the leeward side and refused to heel further, despite the use of a 2m square-rigged sail the top of which was mounted 2.5m above the waterline. The boat required no outrigger, leeboard or keel to counteract the effect of the force the wind applied to the sail. The low centre of gravity of Daire proved more than sufficient for this purpose.

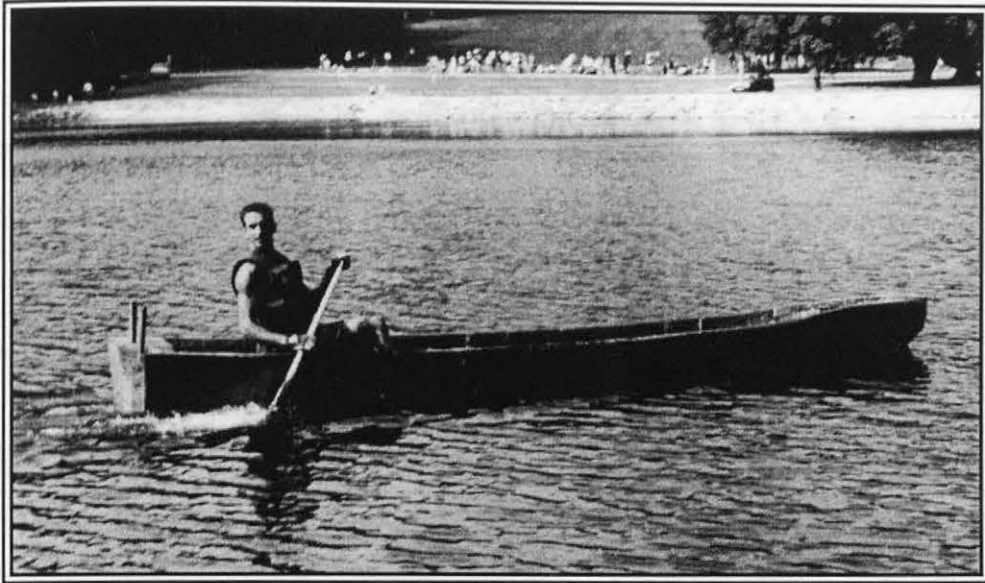
### 12.9.9 Performance under Propulsion

Several methods of propulsion were used during the lake trials. Theses were with one paddler, two paddlers, punting, sculling and sailing.

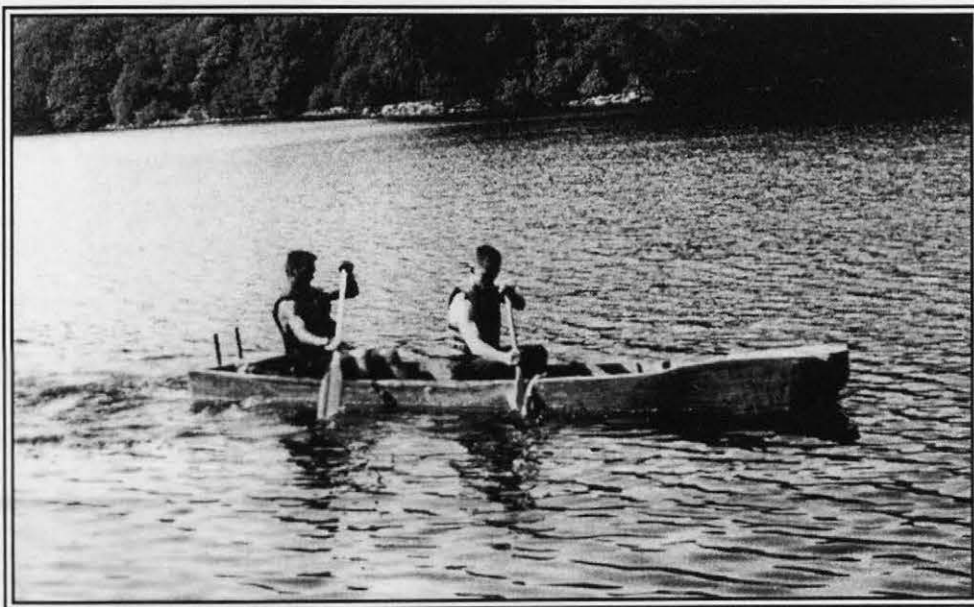
*Table 12.3: Results of Different propulsion Methods.*

| Propulsion Method | Crew No - Weight | Other Weight | Wind Strength | Speed km/h | Speed Knots |
|-------------------|------------------|--------------|---------------|------------|-------------|
| Paddle            | 1- 72kg          | 0            | Force 1       | 4.4        | 2.4         |
| Paddle            | 1- 72kg          | 358kg        | Force 1       | 3.8        | 2           |
| Paddle            | 2 – 151kg        | 0            | Force 1       | 4.7        | 2.5         |
| Paddle            | 2 – 151kg        | 279kg        | Force 1       | 3.8        | 2           |
| Punt              | 2 – 151kg        | 0            | Force 1       | 3.3        | 1.8         |
| Scull             | 2 – 151kg        | 0            | Force 2       | 4.7        | 2.5         |

It can be seen from the above table, that when all tests of its unladen state (no other weight apart from the crew) are compared, propulsion by two paddlers was the fastest means of travel, both into and with the wind. It is interesting to note that the difference between one paddler and two is quite marginal, which suggests that speed is limited by hull form and not propulsive power.



*Plate 12.10: Daire being paddled unladen.*



*Plate 12.11: Daire being paddled fully laden.*

Sculling was by far the most inefficient propulsive method. It must be explained that sculled logboats up to the time of these trials was a theoretical concept. Because of the low speed generated in an empty boat travelling in a downwind direction, this method can be discounted as an effective propulsive method for logboats. With its negative speed when travelling upwind (the force one wind pushed the boat backwards) it is reasonable to assume that logboats were never sculled (Plate 9.1).

The most efficient propulsive method in terms of directional stability and expended energy in relation to speed, is by sail (Plate 2.1). The required energy input, physical or otherwise, is nil. Where the other propulsive methods required greater effort to maintain a true course, the use of the steering oar proved very sensitive and greatly facilitated maintaining the correct course. In addition, minimal effort was required to maintain course on a reach, as long as sufficient length of the oar's shaft was situated on the helmsman's side of its fulcrum point. In this case 1.5m was more than adequate. Because of the small energy input required and greater directional stability over other propulsive methods, this was the most efficient. It was unfortunate that during the period of the trials there was no opportunity to assess the sailed boat's speed potential in a greater wind strength. Undoubtedly it would easily have surpassed that of a paddled logboat under any conditions.



*Plate 12.12: Daire being punted.*

The directional stability of punting was the hardest to maintain since in the action of propelling the boat effectively from the lake bed off the side of the boat there, was the danger that too much initial exertion to move the boat from a stationary state would swing Daire to the side rather than in a forward direction. However, as that boat progressed forward and speed accordingly increased, it became much easier to maintain directional stability and exert greater propulsive force. This method of propulsion proved to require the greater skill over other propulsive methods that required greater physical input. Once this skill is mastered, it is more efficient in energy requirements than paddling. This is perhaps a better method to use over greater distances in shallow waters than paddling in some conditions with a small crew.

#### **12.9.5 Manoeuvrability**

From the physical action required to punt a boat, it was found to be the most efficient way of turning Daire, since it swung very easily about a point near the bow. With paddling, an action of forward propulsion on one side and back-paddling on the other was required. This method proved to expend the most energy for each paddler. The greater energy was expended by the stern-most crewman because the bow area was the location of the effective pivot point. This person would propel the boat forward on one side, while the other paddler would back-paddle or hold water (placing the blade in the water in a vertical position perpendicular to the boat's hull) as directed by the paddler at the stern.

When the boat was sculled, it turned easier than by paddle. This was done by levering the oar out of the water, swinging it to one side, dipping it in the water and pushing or pulling the shaft until it swung through its maximum arc and repeating the process. However it also proved to be a very slow method in achieving the required manoeuvre since a significant proportion of the boat's length was being forced against the water. There was a greater resistance from the water than with the use of a punting pole, since the water was also used against the oar's blade to turn the boat, whereas the firm lakebed was used by the pole.

Daire proved to turn very efficiently through 90° from a run to a reach when it was sailed. However sufficient forward momentum was required to bring Daire a further 90° so it faced the wind. At this point an effective pull-cord reefing was used, otherwise two adverse effects ensued. The first is that the wind would push Daire backwards and there was a greater danger

of losing control. Less desirable than this was that if either the helmsman was slow in his responses or the momentum was insufficient, the boat no longer turn through a full 180° and had to run again to regain forward momentum.

It was found through experimentation, that the best action to take once there were signs of losing momentum, was to use the steering oar to further turn the boat in the same manner required to turn a sculled boat.



## CHAPTER 13

### APPLIED NAVAL ARCHITECTURE

#### 13.1 INTRODUCTION

Rawson and Tupper (1994, i: 2) state that over 90% of all world trade is by sea. The use of waterways is the most economic means of transporting goods. This also applies to inland waterborne transport. Today, boats use inland waterways primarily for pleasure, fishing and ferrying. Originally, the use of these inland waterways were of necessity rather than choice. As stated in section 1.1, the lack of overland routes in forested landscapes would have necessitated the use of water as the major routes. This chapter deals with the various qualities of Irish and Scottish logboats and their design specifications within the context of the environments in which they were used. Since logboats were not only artefacts, but integral components of a culture, their particular designs determined specific functions. They provide an accurate picture or record of their use when they are placed within an appropriate context.

There was probably a progression in logboat design and construction from poor or unsuitable prototypes to more developed examples, with improved qualities of stability, displacement, speed and manoeuvrability. It is equally probable that logboat construction developed into a skill where some builders' proficiency had improved over that of others, to the extent that they may have become recognised craftsmen (Sections 12.4 and 12.6).

It was not 'until the second half of the nineteenth century that science affected ships appreciably' (Rawson and Tupper; 1994 i: 1). Prior to this period of recognised scientific involvement, shipwrights (and undoubtedly logboat builders) would have had an excellent working knowledge of boats and their various attributes such as flotation, trim, properties of salt and fresh water, stability, ballast, eddying, turbulence, laminar flows, resistance under differing propulsive methods, and that they possessed the skills required to successfully build craft to their exact requirements. The techniques of construction and performance (Chapters 5 and 12) show that logboat builders had an excellent working knowledge of these boats and an implicit awareness of naval architecture.

Proctor (1968: 21) lists the considerations of boat design which equally hold true for logboats:

- a) sufficient displacement to carry the intended load,
- b) qualities of speed,
- c) sufficient stability,
- d) appropriate manoeuvring and handling characteristics,
- e) seaworthiness and safety.

It is impossible for any boat to achieve the best qualities of all of the above factors. The design of a boat trades one element off the other in a process of compromise. Hence, specific hull characteristics (e.g. shape and size) have varying design considerations, in which the above factors are addressed in order of priority. Assuming logboats were designed and built for specific purposes, qualities of displacement and stability would override others in the case of logboats designed to carry cargoes in the most efficient manner. A logboat specifically built for warfare or raiding would inevitably show a preference for a more streamlined slender hull with less considerations given to stability and more to greater speed within the parameters of the size of the parent log.

All these considerations can be subdivided into factors of 'size, dead-weight, endurance, speed, life, resistance, methods of propulsion, manoeuvrability...[which are]... matched to provide the right primary performance at the right cost' (Proctor, 1968: 22).

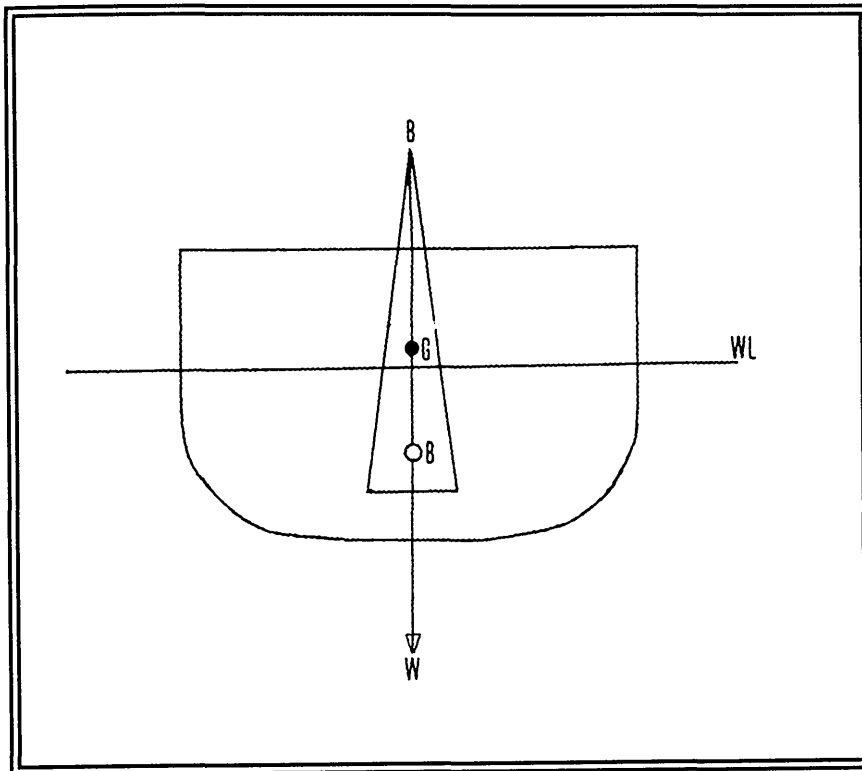
To determine the qualities of Irish and Scottish logboats and their specific design considerations, this chapter examines aspects of naval architecture. They are applied to two logboats (modelled on logboats from the Irish series), which were built by Fry and the writer specifically for this purpose.

They serve several functions here:

- a) to better explain the processes of naval architecture,
- b) to present the manner in which this science is customised to apply to logboats,
- c) to compare experimental results with theory,
- and d) to enable a more clear-cut analysis of the Irish and Scottish Logboats and their naval architecture.

## 13.2 DISPLACEMENT

The amount of water displaced by a boat at rest is an essential starting point in naval architecture on which all other factors depend.



*Figure 13.1: The forces of buoyancy and gravity exerted on a stationary vessel's transverse section*

Any object floating in water displaces its own weight of water ( $W$ ). The (net) volume of an object ( $\nabla$ ) multiplied by its density ( $\rho$ ) is equal to its weight;

$$1) \quad \Delta = W,$$

where

$$2) \quad \nabla \times q_l = W,$$

The weight of water displaced by a boat (or weight of the boat) divided by that fluid's density ( $q_w$ ) is equal to the volume of the displaced water ( $\nabla_w$ ), and the submerged net volume of the boat.

When a body is floating, it is said to be in a state of equilibrium. In Figure 13.1, where the waterline is denoted by,  $wl$ , the weight of the boat ( $W$ ) (depicted in transverse section) which is applied at the centre of gravity ( $G$ ), is counteracted by the hydrostatic uplifting force of buoyancy ( $B$ ) which is applied at the centre of buoyancy ( $B$ ).

For the boat to be in a state of equilibrium, the forces  $B$  and  $W$  have to have the same value, i.e. the weight of the displaced water must be equal to the weight of the boat and  $CB$  and  $CG$  ... 'must be vertically one above the other so that their lines of action are in the same plane' (Gulette, 1984: 57).

### 13.2.1 Weight

Since naval architecture is usually an exact science, the attributes of each material used to make a boat are known prior to construction. Logboats and their architectural applications differ here. The logboat builders would have had full information on their performance through their own and others experience and trials and errors. They would have had an excellent working knowledge of the materials they used, of which they, unfortunately, left no record.

One such instance is in determining the weight of a given logboat. Although, Sections 13.2.2.1 and 13.2.2.2 are not recognised aspects of naval architecture, their results are essential before its applications can be continued.

To determine a boat's weight, both its net volume and its density must be known. A boat's weight when found, even if it could be weighed, would not give a reliable indication of its original weight; the condition of the wood would have changed significantly.

### 13.2.2 Volume

Recognised naval architectural formulae exist, such as the Trapezoidal and Simpson's Rules, which can be used to ascertain, among other things, the net volume and surface areas of craft. One of the conditions which their applications require is that the boat be symmetrical in order to obtain a

reasonable degree of accuracy. Skenc (1948: 14) notes that the margin of error for such boats can be 1.2% with the Trapezoidal Rule and 0.2% with Simpson's Rule. This margin of error is acceptable for boats with perfectly symmetrical hulls. However, it has been found through trial and error that the margin of error with either rule is as high as 8% when they are applied to logboats. The reason for the large degree of error is that logboats are much more crudely built than modern vessels. Even with skill, the methods and tools used could not achieve precisely uniform and regular sections. While they function adequately within their intended design considerations and are reasonably symmetrical, they are by no means built to the fine tolerances of modern boats. So approximations and assumptions in the measurement and calculations is inevitable. In addition, both of the above methods require detailed records of measurements, which have been made rarely with logboats.

For this reason two methods have been developed here to ascertain the net volume of logboats.

The first, which divides the boats into geometrical blocks or areas, is used in this study on boats whose shape or form have been accurately recorded, but measurements have been found to be somewhat lacking in detail. The margin of error has been found to be between 2% and 4%.

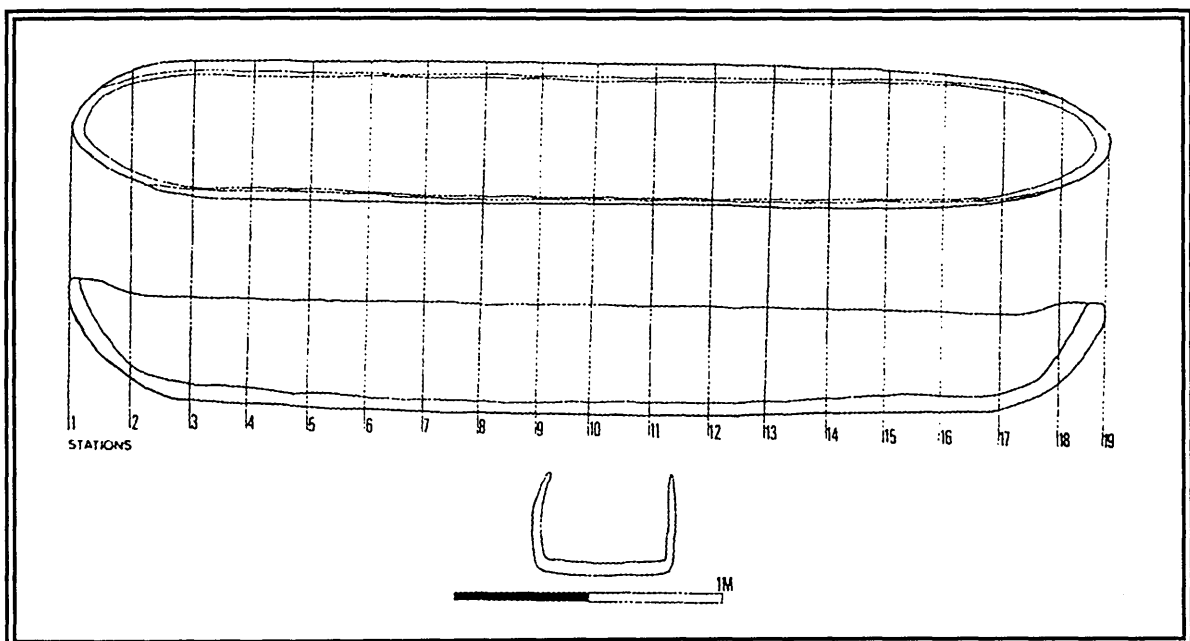


Figure 13.2: *Bláthin* (an experimental logboat) with 19 stations at 20cm intervals

The second method draws from the basis of the Trapezoidal and Simpson's Rules in so far as it uses 'stations'. Detailed measurements are taken at each station on a logboat. The stations are points at

regular intervals along the hull. This is depicted in Figure 13.2. It is essential that stations are equidistant from each other. For example, station 1 is at one end of the boat, station 2 is 10cm along the longitudinal axis, station 3 is 10cm further from station 2.

The cross-sectional area of the logboat is measured at each station, such as Station 10 shown in Figure 13.2. The more stations used in a given logboat, the greater the degree of accuracy. Calculations for a 5m logboat with 51 stations set at 10cm intervals will be much more accurate than 26 stations at 20cm intervals. Unfortunately the survey of a logboat can become quite consuming when many stations are to be used. However, it is not necessary to have a great many stations on a simple logboat which has no internal features and where both ends mirror each other in shape. A more complex logboat with differing ends, tapering throughout its length and with a significant number of internal features requires more stations. The level of accuracy obtained depends on the time available or taken in surveying and examining the boat.

The advantage of employing either of the above methods rather than the Trapezoidal or Simpson's Rules is that archaeologists do not need to be naval architects to apply naval architecture to the logboats.

#### 13.2.2.1 Method 1

This method commences with the main body of the boat and then incorporates the ends into the calculations. Before the volume of the main body is determined, its cross-sectional area at a given point(s) must be found. Method 1 presumes symmetry in logboats, where the cross-section of the hull is assumed to have its apparent geometrical shape. For example, apparently square- or rectangular-shaped hulls are perfect squares or rectangles. There is a degree of error in this approach, but it has been found to be an acceptable method where poor measurements or only non-scale drawings exist. Where a hull tapers uniformly, it is necessary to know the dimensions of at least both ends and use the average of the two.

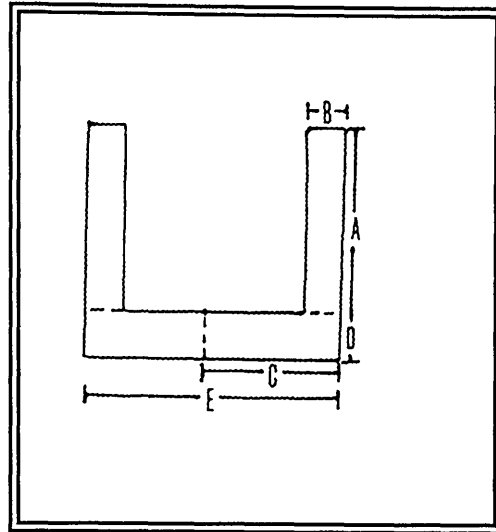


Figure 13.3: Cross-section area of a square- or rectangular-shaped hull

Area =  $2AB + ED$  or  $2(AB + CD)$ , where the boat's sides share equal dimensions.

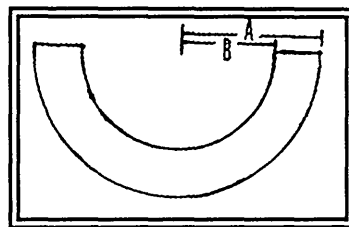


Figure 13.4: Cross-sectional area of a semi-circular shaped hull

Area =  $\frac{1}{2} \pi A^2 - \frac{1}{2} \pi B^2$ .

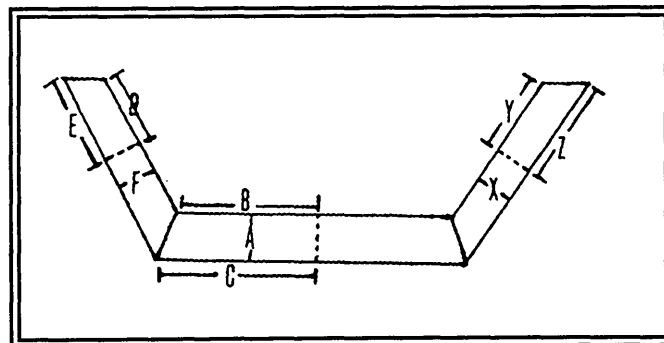


Figure 13.5: Cross-sectional area of a flared hull, where width at the top of each side is the same as that side's bottom

Area= $F(D+E)+A(B+C)+X(Y+Z)$ , where D, E, B, C, Y and Z measure half the lengths of the respective side where they are located.

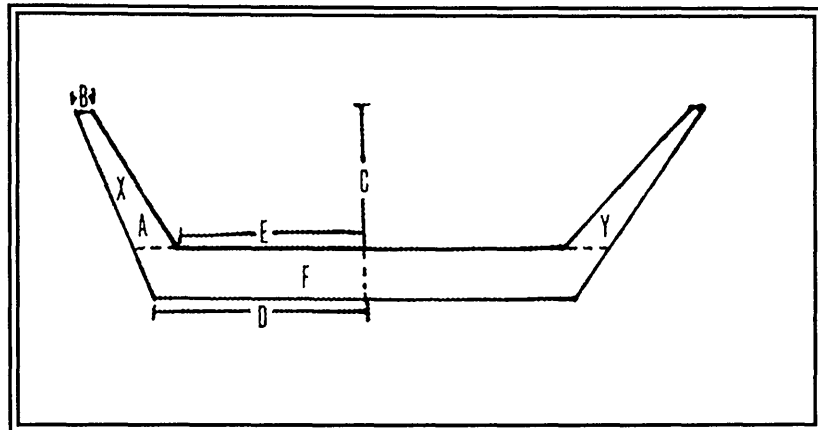


Figure 13.6: Cross-sectional area of a flared hull, where the sides are of unequal proportion

Area= $\frac{1}{2}C(A+B)$  for section X +  $\frac{1}{2}C(A+B)$  for section Y +  $F(D+E)$ .

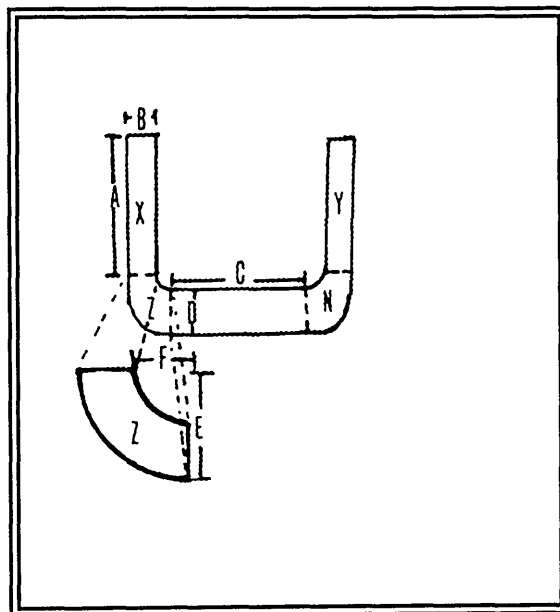


Figure 13.7: Cross-sectional area of the hull where sections X, Y, are rectangles and Z and N are round

Area= $AB$  (for X) +  $AB$  (for Y) +  $CD + \frac{1}{4}\pi(E^2 - F^2)$  (for Z) +  $\frac{1}{4}(\pi E^2 - F^2)$  (for N).



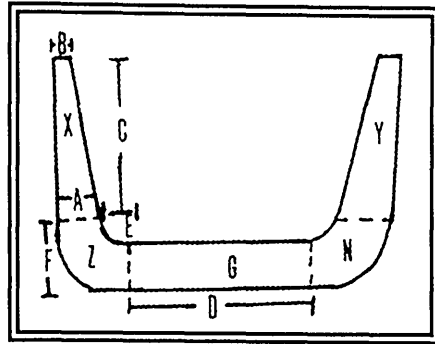


Figure 13.8: Cross-sectional area of hull

$$\text{Area} = \frac{1}{2}C(A+B) \text{ for } X + \frac{1}{2}C(A+B) \text{ for } Y + DG + \frac{1}{4}(\pi E^2 - \pi F^2) \text{ for } Z + \frac{1}{4}(\pi E^2 - \pi F^2) \text{ for } N.$$

Multiply the cross-sectional area by the length of the main body to obtain the net volume of the boat's main body. If the hull tapers, it is necessary to use dimensions from either end of the main body and take the average of these multiplied by its length. The more cross-sections used, the greater the degree of accuracy.

Net Volume of the Ends

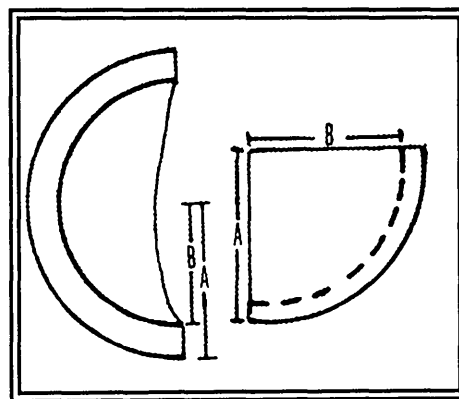


Figure 13.9: Net volume of a rounded end

$$\text{Volume} = \frac{1}{3}\pi A^3 - \frac{1}{3}\pi B^3.$$

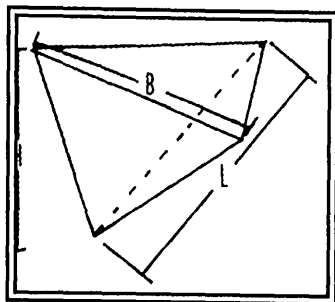


Figure 13.10: Net volume of a triangular or pointed end

Volume= $BLH/6$ , when solid, or  $(BLH - blh)/6$  when hollow.

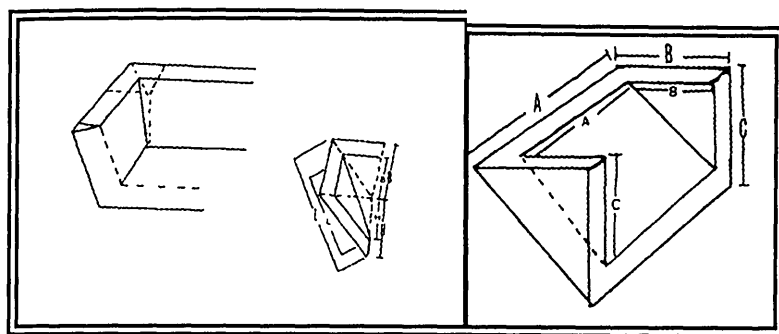


Figure 13.11: Net volume of a flared end on all three planes

Volume= $(LBH/3 - lbh/3) + (\frac{1}{2}ABC - \frac{1}{2}abc)$ .

To obtain the logboats overall net volume, add the net volumes of the main body and both ends.

### 13.2.2.2 Method 2

This method is employed when both the interior and exterior of the logboat are accessible at each station. A survey baseline is set up, above each station, from which distance and depth are measured. This is repeated on the opposite side of the boat. The greater the number of stations, and the less distance there is between each measurement along the baseline the greater the accuracy of calculations.

The average of the measurements is taken from each station. This is then multiplied to the boat's length. This provides the net volume.

### 13.2.3 Density

Different species of tree have different densities. Within each species, the density varies according to their fresh or seasoned condition, and to a lesser extent within different parts of the growing tree. The greater the density of the wood, the heavier it is and the more it will sink until it attains its equilibrium at which it floats, if it has a lower density than water.

Section 10.2 refers to the species of wood which have been used to make European logboats. The species which are relevant to this chapter are alder, oak and scots pine, from which the Irish and Scottish boats were made.

Titmuss (1965: 6) quotes the density of alder as 481 to 641 Kg/m<sup>3</sup> when it is in an air dry state. In its green state, it is 865Kg/m<sup>3</sup>. (HMSO, 1956: 24).

Scots Pine is 561Kg/m<sup>3</sup> when in an air-dry condition (Titmuss, 1965: 211). HMSO (1956: 1) notes that a 1% increase in moisture gives rise to a 0.5% increase in density.

Oak is given a density of 736Kg/m<sup>3</sup> when seasoned, and 993 to 1073Kg/m<sup>3</sup> for fresh oak (HMSO, 1956: 167; Skene, 1948: 24; Smith, 1965: 33). However these figures apply to modern carpentry or woodworking, where freshly felled oak is unacceptable. If oak is worked shortly after felling, the finished product will dry out and tend to split. It must be subject to a period of drying or treatment prior to working. Experiments conducted for this study, have shown that the density of oak can be as high as 1280Kg/m<sup>3</sup>, one year after the tree has been felled, and turkey oak, which was used to make an experimental logboat (Section 12.8 .2 para 3) had a density of 1841K/m<sup>3</sup>, one year after it was felled.

It is assumed that similar relative variations apply to both alder and scots pine when their densities are measured.

The density of the wood directly affects the boat's weight, displacement and all aspects of its performance. Once a reasonably seasoned piece of wood is immersed in water, it will absorb water up to saturation level. Hence the density of fresh wood is used here. For example, a density of 1073Kg/m<sup>3</sup> is used for oak since it is the most realistic one. This introduces a variation to all

subsequent calculations. In this chapter the variable will be given alongside the actual results of the practical experiments for the purpose of comparison.

The density of water in which a boat floats affects its draught and trim, and thus its displacement. The density varies between fresh water and sea water, both of which are subject to very small alterations depending on their respective temperatures (Rawson and Tupper, 1994, i: 304-5). They cite standard densities of 1000 and 1025Kg/m<sup>3</sup> for fresh and salt water respectively. Since almost all Irish and Scottish logboats are found in fresh water, its density is used here. The few recovered from estuarine conditions are subject to a mixed fresh-salt water environment, where the change in density is so small it is not used in the present study.

Where the density of a block of wood is less than that of water, it will float. The volume immersed depends on the relative density of the wood - the higher the relative density the lower it will float. A block of density equal to that of water will remain totally immersed in the position in which it is placed. If a block of wood has a greater density than water, it will sink. However the effects of buoyancy and displacement can allow a hollowed-out block to float as long as the water is prevented from entering its interior - the upthrust of the force of buoyancy - is proportional to the volume of the immersed block.

#### 13.2.4 Case Study

Both methods to determine volume were used on Bláthín and Daire to obtain their displacements and all subsequent calculations to which either of the above methods apply. The second method is presented in all of these circumstances because of its greater accuracy.

##### 13.2.4.1 Daire

|  |                          |
|--|--------------------------|
| Overall Length ( $L_{oa}$ ):                                   | 5m                       |
| Average net cross-sectional area (from 25 stations):           | 0.09642919m <sup>2</sup> |
| Net Volume ( $\nabla$ ):                                       | 0.48214595m <sup>3</sup> |
| Measured Density (from a block of wood from the original log): | 954Kg/m <sup>3</sup>     |

Equation 2 (Section 13.2) is used to find its weight:

$$12) \quad \nabla \times \rho_{tt} = W$$

$$0.48214595\text{m}^3 \times 954\text{Kg}/\text{m}^3 = 460\text{Kg}$$

Daire was weighed on a weigh-bridge at 526Kg. This gives a density of  $1091\text{Kg}/\text{m}^3$  for the oak used in her construction. It has already been stated in Section 13.2.3 that density will vary throughout the log. While the figure of  $954\text{Kg}/\text{m}^3$  is the density of one part of the log,  $1091\text{Kg}/\text{m}^3$  is the overall density of the used to make Daire. Daire's real density ( $\rho_r$ ) was  $1091\text{Kg}/\text{m}^3$  and her test density ( $\rho_t$ ) was  $954\text{Kg}/\text{m}^3$ , a difference of 13%.

Equation 12 is again used with the densities for seasoned and fresh oak:

$$\nabla \times \rho_a = W_a,$$

where  $\rho_a$  is the official (HMSO) density of oak, and hence  $W_a$  the boat's weight using that figure. There are two densities, seasoned and fresh wood,  $\rho_a$  and  $\rho_b$  respectively.

With oak;

$$\rho_a = 736\text{Kg}/\text{m}^3$$
$$\rho_b = 1073\text{Kg}/\text{m}^3$$
$$\rho_c = 1280\text{Kg}/\text{m}^3$$

and

$$\rho_d = 905\text{Kg}/\text{m}^3$$

where  $\rho_c$  is the experimental result and  $\rho_b$  is the average density of seasoned and fresh oak.

For:

$$\rho_a, \text{ Daire weighs } 355\text{Kg}$$
$$\rho_b, \text{ Daire weighs } 517\text{Kg}$$
$$\rho_c, \text{ Daire weighs } 617\text{Kg}$$
$$\rho_d, \text{ Daire weighs } 436\text{Kg}$$

The theoretical weight of Daire is between 355 and 517Kg, or  $436 \pm 81\text{Kg}$ .

Experiments with blocks of oak, fresh and saturated, were performed to determine their density and weight. All tests showed that their actual densities were greater than the theoretical figures. On this basis, the calculations use two densities,  $\rho_b$ , the maximum cited 'official' value for fresh wood, and  $\rho_c$ , the average fresh density for oak (from practical experiments).

The weight of the logboat equals the weight of the water it displaces:

$$13) \quad W_r = W$$

Daire weighed 526Kg and therefore displaced 526Kg of water ( $W_r$ ).

#### 13.2.4.2 Bláthin

|  |                           |
|--|---------------------------|
| Overall Length ( $L_{oa}$ ):                         | 3.58m                     |
| Average net cross-sectional area (from 19 stations): | 0.027974749m <sup>2</sup> |
| Net Volume ( $\nabla$ ):                             | 0.1001496m <sup>3</sup>   |

Equation 2 (Section 13.2) is used to find her weight:

$$12) \quad \nabla \times \rho_l = W$$

$$0.1001496\text{m}^3 \times 1841\text{Kgm}^3 = 184.4\text{Kg}$$

$$\nabla \times \rho_b = W_b$$

$$0.1001496\text{m}^3 \times 1073\text{Kgm}^3 = 107.4\text{Kg}$$

$$\nabla \times \rho_c = W_d$$

$$0.1001496\text{m}^3 \times 905 = 90.94\text{Kg}$$

The particular species of oak used to make Bláthin was turkey oak, which is much denser than native oaks. The measured density of the wood was 1841Kg/m<sup>3</sup>, which causes the difference between the boat's 'theoretical' density and weight, and her actual density and weight.

Since the boat's weight equals the weight of the water it displaces, Bláthin displaces 184Kg of water.

### 13.3 DRAUGHT

A logboat's draught directly affects its stability and freeboard (by how much its gunwales are above the water level), and its resistance to motion. The resistance in turn directly affects the boat's speed capabilities.

To find a logboat's draught (T), multiply its density to its net cross-sectional surface area and divide them by the density of water by the boat's average external width, or:

$$14) \quad T = \frac{\rho_l (HW - hw)}{\rho_w \times W}$$

where **H** is the boats external height, **W** is its external width, **h** is its internal height and **w** is the internal width (assuming rectangular outer and inner cross-sections).

#### 13.3.1 Daire

Daire's real density ( $\rho_r$ ) is used first, and then the other densities ( $\rho_b$  and  $\rho_c$ ), to obtain the draughts for the two above conditions, where  $T_t$  is the test draught (based on the real density of the boat):

$$\text{(equation 14)} \quad T_t = \frac{\rho_r (HW - hw)}{\rho_w (W)}$$

$$T_t = \frac{1091(65.24\text{cm} \times 37.88\text{cm} - 52\text{cm} \times 29.92\text{cm})}{1000(65.24\text{cm})}$$

$$T_t = \frac{1.091(915.4512)}{65.24}$$

$$T_t = 15.3\text{cm}$$

When physical measurements were taken in tank tests, Daire's draught ( $T_r$ ) was 16cm. The small difference (7mm - 4%) will not affect the outcome of further calculations. Accuracy deteriorates as each new parameter is introduced.

So:  $T_t = 15.3\text{cm}$  and  $T_r = 16\text{cm}$ .

Now Daire's draft is ascertained with the two densities,  $\rho_b$  and  $\rho_c$  (Section 13.2.3), where:

$$\rho_b = 1073\text{Kg/m}^3 \text{ and } \rho_c = 1280\text{Kg/m}^3$$

$$\text{(equation 14) } T_b = \frac{\rho_b(HW - hw)}{\rho_w(W)}$$

$$T_b = \frac{1073(1143.016)}{1000(65.24)}$$

$$T_b = 15.1\text{cm}$$

$$T_c = \frac{\rho_c(HW - hw)}{\rho_w(W)}$$

$$T_c = \frac{1280(915.4512)}{1000(65.24)}$$

$$T_c = 17.96\text{cm}, (18\text{cm})$$



When both draughts ( $T_b$  and  $T_c$ ) are averaged, the resulting draught is  $16.55 \pm 1.45$ cm. The real draft ( $T_r$ ) of 16cm is clearly within the range expected from both densities. The discrepancy of between -0.2 and +2.7cm remains, but does not affect the outcome of subsequent calculations.

### 13.3.2 Bláthin

The exercise is repeated for Bláthin. Her 'actual' density of  $1270 \text{Kg/m}^3$  is used first:

$$\text{(equation 14) } T_t = \frac{\rho_r(HW - hw)}{\rho_w(W)}$$

$$T_t = \frac{1270(418.593)}{1000(42)}$$

$$T_t = 12.7\text{cm}$$

The tank tests gave Bláthin's actual draught as 17cm, with a freeboard of 16.5cm. The above results vary by 25%. This difference is due to the fact that a sample of the tree from which Bláthin was made was sealed for tests to ascertain its density. However, while in the laboratory, the sample was left exposed to warm dry conditions for several days before its density was tested. Its density was then recorded as  $1270 \text{Kg/m}^3$ . Bláthin was made from turkey oak, a particularly dense species of oak (Section 13.2.1.2).

When  $T_b$  and  $T_c$  were applied to Bláthin, her respective draughts were 10.7 and 12.8cm.

These results differ from the tank tests recorded. In fact a density of  $1700 \text{Kg/m}^3$  would give a 17cm.

The results of all further equations and tests on Bláthin are not used in this study as all further calculations would be derived from draught and density, which in these circumstances would lead to greater confusion in an exercise that already is.

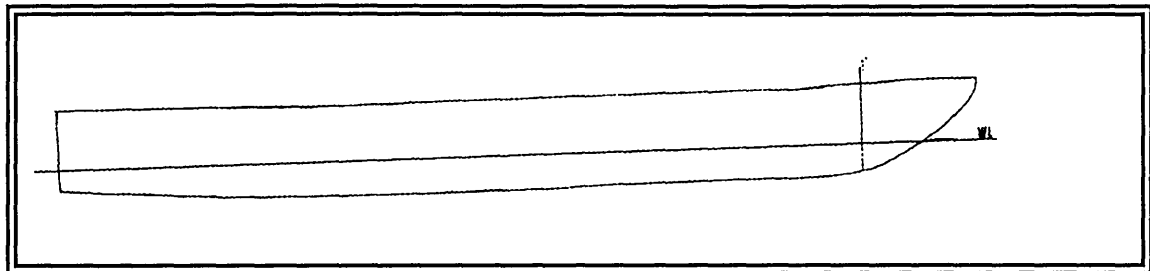
## 13.4 THE WATERLINE

Once the logboat's draught has been obtained, it is a simple matter of trigonometry to determine the boat's waterline (WL), as long as accurate measurements were initially taken of the boat.

### 13.4.1 Waterline Length

To determine a logboat's waterline length (LWL), take two points on the boat's side, on the waterline, about half the boat's length apart. Then measure the length from one end of the boat to the other on a line through the two points.

Next, the external angle of incline of the ends must be obtained. Divide the boat vertically between the main body and the bow and stern sections, at the points from which the underside of the logboat inclines (the line  $\tau'$  in Figure 13.12). The bow is the only end which is relevant as the stern is vertical.



*Figure 13.12: Daire with her waterline length and division between the bow and main body.*

When surveying the boat, locations of points can be taken along the incline of the end sections, on the longitudinal axis, to measure the angle of incline.

Figure 13.13 shows the end section of a logboat on its longitudinal axis. The vertical line  $TT'$  indicates the starting point of the incline and is perpendicular to  $TT''$ , a continuation of the boat's bottom.

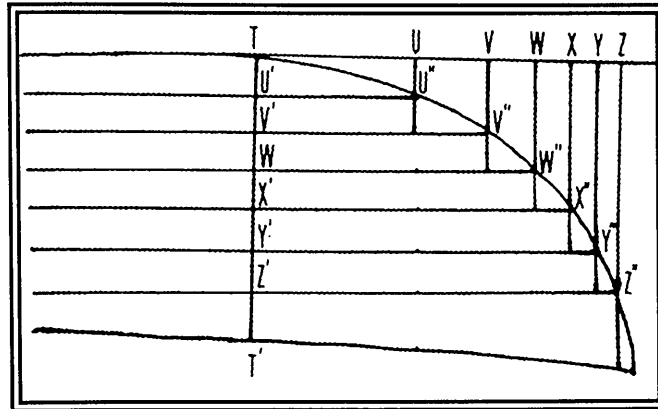


Figure 13.13: Detail of an inverted logboat's end section.

The location of point U'' can be determined by measuring the distances from the TT'' and TT' axes; similarly for the points V'', W'', X'', Y'', and Z''. The angle of incline can then be calculated.

To measure the rate of incline from T to U'', the distances TU and UU'' are known and are equal to U'U'' and TU' respectively.

The waterline length can be determined also by adding the lengths of the bow section ( $t_b$ ), the main body ( $t_m$ ) and the stern section ( $t_s$ ) for a given draught, or value of UU''.

$$15) \quad \text{LWL} = t_b + t_m + t_s$$

Since a limited number of points are initially taken, if the specific value of U'' is not noted, their will be a small discrepancy in the boat's waterline length, where the end sections' lengths will fall between two values of t. There is a danger that, if a sufficient number of points (U, U'' etc) are not taken, the actual waterline will not pass close to one of the points, and interpolation will be necessary in subsequent calculations.

A danger to be avoided is assuming the end is a straight line from T to the sheerline at the bow. The greater the convexity of the end, the greater this discrepancy.

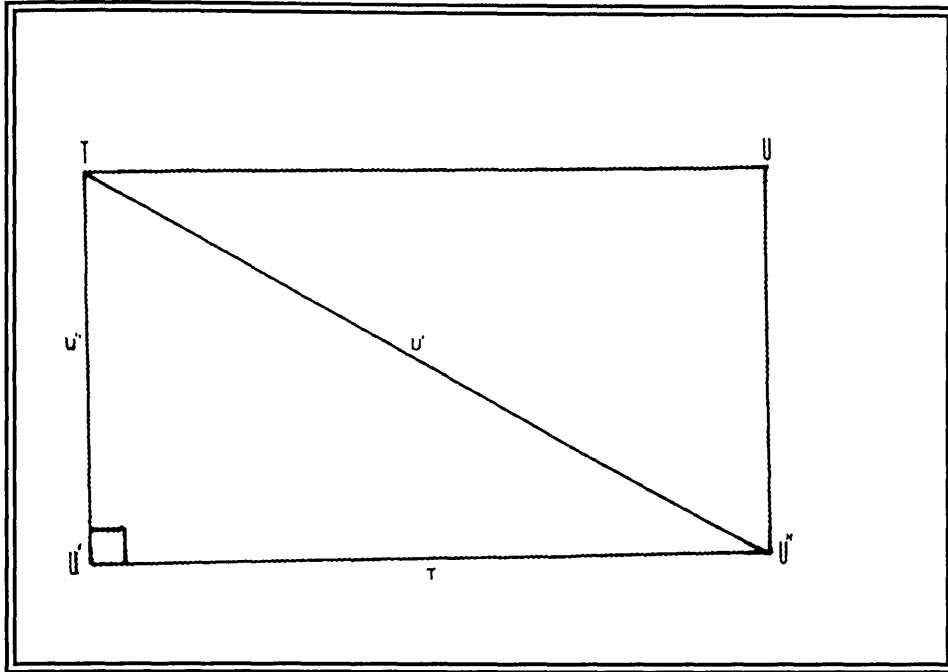


Figure 13.14: Schematic detail of figure 13.13.

To lessen this discrepancy, a profile can be taken with the use of equation 16, which determines the angle of incline between relevant points. Figure 13.14 is a detail of Figure 13.13, in which the line  $u'$  is a section of the inclined end. First the length  $u'$  can be found by Pythagoras' theorem, (the square on the hypotenuse is equal to the sum of the squares on the other two sides in a right angled triangle), or:

$$16) \quad T^2 + U''^2 = U'^2$$

$u''$  is a portion of the boat's draught, which is shown as  $TT'$  in Figure 13.13,  $\tau$  is the line depicted as  $U'U''$  in the same diagram, and  $u'$  is the section of the inclined end.

Next the angles  $U''$  and  $T$  must be found. To find  $U''$ :

$$17) \quad U'' = \tan^{-1} \left( \frac{u''}{\tau} \right)$$

To find  $T$ :

$$18) \quad T = 900 - [\tan^{-1}(u'')] \\ \quad \quad \quad [ \quad (T) ]$$

This method breaks the boat's profile into a series of small triangles and gives an outline of any particular section of the end; the accuracy depending on the number of points selected.

#### 13.4.1.1 Case Study

Equations 16, 17 and 18 have been used to obtain Daire's length  $u'$  and the angles  $U''$  and  $T$  which are presented in Table 13.1.

If the profile of the bow is a straight line, measurements to locate points  $U''$ ,  $V''$  etc to  $Y''$  need not be taken. Locations of points  $T$  and  $Z''$  will be sufficient. Knowing the draught,  $t_b$  may then be calculated by interpolation or by use of equation 19.

$$19) \quad T = \frac{\tan U''}{u''}$$

If the profile of the bow is, or approximates to, a recognisable curve such as a circle, ellipse or parabola, equation 19 may be used also, in conjunction with the known properties of the relevant curve.

Since Daire has a vertical stern, it is only necessary to find the waterline length of her main body and bow section. The main body is 417cm which is constant for all draughts. The overall length of her bow is 83cm.

Table 13.1: Table used to obtain Daire's LWL

| Point/Station | t   | Cum. u | Cum. u'' | u'' | u'   | U'' | T  |
|---------------|-----|--------|----------|-----|------|-----|----|
| 1             | 0   | 0      | 0        | 0   | 0    | 0   | 0  |
| 2             | 2.5 | 2.5    | 0.2      | 0.2 | 2.51 | 5   | 85 |
| 3             | 2.5 | 5      | 0.3      | 0.1 | 2.5  | 2   | 88 |
| 4             | 2.5 | 7.5    | 0.3      | 0   | 2.5  | 0   | 90 |
| 5             | 2.5 | 10     | 0.5      | 0.2 | 2.51 | 5   | 85 |
| 6             | 2.5 | 12.5   | 0.5      | 0   | 2.5  | 0   | 90 |
| 7             | 2.5 | 15     | 0.5      | 0   | 2.5  | 0   | 90 |
| 8             | 2.5 | 17.5   | 0.7      | 0.2 | 2.51 | 5   | 85 |
| 9             | 2.5 | 20     | 0.7      | 0   | 2.5  | 0   | 0  |
| 10            | 2.5 | 22.5   | 0.8      | 0.1 | 2.5  | 2   | 88 |
| 11            | 2.5 | 25     | 0.8      | 0   | 2.5  | 0   | 90 |
| 12            | 2.5 | 27.5   | 1        | 0.2 | 2.51 | 5   | 85 |
| 13            | 2.5 | 30     | 1        | 0   | 2.5  | 0   | 90 |
| 14            | 2.5 | 32.5   | 2        | 1   | 2.69 | 22  | 68 |
| 15            | 2.5 | 35     | 3        | 1   | 2.69 | 22  | 68 |
| 16            | 2.5 | 37.5   | 3.5      | 0.5 | 2.55 | 11  | 79 |
| 17            | 2.5 | 40     | 4.5      | 1   | 2.69 | 22  | 68 |
| 18            | 2.5 | 42.5   | 5        | 0.5 | 2.55 | 11  | 79 |
| 19            | 2.5 | 45     | 7.5      | 2.5 | 3.54 | 45  | 45 |
| 20            | 2.5 | 47.5   | 8        | 0.5 | 2.55 | 11  | 79 |
| 21            | 2.5 | 50     | 9.5      | 1.5 | 2.92 | 31  | 59 |
| 22            | 2.5 | 52.5   | 10       | 0.5 | 2.55 | 11  | 79 |
| 23            | 2.5 | 55     | 10.5     | 0.5 | 2.55 | 11  | 79 |
| 24            | 2.5 | 57.5   | 12       | 1.5 | 2.92 | 31  | 59 |
| 25            | 2.5 | 60     | 13.5     | 1.5 | 2.92 | 31  | 59 |
| 26            | 2.5 | 62.5   | 14.5     | 1   | 2.69 | 22  | 68 |
| 27            | 2.5 | 65     | 16       | 1.5 | 2.92 | 31  | 59 |
| 28            | 2.5 | 67.5   | 17       | 1   | 2.69 | 22  | 68 |
| 29            | 2.5 | 70     | 20.5     | 3.5 | 4.3  | 54  | 36 |
| 30            | 2.5 | 72.5   | 22.5     | 2   | 3.2  | 39  | 51 |
| 31            | 2.5 | 75     | 24.5     | 2   | 3.2  | 39  | 51 |
| 32            | 2.5 | 77.5   | 26.5     | 2   | 3.2  | 39  | 51 |
| 33            | 2.5 | 80     | 29       | 2.5 | 3.54 | 45  | 45 |
| 34            | 2.5 | 82.5   | 32.5     | 3.5 | 4.3  | 55  | 35 |
| 35            | 2.5 | 85     | 38       | 5.5 | 6    | 66  | 24 |

Equation 15 is used to illustrate what is required:

$$15) \quad LWL = t_s + t_m + t_b$$

where,  $t_s = 0$

$$t_m = 417\text{cm}$$

$t_b =$  between 62.5cm and 65cm. Or  $63.75\text{cm} \pm 1.25\text{cm}$ , (where columns 2 and 4 in

Figure 13.14 show that  $t_b$  is between 62.5 and 65cm for a draught of 15.3cm, where  $T = 15.3\text{cm}$ , Section 13.3.1).

As Daire's bow profile is not a recognisable standard curve the more laborious method of detailed measurement is necessary to establish her bow length. However in order to illustrate the method of using equation 19, this is shown below in conjunction with Table 13.1 using the results of actual measurements of Daire.

First find the angle  $U''$  for  $u'' = 1.5\text{cm}$  and  $t = 2.5\text{cm}$  (the difference between points 26 and 27, table 13.1):

$$\begin{aligned}
 17) \quad U'' &= \tan^{-1}\left(\frac{u''}{t}\right) \\
 &= \tan^{-1}\left(\frac{1.5}{2.5}\right)
 \end{aligned}$$

$$U'' = 31^\circ, \text{ (column 7, line 25, Table 13.1)}$$

Next use the difference of 0.8cm from  $u'' = 14.5$  (i.e. 14.5cm from column 4 and line 26 Table 13.1) and 15.3cm ( $Tt$ ).

Equation 19 will then give  $Tb$  for where  $u'' = 15.3\text{cm}$ .

$$\begin{aligned}
 19) \quad \tau &= \frac{0.601}{0.8} \\
 \tau &= 0.75\text{cm} \quad (0.8\text{cm})
 \end{aligned}$$

So for  $U'' = 15.5\text{cm}$ ,  $tb = 62.5\text{cm} + 0.8\text{cm} = 63.3\text{cm}$ .

$$\begin{aligned}
 15) \quad \text{LWL} &= ts + tm + tb \\
 \text{LWL} &= 0 + 417\text{cm} + 63.3\text{cm} \\
 \text{LWL} &= 480.3\text{cm}
 \end{aligned}$$

The tank tests on Daire showed that her real LWL was 482cm, a 1.7cm difference of (less than 1%). This is the closest result that can be obtained by any means and is perfectly acceptable. So:

$$LWL_r = 482\text{cm}$$

$$LWL_t = 480.3\text{cm}$$

The formula for the waterline length of Daire is now applied to the densities of oak, which gave draughts of 15.1 (T<sub>b</sub>) and 18cm (T<sub>c</sub>).

For a draught of 15.1cm, u'' is between the values of 14.5 and 16 (column 4, lines 26 and 27 in Table 13.1). This makes t<sub>b</sub> equal to or between 62.5 and 65cm. By using equation 15, the boat's overall LWL is shown as between 479.5 and 482cm for T<sub>b</sub>.

With a draught of 18cm (T<sub>c</sub>), u'' is between 17 and 20.5cm, which gives an overall LWL of 484.5 and 487cm.

In all, the range within which LWL lies for the above draughts is between 479.5 and 487cm, a variation of 7.5cm. To lessen this discrepancy, equation 19 is again used firstly for T<sub>b</sub> and then T<sub>c</sub>. u'' = 1.5cm (the difference between lines 26 and 27 in column 4, table 13.1). The angle U'' is 31° (line 26 in column 7, table 13.1).

$$19) \quad \tau = \frac{\tan U''}{u''}$$

$$= \frac{\tan 31}{1.5}$$

$$\tau = 0.4\text{cm}$$

So t<sub>b</sub> = 62.5cm + 0.4cm = 62.9cm and with LWL = 479.9cm.

For a draught of 18cm, u'' = 3.5, the difference between the values of 17 and 20.5 (lines 28 and 29 in column 7, Table 13.1). The angle U'' = 22° (line 28, column 7). So:



$$19) \quad T = \frac{\tan 54}{3.5} = 0.37$$

$$0.37 \times \frac{1}{25} = 0.1 \text{ cm (to interpolate for } u'' \text{ of 18 cm)}$$

$$T = 0.1 \text{ cm}$$

and,  $tb = 67.6 \text{ cm}$

So for the given draft of between 15.1 cm and 18 cm, Daire's LWL is between 480.3 and 484.6 cm, or  $482 \text{ cm} \pm 2.15 \text{ cm}$ . The variable has been lessened by 57% to 4.3 cm. The real LWL of 482 cm is still within this range.

### 13.4.2 Waterline Width

Knowledge of the waterline width (WWL) is largely incidental to naval architectural applications. It is of limited value. The boat's slenderness coefficient (Section 7.6.1) is more relevant to establish resistance through motion and potential speed applications under differing propulsive forces.

Since the slope of the boat's sides are nearly vertical and more regular than the ends, it is much easier to find the waterline width (WWL) of a logboat. The method in which the cross-sectional areas of logboats (Section 13.2.2.1) is used here, in particular 'method 1'.

Figure 13.15 shows the cross-section of a logboat, in which, the draft is  $T$ , and  $WL$  is the waterline. The equation for  $WWL$  is:

$$20) \quad WWL = w_m + w_p + w_s$$

where  $w_m$  is the width of the boat's bottom,  $w_p$  is the width of the portside at water level, and  $w_s$  is the width of the starboard side at water level. Figure 13.15 shows two vertical lines which divide  $w_m$  from  $w_p$  and  $w_s$ .

It is assumed the angle between the boat's sides and the vertical constant throughout the boat's length.

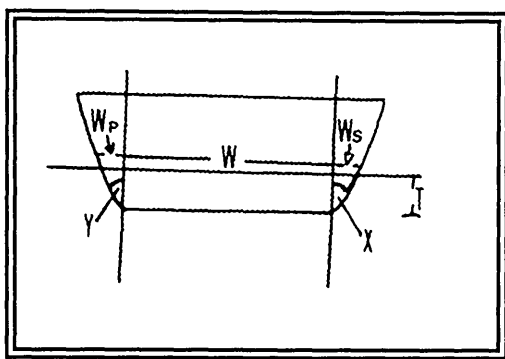


Figure 13.15: Schematic cross-section of a logboat.

$T$ , the boat's draught is already known, as is  $w_m$ . Similar to finding  $LWL$ , points are taken across the hull on the initial survey. Not as many points are required since it is a small area and the sides rise at a steeper angle than the ends. The equation to find  $w_p$  and  $w_s$  is:

$$21) \quad w_s = T(\tan X)$$

and,  $w_p = T(\tan Y)$

Since logboats' cross-sections tend to be symmetrical,  $w_p$  and  $w_s$  may be considered, and therefore the angles  $X$  and  $Y$  also. So:

$$22) \quad w_p + w_s = T(\tan X + \tan Y)$$

or  $w_r = T(2\tan X)$  (assuming  $X$  and  $Y$  are equal)

where  $w_r = w_p + w_s$

### 13.4.2.1 Case Study

Daire's real draught of 16cm is used first:

where,  $T_r = 16\text{cm}$

$$X = 6.50$$

Both angles  $X$  and  $Y$  are each  $6.5^\circ$ , which was ascertained by using equation 17 (Section 13.4.1) where:

$$U'' = \tan^{-1}\left(\frac{U''}{\tau}\right)$$

or:

$$\tan^{-1}\left(\frac{\text{half the differences in widths measured at the boat's bottom and top}}{\text{external height}}\right)$$

= the angle of the boat's side, or the angle at which it diverges from the vertical.

Both angles  $X$  and  $Y$  are equal to  $U''$ , so:

$$\tan X = \frac{5}{68} = 6.5^\circ$$

(44)

So  $w_r = T(2\tan X)$

$$w_r = 16(2\tan 6.5) = 3.6\text{cm}$$

$$\text{WWL} = w_r + w_m = 68\text{cm} + 3.6\text{cm} = 71.6\text{cm}.$$

From the tank tests, it was seen that Daire's actual **WWL** was 72cm, where  $T_r = 16\text{cm}$ .

When  $T_b = 15.1\text{cm}$  and  $T_c = 18\text{cm}$ , the draught is between 71.4 and 72.1cm.

All the above differences are so small that they make virtually no difference to further calculations in factors of resistance (Section 13.11).

When the draught of 15.3cm ( $T_t$ ) is used in the equation, Daire's waterline width is 71.5cm, a difference of only 1%.

### 13.5 THE LOADED LOGBOAT

Once a logboat carries a load, new conditions are created which alter its displacement, draught, LWL, WWL, stability and factors affecting speed.

#### 13.5.1 Loaded Displacement

Once cargo, passengers and crew are in a logboat, its condition changes. The additional weight increases the force of gravity, so that the boat will sink deeper into the water. It displaces a greater volume of water. The boat is now displacing not only its own weight, but also the weight of its contents. Once the boat ceases to sink, it attains a state of equilibrium, in which:

$$23) \quad \Delta = W_1 + W_c,$$

where,  $W_1$  is the weight of the logboat,  $W_c$  is the weight of its contents and  $\Delta$  is the upwards force of the displaced water.

Equation 2 (Section 13.2) shows that the net volume of the logboat ( $\nabla$ ), (now called  $\nabla_1$ ) multiplied by its density  $\rho_1 = W$  (now called  $W_1$ ). So the final  $\Delta$  in equation 23:

$$24) \quad \nabla_1 \times \rho_1 + \nabla_c \times \rho_c = W_1 + W_c = \Delta$$

The boat may carry different contents at the same time, such as crew members, polished stone axes, ores, timber, turf, or animals, etc. Each of the above has a different density and weight.

Figure 13.16 shows a cross-section of a hypothetical logboat, in which the unloaded position of the logboat at rest (in a state of equilibrium) is shown). A similar logboat carrying a load is superimposed.

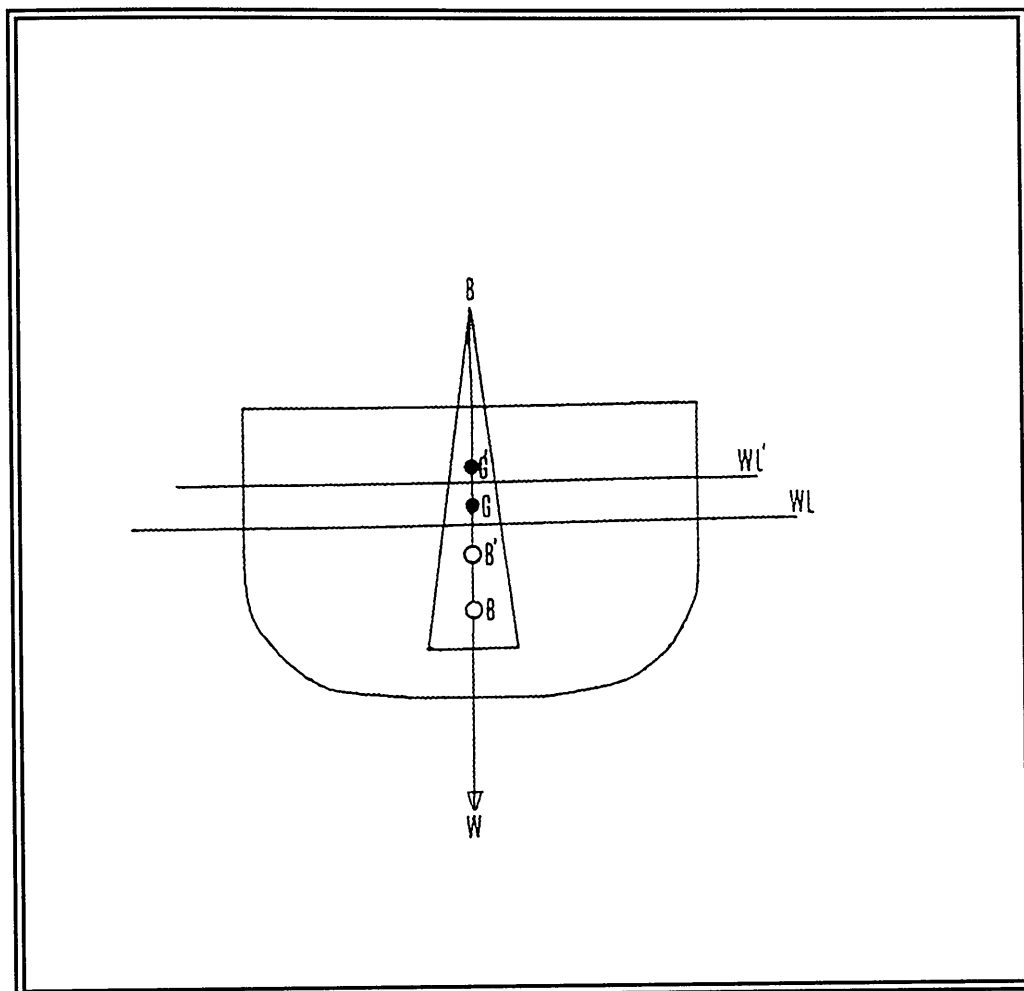


Figure 13.16: Cross-section of a loaded and unloaded logboat at rest (in equilibrium).

Figure 13.16 is the same as Figure 13.1 in that **WL** is the waterline of the unloaded logboat. **B** and **G** are the centres of buoyancy and gravity respectively in a vertical plane. The hydrostatic force of **B** support the boat, while **G**, the force applied by gravity pushes the boat down and the boat floats in a state of equilibrium.

When a load is introduced, the boat sinks, from the weight of the load, **WL'**, where the additional buoyancy is equal to the additional weight. 'The new buoyancy...acts now through the new centre of buoyancy **B'**...[and]...the new weight...acts now through the new centre of gravity **G'**' (Rawson and Tupper, 1994 i: 58).

### 13.5.1.1 Case Study

To find the loaded or new displacement, equation 24 is used. Section 13.2.4.1 shows that Daire's net volume ( $\nabla_1$ ) is 0.482mcu. Her real density ( $T_r$ ) is 1091Kg/m<sup>3</sup>, while her measured density ( $T_t$ ) is 954Kg/m<sup>3</sup>.  $T_b$  and  $T_c$  are 1073 and 1280Kg/m<sup>3</sup> respectively. So the weights for the empty logboat for the above densities are:

$$W_r = 526Kg$$

$$W_t = 460Kg$$

$$W_b = 517Kg$$

$$W_c = 617Kg$$

The material used in the experiment was concrete blocks. Each had a volume of 0.009092mcu. They each weighed an average of 14.1Kg and had a density of 1551Kg/m<sup>3</sup>.

A freeboard of 10cm is considered here to be the minimum at which logboats can operate in calm conditions without shipping water. She was tested at freeboards of 30% and 40%. In the above condition, her real density ( $\rho_r$ ) and weight ( $W_r$ ) are used first to ascertain her displacement:

$$\begin{aligned} 24) \quad \nabla_1 \times \rho_r &= W_r = 526Kg \\ \nabla_c \times \rho_c &= W_c = 430Kg \end{aligned}$$

where, 30.5 blocks gave a total volume of 0.2773m<sup>3</sup>.

$$23) \quad W_r + W_c = 956Kg$$

Daire was in a state of equilibrium at a 10cm freeboard when she displaced 956Kg of water at her maximum load capacity.

Daire's theoretical density ( $T_t$ ) and theoretical weight ( $W_t$ ) are now used to ascertain her displacement:

$$\begin{aligned} 24) \quad \nabla_1 \times \rho_t &= W_t = 460Kg \\ \nabla_c \times \rho_c &= W_c = 430Kg \end{aligned}$$

$$23) \quad W_t + W_c = 890\text{Kg}$$

Under normal circumstances, the density of logboats can not be tested, so  $q_{ob}$  and  $q_{oc}$  are used to see how they compare to the two above results:

For  $q_b$ :

$$24) \quad \nabla_1 \times \rho_b = W_b = 517\text{Kg}$$

$$\nabla_c \times \rho_c = W_c = 430\text{Kg}$$

$$23) \quad W_b + W_c = 947\text{Kg}$$

For  $q_c$ :

$$24) \quad \nabla_1 \times \rho_c = W_c = 617\text{Kg}$$

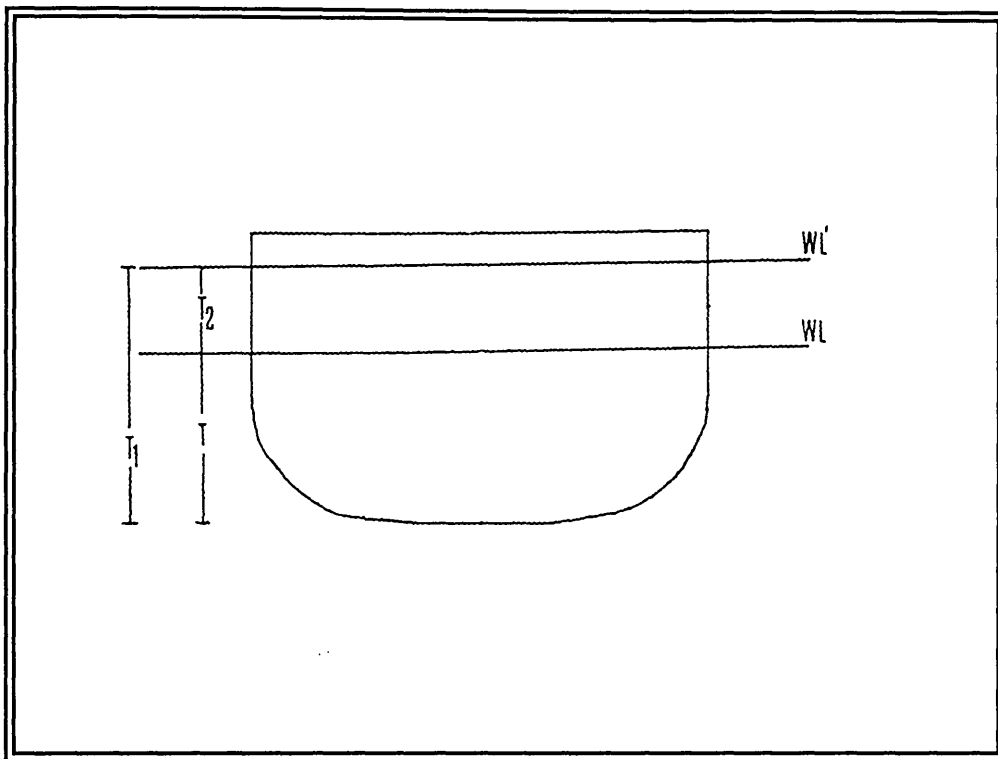
$$\nabla_c \times \rho_c = W_c = 430\text{Kg}$$

$$23) \quad W_{cl} + W_c = 1047\text{Kg}$$

The true weight of Daire, under maximum load conditions, and her theoretical vary by 66Kg (7%). For the official densities, Daire and her maximum cargo weigh 997Kg  $\pm$  50Kg, which differs from the real situation by a maximum of 91Kg. From a mean figure of 997Kg, the result varies by 41Kg (4%), which is within acceptable limits.

## 13.6 LOADED DRAUGHT

Section 13.7.1 presents the test conditions under load. Since  $W_r$  is the true weight of the boat, it is the only situation in that section that gives a 10cm freeboard. It is more realistic to work from a maximum load condition that gives a 10cm freeboard, and then determine the required load to obtain this. This section works on this premise and then applies the different densities of oak to establish the maximum load for each condition.



*Figure 13.17: The new draught for a logboat with a given load.*

It has already been stated that Daire attains a new waterline (Figure 13.16) and subsequently a new draught with a given load. To calculate a maximum load capacity with a minimum freeboard of 10cm,  $T$  is the draught of the unladen vessel in Figure 13.17,  $T_1$  is the new overall draught with the maximum load.  $T_2$  is the amount by which the boat's draught increases with the introduced load. So:

$$25) \quad T_1 = T + T_2$$

and,



$$26) \quad T_2 = T_1 - T$$

We know  $T$  is the original unladen draught which is quantifiable.  $T_1$  in this circumstance is the maximum safe draught, which is the boat's external height less the 10cm freeboard. Therefore  $T_2$ , the amount by which the draught increases once the load has been introduced is also quantifiable.

The load which causes the boat to sink by  $T_2$  and give a draught of  $T_1$  is now sought:

$$27) \quad W_c = L\{\rho_w \times T_1 \times W - \rho_l(HW-hw)\}$$

where;  $L$  (the length of the logboat) = 5m for Daire

$W$  (the width of the logboat) = .6524m for Daire

$T_1$  (the average external height,  $H$ , of the boat less the 10cm freeboard) = .2788m

$HW-hw$  = .091msq for Daire (Section 13.3)

$\rho_l$ :  $q_r = 1091\text{Kg/m}^3$ ,  $\rho_b = 1073\text{Kg/m}^3$

$\rho_c = 1280\text{Kg/m}^3$ , for Daire (Sections 13.2.3 and 13.3)

$\rho_w$ , density of water =  $1000\text{Kg/m}^3$

$$27) \quad W_c = 5\{1000 \times .2788 \times .6524 - 1091(.09155)\}$$

$$W_c = 410.04035\text{Kg or, } 410\text{Kg}$$

The actual load of 30.5 concrete blocks which gave Daire a 10cm freeboard weighed 430Kg, a difference of 20Kg or 4.6%, which is acceptable.

Equation 27 is now uses  $q_c$  and  $q_a$  the theoretical densities of oak to compare the results with the above equation.

For  $\rho_b$ :

$$W_c = 5(181.88912 - 98.233)$$

$$W_c = 418.28\text{Kg, } (418\text{Kg})$$

For  $\rho_c$ :

$$W_c = 5(181.88912 - 117.184)$$

$$W_c = 323.53\text{Kg}, (324\text{Kg})$$

The theoretical maximum load that Daire could carry with a 10cm freeboard is  $371 \pm 47\text{Kg}$ . It can be seen that the real carrying capacity lies above this. It is sufficiently close to the real weight of the cargo to establish that the upper end of the range is applicable.

Finally, to find a logboat's draught for any given load ( $W_c$ ):

equation 28: 
$$T = \frac{W_c + L\rho_l(HW - hw)}{L\rho_w W}$$

### 13.7 THE WATERLINE OF THE LOADED LOGBOAT

The equations developed in Sections 13.4.1 and 13.4.2 are used in this section to determine the logboat's waterline lengths and widths under loaded conditions. The maximum draught condition of 32cm is now used (the overall external height of 42cm less the specified 10cm minimum freeboard). Sections 13.7.1 and 13.7.2 simply apply the waterline conditions to Daire.

#### 13.7.1 The Waterline Length of Daire with Minimum Freeboard

The data presented in Figure 13.14 and equation 15 is used here, where:

$$15) \quad LWL = t_s + t_m + t_b$$

in which  $t_s = 0$

$$t_m = 417\text{cm}$$

$$t_b = \text{between } 80 \text{ and } 82.5\text{cm}$$

The figure of 80 to 82.5cm for  $t_b$  is ascertained from Figure 13.14. The boat's draught  $T_1$  is equivalent to **Cum.  $u''$**  in Figure 13.14. Since  $u''$  (or  $T_1$ ) is equal to 32cm, which lies between the values of 29 and 32.5 (Column 4, Points 33 and 34), **Cum.  $\tau$**  (or  $t_b$ ) is between 80 and 82.5cm in length. The stern is vertical, so  $t_s = 0$ .

Hence 
$$LWL = 0 + 417\text{cm} + 81.25 \pm 1.25\text{cm}$$

So 
$$LWL = 4.97 \text{ to } 5\text{m}$$

There remains a variable of 2.5cm. To lessen this, the angle  $U''$  must be obtained. This can be read off from column 7 and point 35, in Figure 13.14, where  $U'' = 550$ . The difference between the two values of  $u''$  is 3.5cm (column 5, point 34).

So 
$$U'' = 550$$
  
and 
$$u'' = 3.5\text{cm}$$

To find  $\tau$  equation 19 is used:

$$\tau = \frac{\tan 55}{3.5}$$

$$\tau = 0.408\text{cm} (0.4\text{cm})$$

So far  $u''$  equal to between 29 and 32.5,  $t_b = 80\text{cm} + 0.4\text{cm}$

Therefore 
$$LWL = 497.4\text{cm} \text{ or } 4.974\text{m} (417\text{cm} + 80\text{cm} + 0.4\text{cm})$$

Alternatively by an interpolation method:

$$\tau \text{ at } u'' = 32 \text{ is } \frac{32 - 29}{32.5 - 29} \times 2.5 = \frac{3}{3.5} \times 2.5 = 2.14\text{cm}$$

$$LWL = 4.99\text{m}, (417\text{cm} + 80\text{cm} + 2.1\text{cm})$$

The tank tests of Daire indicated a waterline length of 4.97m with a freeboard of 10cm. The resulting difference between the tank and theoretical tests of 4mm amounts to 0.08%.

### 13.7.2 The Waterline Width of Daire with Minimum Freeboard

Again  $T_1 = 32\text{cm}$ . Section 13.4.2.1 shows that the angle  $X = 6.5^\circ$ , Figure 13.15 and Section 13.4.2.1).

$$20) \quad \text{WWL} = W_m + W_r, \text{ where } W_r = W_p + W_s,$$

$$W_r = 32(2\tan 6.5) = 7.29\text{cm}$$

$$W_r + W_m = 68\text{cm} + 7.29\text{cm} = 75.29\text{cm} = \text{WWL}$$

Daire's tank test waterline width measured 75cm when there was a minimum freeboard of 10cm. The difference 29mm amounts to a discrepancy of only 0.4%.

## 13.8 STABILITY

The equilibrium value of displacement has already been discussed in section 13.2, i.e. when a body is floating it is said to be in a state of equilibrium (Gutelle, 1984: 57). The state of equilibrium of concern here, is that of stability. 'The term stability refers to the tendency of a boat or system to return to its original state after it has suffered a small disturbance' (Rawson and Tupper, 1994 i: 90).

This section deals with static stability. Static means the boat is stationary in the water. When a boat is in motion it is affected by additional influences of wind and wave action as well as resistance which introduce more complex aspects of naval architecture. Therefore, it is best to examine first the situation of static equilibrium.

'If a rigid body, subject to a small disturbance from a positive equilibrium, tends to return to that state it is said to possess positive stability or to be in a state of stable equilibrium. If, following

the disturbance, the body remains in its new position, then it is said to be in a state of neutral equilibrium, or to possess neutral stability. If following the disturbance, the excursion from the equilibrium position tends to increase, then the body is said to be in a state of unstable equilibrium or to possess negative stability' (Rawson and Tupper, 1994 i: 90). As discussed in section 13.2, for a body to attain equilibrium, 'the buoyancy force and weight must be equal and the two forces must act along the same straight line. For a floating body this line must be vertical' (Rawson and Tupper, 1994, i: 90). Statical stability is in effect 'the moment of the couple formed by the weight and buoyancy' (Skene, 1948: 46).

There are two aspects of stability, longitudinal and transverse stability. Longitudinal stability deals with the moment of inertia of a boat's longitudinal section or the effect of downward pressure applied to either end, about its longitudinal centre of gravity or point of rotation. Since the length of a boat is so much greater than that of its beam, the overall effect of pressure applied to either end tends to be dampened. Transverse stability deals with the moment of inertia of a boat's transverse section about its centre of gravity.

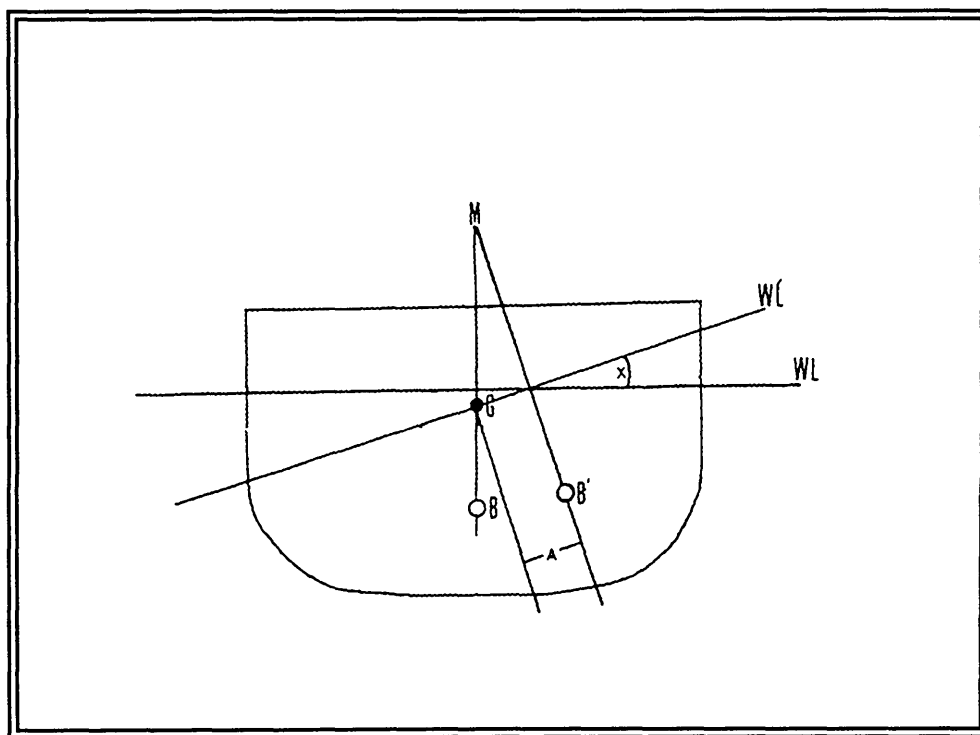


Figure 13.18: The forces of gravity and buoyancy that affect transverse stability.

Figure 13.18 shows how the forces of buoyancy and gravity affect the stability of a vessel. **WL** is the water line of the boat when it is stationary and undisturbed. **G**, the centre of gravity and **B**, the centre of buoyancy through which the external support acts upwards, are and are on the same vertical line. **WL'** is the water line when the boat heels at the angle  $x$  and **B'** the centre of buoyancy when heeled. The distance between the lines passing through **G** and **B'** perpendicular to **WL'** is  $\Delta$ . The intersection at **M** of the perpendicular line through **B'** with the central vertical line is the metacentre. **GM** is the metacentric height.

As long as **G** is below **M**, stability is positive. When **G** corresponds to **M**, stability is neutral. When **G** is above **M**, stability is negative and the boat will continue to rotate around **G** until it is in a position where **G** is vertically below **M**.

'The transverse static stability of a...[boat]... is equal to the displacement multiplied by  $\Delta$ , the righting arm' (Skene, 1948: 46). To find a boat's stability for any given angle of heel, the distance between the centre of gravity and the centre of buoyancy in a direction parallel to the water line at the angle of heel must be found. (Skene, 1948: 46) notes that 'stability is dependent upon two factors', weight and ballast (which affects the position of the centre of gravity), and the shape of the hull (which affects the position of the centre of buoyancy).

In reality, **G**, the centre of gravity, may lie to one side of a logboat's transverse vertical centre line, as there may be some asymmetry in the hull. However as the difference would be small, it can be ignored.

**B**, the centre of buoyancy must be vertically under **G**, if static equilibrium is to exist.

Finally, the metacentric height, **GM**, must also be known. Skene (1948: 46) notes that  $\Delta = GM \sin X$ , which will be discussed further in Section 13.10.3.

The design of logboats and the manner in which their weight is concentrated in the bottom, gives them a very low centre of gravity relative to other types of boats. Section 13.2.2.1 shows the various cross-sections of logboats. Each cross-section's form affects the logboats' stability and resistance differently.

Figures 13.5 and 13.6 are the most stable logboat forms, while Figure 13.4's rounded cross-section is the least stable. Figures 13.5 and 13.6 show flat bottoms with flared sides. This presents a greater wetted surface area, which provides greater buoyancy and stability. A greater heeling force has to be applied to flat-bottomed boats to cause them to heel by the same amount as a boat with a circular cross-section.

As a load is put in the boat, its draught increases and accordingly increases the wetted surface area over a greater cross-sectional distance, which further increases buoyancy and stability. The triangular shape to the sides in figure 13.6 gives a lower weight and centre of gravity than Figure 13.5, which further increases its stability. An increase in the load of a circular-sectioned boat (Figure 13.4) does not increase stability.

The square and sub-square cross sections of Figures 13.3, 13.7 and 13.8 have varying degrees of stability between those of Figures 13.4, 13.5 and 13.6. The rounded corners of 13.7 and 13.8 present a smaller cross-sectional distance than Figure 13.3, which provides marginally greater stability. Figure 13.8's triangular sides give a lower centre of gravity and greater stability than Figure 13.7.

When a load is put into all three boats and their draughts are increased, the vertical sides do not increase the cross-sectional distance under water and thus do not increase their buoyancy forces and stability.

When the logboats cross-sections alone are considered, it can be stated that those logboat which have flat bottoms and flared sides, have the best carrying-capacity and would have been used as cargo boats. Those logboats with rounded cross-sections were specifically designed for speed, not cargo-carrying. The remainder of cross-sectional types could have been used for either which is dependant on the shape of the ends, overall size and the environment in which they were found (Section 13.11.1.2).

### 13.8.1 Position of the Centre of Buoyancy

It has already been stated in Section 13.10, that the location of the centre of buoyancy is on the same vertical line as the centre of gravity. The transverse centre of buoyancy is the midpoint of the submerged cross-sectional area.

Figure 13.19 shows a symmetrical trapezium, which most closely approximates a logboat's cross-section. This may lead to a less accurate position of the centre of buoyancy, but the difference is quite small and is acceptable for this exercise.

HT is the centre line of the rectangular area and also the centre line of the boat, assuming a symmetrical cross-section. For the rectangle AEFD, assuming a rectangular cross-section for the boat, L is the centre of buoyancy, which is at the mid point of the boat's draught, or:

equation 28) 
$$\text{Centre of Buoyancy} = \frac{PT}{2}$$

This distance is measured from the horizontal line JK, (the water line). To obtain the true centre of buoyancy, PL is then added to PH, to establish the location of the centre of buoyancy from the boat's gunwale level (the reference line), BC.

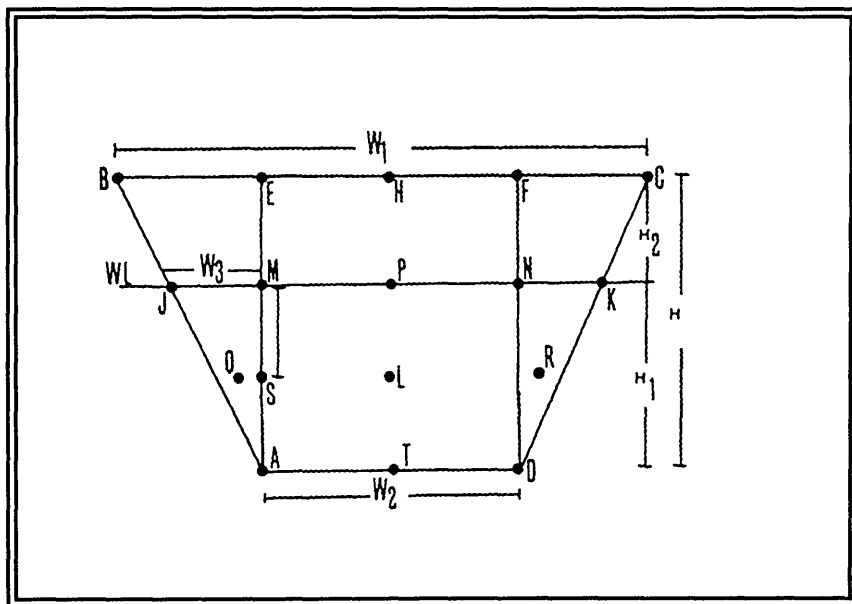


Figure 13.19: Cross-section of a logboat to establish its centre of buoyancy.



The centre of buoyancy, for the more realistic trapezoidal cross-section is the centre of gravity of the immersed area, JKDA, or:

$$\text{equation 29) } \quad \text{MNDA} + \text{JMA} + \text{KND} = W_2 h_1 + h_1 \text{JM}$$

or:

$$\text{equation 30) } \quad \text{MNDA} + \text{JMA} + \text{KND} = h_1 \left\{ W_2 + \frac{h_1(W_1 - W_2)}{h(2)} \right\}$$

Q and R are the centres of gravity of the triangles JMA and NKD respectively.

$$\text{equation 31) } \quad \text{MS} = \frac{h_1}{3}$$

To find the centre of buoyancy (L), moments about JK are given:

$$\text{equation 32) } \quad \text{PL} = \frac{h_1(3W_2 + 2W_3)}{6(W_2 + W_3)}$$

and

$$\text{equation 33) } \quad \text{HL} = h - \frac{h_1}{6} \times \frac{(3W_2 + 4W_3)}{(W_2 + W_3)}$$

### 13.8.1.1 Case Study

Daire's centre of buoyancy is calculated from equation 33:

$$33) \quad \text{HL} = 37.88 - \frac{16(3 \times 52 + 4 \times 5.59)}{6(52 + 5.59)}$$

$$\text{HL} = 29.62\text{cm}$$

### 13.8.2 Position of the Centre of Gravity

The vertical position of the centre of gravity,  $G$ , is measured vertically from the gunwale which is used as a transverse reference line. Skene (1948: 47) states that its position is found by either 'direct calculation, by approximation...[or]... by experiment on the completed'...boat. He also states that direct calculation is a laborious process and that it is simpler and generally sufficient to arrive at the position of the centre of gravity by an approximation. However a model is developed for the current study which uses direct calculation to lessen inaccuracies. It may appear confusing initially, but it is a simple and repetitive process.

Figure 13.20 simplifies the cross-section of a logboat into a symmetrical trapezium. Assuming symmetry, the centre of gravity will be at the geometrical centre of the cross-section.

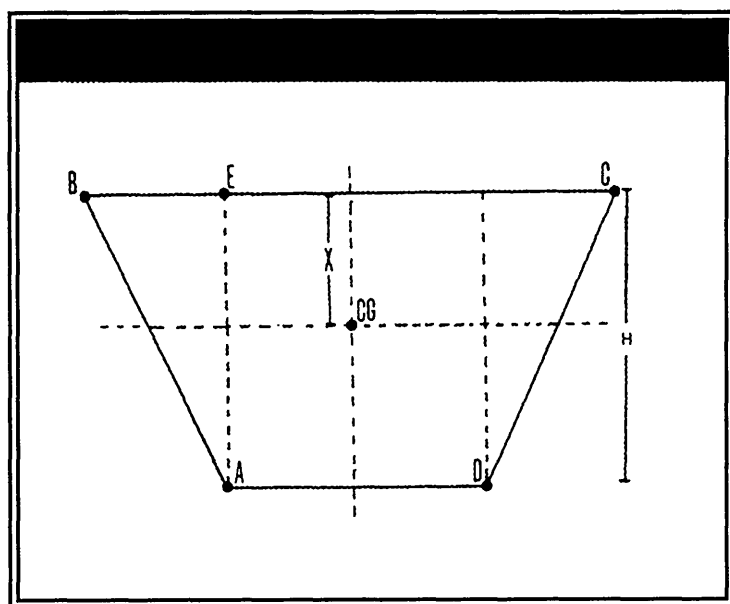


Figure 13.20: Cross-section of a boat to establish the location of its centre of gravity.

From Figure 13.20, the distance  $BC$  is equal to  $W_1$  and the distance  $AD$  is equal to  $W_2$ . The area of the trapezium is:

$$\text{Equation 34) Area} = \frac{h(W_1 + W_2)}{2}$$

where  $h$  is the vertical external height of the boat.

Next, to find the position of the centre of gravity, the vertical distance  $X$  must be obtained by taking moments about  $BC$ :

$$\text{equation 35) } X = \frac{h(W_1 + 2W_2)}{3(W_1 + W_2)}$$

This equation establishes the position of the centre of gravity ( $X$ ) for a boat whose interior is solid. Figure 13.21 shows two trapeziums,  $ABCD$ , inside of which is the second,  $VXYZ$ . Assuming symmetry, the centre of gravity,  $P$ , is the intersection of  $GH$  and  $JK$ .  $P$  is not equidistant between  $H$  and  $G$ , but is assumed to the midpoint of  $JK$ .

$$\text{equation 35) } ph_1 = \frac{h_1(W_{11} + 2W_{21})}{3(W_{11} + W_{21})}$$

The process is repeated for the inner trapezium  $VXYZ$ :

$$\text{Also from equation 35) } ph_1 = \frac{h_1(W_{1s} + 2W_{2s})}{3(W_{1s} + W_{2s})}$$

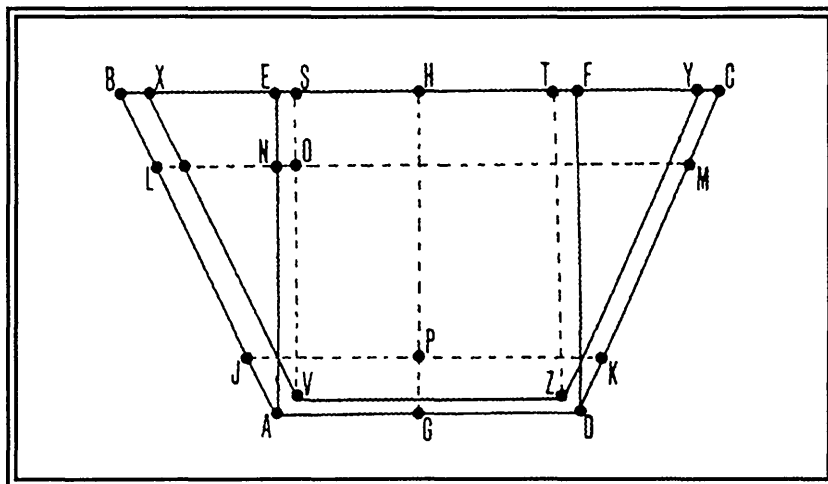


Figure 13.21: A cross-sectional area of a boat shown as two trapeziums.

The centre of gravity for two solid trapeziums have been obtained. Next the difference between the two must be sought to get the boat's overall location of the centre of gravity. So Figure 13.21 shows the cross-sectional area of the boat, in the form of two trapeziums, one inside the other, in which:

$P_{h1} = PH$  for the large trapezium

$P_{hs} = PH$  for the small trapezium

$H_f = PH$  for the final net trapezium

$H_1 =$  The external height of the boat

$H_s =$  The internal height of the boat

$W_{11} =$  The top width of the large (outer) trapezium

$W_{1s} =$  The top width of the Small (inner) trapezium

$W_{21} =$  The bottom width of the large trapezium

$W_{2s} =$  The bottom width of the small trapezium

Equation 36) The net transverse area of the boat ( $A_f$ ) =  $A_1 - A_s$

Where:

$A_1 =$  area of the large trapezium

$A_s =$  area of the small trapezium

$A_f =$  area of the final net trapezium

$p_{hf}$  (the distance from the top horizontal dashed line on which CG is located):

$$\text{Equation 27) } p_{hf} = \frac{A_1 p_{h1} - A_s p_{hs}}{A_f}$$

### 13.8.2.1 Case Study

The following study uses Daire's dimensions to ascertain the location of its centre of gravity.

Daire's cross-section is assumed symmetrical about its centre line.

$$37) \quad p_{h1} = \frac{37.88(65.24 + 2 \times 59)}{3(65.24 + 59)}$$

$p_{h1} = 18.62\text{cm}$  from the gunwale (i.e. The reference line)

The process is repeated for the second trapezium:

$$37) \quad p_{hs} = \frac{29.92(59 + 2 \times 52)}{3(59 + 52)}$$

$$ph_s = 14.65\text{cm from the gunwale}$$

To find the position of the final centre of gravity, the net cross-sectional area of Daire ( $A_f$ ) must be ascertained:

$$36) \quad A_f = A_1 - A_s$$

$$\text{Where } A_1 = \frac{1}{2}(W_{11} + W_{21})h_1 = 2353$$

$$\text{And } A_s = \frac{1}{2}(W_{1s} + W_{2s})h_s = 1660$$

$$37) \quad A_f = 2353 - 1660 = 693$$

$$ph_f = 28.13\text{cm below the gunwale}$$

So Daire's transverse centre of gravity is situated on the centre line at 28cm below the gunwales; about 1cm above the bottom of the boat.

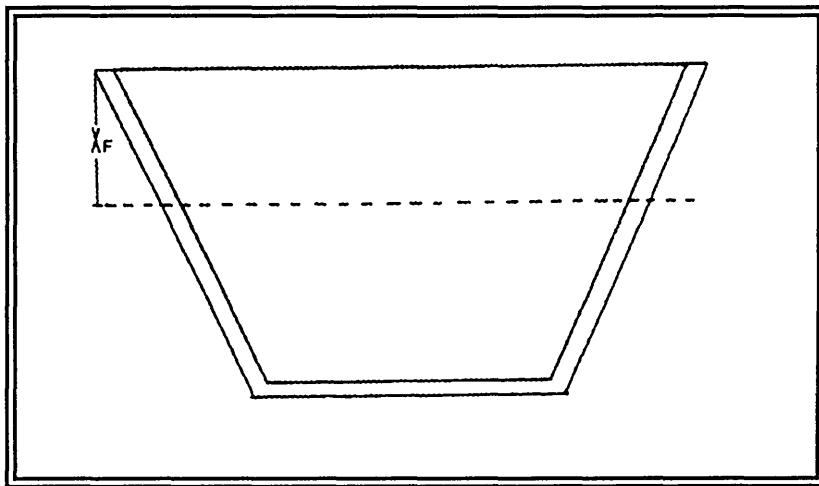


Figure 13.22: Position of the final centre of gravity ( $ph_f$ ).

### 13.8.3 The Metacentric Height

Figure 13.18 shows the position of  $M$ , the metacentre. The metacentric radius is the distance  $BM$ ; the metacentric height is  $GM$ .

Skene states that ‘for small angles (up to about 10°) the height of M remains practically constant...for small inclinations of the metacentric height is a measure of stability’ (Skene, 1948: 50-1). A large metacentric height causes a boat to return quickly to its position. Boats with small metacentric height return more slowly and have less violent transverse motion. Logboats tend to have large metacentric heights. In addition, the larger the metacentric height, the more likely the boat will return to the up right from greater angle of heel. Hence while logboats can be alarmingly violent in corrective lateral motion (as Daire proved in lake tests), they are very stable craft.

The case study of Daire s incorporated into this section to clarify the formulae used.

This metacentric method of determining stability is suitable only for small angles of inclination (Skene, 1948: 50), such as are found in logboats.

The measure of stability is:

equation 38)  $GM = BM - BG$

To find M, the moment of inertia about the transverse axis through the centre of gravity must be known, so that:

Equation 39)  $BM = \frac{I}{V}$

In which I is the moment of inertia of the cross-section about the water line and V is the volume of the displacement. The volume of displacement has already been calculated in Section 13.2.4.1.

Skene’s formula (1948: 50) for the moment of inertia is used here. It is adapted by using the average dimensions of the logboat taken from the boat’s stations and applying them to a 1cm length of the hull, where:

Equation 40)  $I = \text{the cube of the average half-width} \times \frac{2}{3} \times 1$

Where 1 is the 1cm length of the hull, so:

40)  $I = 34709.8 \times \frac{2}{3} \times 1 = 23139.9\text{cm}^3$

$$38) \quad \text{BM} = \frac{23139.9}{1052} = 21.9 \text{ or } 22\text{cm}$$

The metacentric height of Daire is:

$$41) \quad \text{GM} = \text{BM} - \text{BG}$$

$$= \text{BM} - (\text{BO} - \text{GO}) = 22 - (29.62 - 28.13) = 20.51\text{cm}$$

where: **BO** is the distance of **B** from the gunwale (Section 13.8.1.1)

**GO** is the distance of **G** from the gunwale (Section 13.8.2.1)

$$\text{Equation 41)} \quad \Delta = \text{GmsinX} \quad (\text{Skene, 1948: 50})$$

$$\text{Equation 42)} \quad \Delta = 20.62 \times .174 \text{ (for } 10^\circ \text{ angular displacement) (Skene, 1948: 50)}$$

$$\text{In Daire,} \quad \text{Stability} = 536 \times .2062 \times .174$$

$$\text{Stability} = 18.9\text{kg/m}^3$$

### 13.9 RESISTANCE

Rawson and Tupper note that ‘the power required to drive a...[boat]...through...water depends upon the resistance offered by...water and air, the efficiency of the propulsive devise...and the interaction among them’ (Rawson and Tupper, 1994, ii: 375). Rough water increases the complexity of these interactions. Accordingly its influence is not considered in the current study. This section studies the effects of resistance to the motion of logboats in calm water conditions. Slenderness coefficients (Section 7.6.1) and boat forms (Chapter 6) play integral roles in determining the resistance to which logboats are subjected.

The resistances to a boat in motion consist of frictional, skin, wave-making, eddy-making and air resistance. Gutelle states that ‘the interface between air and water is disturbed, and various wave systems are created which, in turn, modify pressure distribution over the hull and cause the appearance of a resistance force; the energy expended on propulsion is equal to the energy

needed to overcome the...[above resistances]...and maintain these wave systems' (Gutelle, 1984: 93).

The overall resistance of a boat in motion on calm water is composed of two parts, frictional resistance and pressure resistance. Pressure resistance can be further subdivided into wave-making, form, and eddy-making resistances. Since the resistance of air subjected on a boat's hull is 'only about 1/800 the weight of water' and requires a boat to travel at speeds of at least 30 knots to be of significance, it is not considered in the current study (Skene, 1948: 50). Skene also quotes Froude as establishing that air resistance at 10 knots is only about 1.5% of water resistance (Skene, 1948: 186)

### 13.9.1 Frictional Resistance

For low speeds, frictional resistance is the largest. Also when the greater displacement values of logboats to other craft is considered, it is the most significant resistance. Water is not frictionless. The submerged area of the boat causes drag as it passes through the water. Skene states that 'the smaller the displacement-length ratio, the higher the percentage of total resistance due to friction...the wave-making resistance is proportionately less in the finer models at all speeds' (Skene, 1948: 181-2).

The formula for frictional resistance is:

$$\text{Equation 43) } R_f = rSV^a, \quad (\text{Skene, 1948: 181})$$

'...where  $r$  is the coefficient of friction of the surface,  $S$  is the total area of the wetted surface,  $V$  is the speed in knots, and  $a$  is an exponent, the value of which for general work is 1.83. The value of  $r$ , the coefficient of friction, varies with the length of the surface due to the fact the forward part of the surface enters undisturbed water whereas the after portion passes through water that has had some motion imparted to it; the longer the surface, the greater the fraction of the total area which is in contact with water which acquired forward motion' (Skene, 1948: 181-2).

When the underwater surface area of the boat and its speed are known, its frictional resistance can be found with equation 43, if the factors  $r$  and  $a$  can be established.



### 13.9.1.1 Wetted Surface Area

To find the wetted surface area (S):

$$\text{Equation 44) } S = \frac{(2(l' + l''))d}{2} + w_b d + w_s d + l' w_a$$

where:  $l'$  = length of the bottom of the boat

$d$  = draught

$w_b$  = bow width

$w_s$  = stern width

$w_a$  = average bottom width

$$= \frac{w' + w'' + w^a}{n}$$

$w', w'', \dots, w^a$  are the bottom widths measured at each of  $n$  stations

This assumes a constant draught (though a varying draught may be allowed for easily) and also that all faces of the boat are rectangular.

For Daire  $S = d(l'' + 5.85) + 2.97$

Where,  $d$  and  $l''$  vary depending on load

unladen,  $d = 4.82\text{m}$

and  $S = 4.68\text{m}^2$ , or  $50.4\text{ft}^2$

where  $h$  is the draught,  $W1$  is the average small width,  $W2$  is the average large width and  $s$  is the number of stations in Figure 13.20.

### 13.9.1.2 Speed

To measure speed effectively all forms of resistance, a boat's speed must be known in absolute terms, before speed-length ratio can be determined. The modern boat designer employs not only theoretical analysis and models, but also full-scale test data. Rawson and Tupper (1994, ii: 376) note that the theory is not suitable in itself and is only 'an aid to more

practical methods'. For this reason, the results of propulsion methods and speed obtained from Daire are used to determine the speed-length ratio and resistance for the remainder of the logboats.

Table 12.3 presents the speeds of Daire under differing load conditions and propulsive methods. The only propulsive method not attempted was rowing, because Daire lacked sufficient hull width to allow this.

Even though the speed tests were carried out under low wind conditions (usually force 1), in order to eliminate the effect of wind on speed, each trial run was replicated in reverse and the total time for the two runs was used, average speed being calculated over the double distance.

The nature of the location of the speed tests, Castlewellan Lake, Co. Down, provided a current free environment so flow allowances were unnecessary.

$$42) \quad Rr = rSV^a$$

For smooth painted surfaces and hull length of 5m, Froude's coefficient  $r$  is given as 0.011. a value of 0.025 may be appropriate for logboats, also a doubling of the exponent  $a$ .

Skene (1948: 182) notes that Froude gives a value of 1.83 for  $r$  for 'smooth...surfaces of a wide range of lengths'. Skene also goes on to say that for foul or uneven surfaces the  $r$  should be doubled.

However, logboats, their nature, shape, material and surface finishes are so different from the variables for which Froude's formula was established that it would be necessary to carry out extensive controlled experiment to determine the values of  $r$  and  $a$  appropriate for them.

Incidentally, the expectation that logboat surfaces, unlike those of other craft, would smoothen from abrasion of use, leads to the speculation that, over time, their resistance to motion would lessen and, hence, their speed increase.

Where, for Daire;  $r = 0.025$   
 $V = 2.2$  (the average of the speeds under different propulsion forces and conditions in Table 12.3)  
 $S = 4.7m^2$ , or  $50.4ft^2$   
and  $a = 3.66$

$$R_f = 0.025 \times 50.4 \times 3.66$$

$$R_f = 22.6$$

A logboat's speed is directionally proportional to its length, in which its speed-length ratio is:

$$44) \quad K = \frac{V}{\sqrt{LWL}}$$

where  $K$  is the speed-length ratio

$V$  is speed

And  $LWL$  is waterline length

Table 13.2: Speed-length ratios ( $K$ ) measured in km/h and Knots where  $LWL$  is in metres.

| K (km/h) | K (knots) | V in Km/h for Daire (LWL = 4.82m) |
|----------|-----------|-----------------------------------|
| 4.7      | 2.5       | 10.3                              |
| 4.2      | 2.3       | 9.2                               |
| 3.4      | 1.8       | 1.8                               |
| 2.7      | 1.5       | 5.9                               |
| 2.0      | 1.1       | 4.4                               |
| 1.7      | 0.9       | 3.7                               |
| 1.3      | 0.7       | 2.9                               |
| 1.0      | 0.5       | 2.2                               |
| 0.7      | 0.4       | 1.5                               |
| 0.3      | 0.16      | 0.7                               |

$K$  is equal to 4.7 and 2.5 for yachts of fast lines and clean underwater surfaces. If Daire had such lines, her absolute maximum attainable speed would have been 10.3km/h for her unladen waterline length of 4.82m. however the maximum speed attained during open water trials was 4.7km/h (Table 12.3). this means it had a speed-length ratio of 2.1 if 4.7km/h is its maximum attainable speed. This is to be expected considering it does not have the same underwater lines of modern boats with smoother finishes. It may be capable of higher speeds if the crew is increased. However the difference would be marginal for the increased propulsive force, since the weight of the additional crew would increase its weight, draught and displacement. This in turn introduces new factors of resistance and speed-length ratio.

Pressure resistances are the remaining effects of resistance. Of these, wave-making is negligible, because logboats rarely attain speeds in which a build-up of wave patterns would exert more pressure on the hull. Form and eddy-making resistance require the effects of the shape of the bow as it enters undisturbed water and the shape of the stern as it moves through disturbed water to be determined. This requires specific experiments in which both detailed measurement and an extensive datum of reconstructed logboats, are subjected to the same conditions. These results can be achieved by either constructing a tank test, tank test conditions (where all factors that effect resistance on the hull can be controlled), and using scale models which cover the range of logboats' forms, sizes and dimensional coefficients.  $K$  and  $V$  can be established by the same means. On the basis of the available evidence from the Irish logboats, it is estimated that a minimum of fifty logboat models would be required to provide the necessary data. This would provide the basis for continuing research. Until then, absolute analysis and application of logboat speed can not be determined.

Those logboats which have a squared bow in plan would have significant resistance. These were slow boats and would probably have been used for cargo-carrying over short distances. Rounded and in particular rounded-point bows created the least resistance. This does not mean that these boats were designed for speed, but to be propelled as efficiently as possible. The plan of the hull and the shape of the stern determine to what extent these logboats were built successfully for speed and efficiency. A tapered hull and squared stern shows that the boat was designed to carry as large a cargo as possible and to be propelled efficiently. When the stern is rounded, the boat is both propulsively efficient and fast, relatively speaking.

Comparison of the results of Daire's paddling conditions indicates the effects of displacement and resistance on speed (Figure 13.24). It can be seen that one crewman paddling is the optimal allocation of crew to load (including passengers), since there is no improvement to speed at full load capacity with two paddlers. The extra displacement of the full load counteracts the additional propulsive force of a second paddler, since the greater resistance negates any extra speed. When Daire carries crew only, its speed is increased by only 6% to 4.7km/h with the addition of an extra crewman. The lessened displacement (from full load conditions) leads to less resistance being applied to her hull and so it is faster than with one paddler. However the resistance is significant to restrict its speed relative to the additional propulsive force. For Daire to optimally increase its effective speed over displacement, more paddlers would be required. Alternatively for cargo-carrying, she is most effective at a lower speed with one paddler.

When a boat's length is increased, its resistance is lessened in spite of the additional wetted surface area and accompanying frictional resistance. This enables a relatively faster speed assuming that both the propulsive force and the shape of the ends remain constant.

### **13.10 APPLICATION OF THE ARCHAEOLOGICAL EVIDENCE**

It can be seen from the previous sections, that to analyse all aspects of naval architecture of the Irish and Scottish boats, very detailed measurements are essential. Section 1.4 para 6 has already stated that there are omissions in the recording of logboats; frequently only their external lengths were recorded. Even when more measurements were taken, they are often insufficient in detail or were contradicted by measurements taken by other examiners.

To an extent, drawings may be used from which measurements can be obtained. However this creates inaccuracies in the results, because there is an assumption that the drawings are all accurate and to scale. The drawings are representations of the artist's perceptions of the boats and what they deem to be sufficient detail. Their drawings may be unconsciously guided by what they wish to see, not necessarily what is actually there.

Due to the nature of the required measurements, five Irish logboats (Cloonagalloon, Derrybroughas, Derryco, Lurgan and Summerville) and one Scottish logboat (Loch Doon 1) are recorded in sufficient detail to apply the naval architectural models.

Two of the boats (Lurgan and Loch Doon 1) were unfinished. Two sets of results are presented for them, that of their unfinished states, and their hypothetically finished conditions.

#### **13.10.1 Synthesis of the Results**

The results are presented here in tabular form to facilitate comparison. The procedures are the same as those used in the previous sections.

The slowest and least manoeuvrable of the above boats is Cloonagalloon, because it has vertical ends and the smallest hull length. These ends cause the greatest resistance of any logboat form and its smaller length does not reduce the friction. It would have been used for very short distance travel as a one or two man boat.

Table 13.3: Synthesis of results applied to Irish and Scottish Logboats.

| Boat Name              | Cross-sectional Area | Net Volume          |
|------------------------|----------------------|---------------------|
| Cloonagalloon          | .075m <sup>2</sup>   | .39m <sup>3</sup>   |
| Derrybroughas          | .048m <sup>2</sup>   | .263m <sup>3</sup>  |
| Derryco                | .063m <sup>2</sup>   | .369m <sup>3</sup>  |
| Lurgan (unfinished)    | .32m <sup>2</sup>    | 5.136m <sup>3</sup> |
| Lurgan (finished)      | .218m <sup>2</sup>   | 3.614m <sup>3</sup> |
| Summerville            | .055m <sup>2</sup>   | .284m <sup>3</sup>  |
| L. Doon 1 (Unfinished) | .119m <sup>2</sup>   | .346m <sup>3</sup>  |
| L. Doon 1 (finished)   | .104m <sup>2</sup>   | .304m <sup>3</sup>  |
| Boat Name              | Minimum Weight       | Maximum Weight      |
| Cloonagalloon          | 353kg                | 449kg               |
| Derrybroughas          | 334kg                | 473kg               |
| Lurgan (unfinished)    | 4648kg               | 6574kg              |
| Lurgan (finished)      | 3271kg               | 4627kg              |
| Summerville            | 257kg                | 363kg               |
| L. Doon 1 (Unfinished) | 313kg                | 443kg               |
| L. Doon 1 (finished)   | 275kg                | 389kg               |
| Boat Name              | Minimum Draught      | Maximum Draught     |
| Cloonagalloon          | .11m                 | .15m                |
| Derrybroughas          | .06m                 | .08m                |
| Derryco                | .05m                 | .07m                |
| Lurgan (unfinished)    | .4m                  | .56m                |
| Lurgan (finished)      | .2m                  | .28m                |
| Summerville            | .07m                 | .1m                 |
| L. Doon 1 (Unfinished) | .2m                  | .28m                |
| L. Doon 1 (finished)   | .13m                 | .18m                |
| Boat Name              | Waterline Length     | Waterline Width     |
| Cloonagalloon          | 3m                   | Insufficient Data   |
| Derrybroughas          | Insufficient Data    | Insufficient Data   |
| Derryco                | Insufficient Data    | Insufficient Data   |
| Lurgan (unfinished)    | 14.42±.08m           | Insufficient Data   |
| Lurgan (finished)      | 13.62±.08m           | Insufficient Data   |
| Summerville            | 3.61±.06m            | Insufficient Data   |
| L. Doon 1 (Unfinished) | 3.23±.02m            | Insufficient Data   |

Table 13.3 (continued): Synthesis of results applied to Irish and Scottish Logboats.

| Boat Name              | Waterline Length      | Waterline Width   |
|------------------------|-----------------------|-------------------|
| L. Doon 1 (finished)   | 3.19±.02m             | Insufficient Data |
| Boat Name              | Maximum Load Capacity | Stability         |
| Cloonagalloon          | 715±42kg              | Insufficient Data |
| Derrybroughas          | 768±39kg              | Insufficient Data |
| Derryco                | 1448±70kg             | Insufficient Data |
| Lurgan (unfinished)    | 5698±915kg            | Insufficient Data |
| Lurgan (finished)      | 7401±623kg            | Insufficient Data |
| Summerville            | 639±49kg              | Insufficient Data |
| L. Doon 1 (Unfinished) | 613±75kg              | Insufficient Data |
| L. Doon 1 (finished)   | 669±65kg              | Insufficient Data |

Both the rounded sterns, rounded point to the bows and straight sides of the boats from Derrybroughas and Derryco, make them the fastest of all the above logboat hull forms. Their bows enable the most efficient separation of the water, their straight sides don't increase friction. Their sterns also lessen eddy-making turbulence. On the basis of their dimensions, Derryco is the faster of the two, since it is 1.68m longer and only has a 6% greater hull slenderness.

Derrybroughas has two thwart rests for paddlers, while Derryco has five thwart rests. The extra crewmen gives Derryco a potentially greater propulsive force which again would have significantly increased its speed. While Derryco could carry almost twice the weight of Derrybroughas, much of its internal space would have been taken up by crewmen. While both boats are from rivers, Derryco was deliberately built for speed, it appears that Derrybroughas was specifically designed to carry cargo, and that the hull shape presented the least resistance when travelling against the current of the upper River Bann.

Although Summerville's punt ends would have created significant resistance, its greater slenderness (6.6) over that of Loch Doon 1 (4.3) may have counteracted Loch Doon 1's potentially lower resistance. This is due to Loch Doon 1's relatively low slenderness coefficient and its flat and vertical stern would have caused significant drag. If Loch Doon 1 had been finished, its carrying capacity would have been increased by 9%. Both boats were probably used for relatively low speed cargo-carrying.

With a length of 15.24m and a slenderness coefficient of 19.8, Lurgan would have had the potential to be a very fast boat, if its construction had been completed. Its ends are also the same shape as Derrybroughas and Derryco. There is as much as 23% difference in maximum load carrying capacity between its finished and unfinished states. This boat has the best combination of qualities for carrying a cargo and speed, despite its tapered hull which would marginally increase its resistance.



## CHAPTER 14

### SUMMARY

#### 14.1 PERIOD OF USE

Both the dating and literary evidence of the logboats, in particular the Irish boats, show that they had a very extensive period of use, from at least as early as *circa* 5400BC to the middle, and possibly the end of the eighteenth century AD. This is a period of at least 7100 years. Such a prolonged period demonstrates a successful type of water transport which out-lasting several other types of boat.

The literary accounts have also shown some of the uses to which logboats have been put. However, since they refer to circumstances in which logboats play an incidental part, there is a bias in these accounts towards warfare and tragic events. Even though the description of their uses range from fishing, ferrying and transporting goods to raiding and sieges. Some accounts refer directly to their prolific distribution throughout the Irish landscape, while others are less direct but equally portray their large numbers by the manner in which English forces found it necessary to impose restrictions on them.

Due to the significant wastage of wood in a logboat's construction, the scarcity of raw materials and of the competing ship-building, charcoal and tanning industries, large scale deforestation in the seventeenth and eighteenth centuries led to the end of logboats. However, the tradition of logboats still continues in the plank-built Nore cots. They not only emulate some of the logboats' hull shapes and slenderness, but have also adopted the name which originally belonged to logboats.

#### 14.2 DISTRIBUTION

Logboats have been recovered from all aspects of both Irish and Scottish landscapes, from lacustrine and riverine contexts through to estuaries. As a rule they were not capable of being used at sea, unless in very sheltered circumstances. Their distribution favours regions in which there is a large proportion of navigable water. These areas would have functioned as networks of communication and trade

through a landscape that may otherwise have been difficult to traverse. In some instances, such as on the River Foyle, logboats were specifically used to ferry people across the river which would otherwise have acted as a barrier to travel.

In Ireland, the highest concentrations are in the Shannon, Erne and Bann Basins, which are areas of lakes, both large and small, interlinked by navigable rivers. Proportionately smaller concentrations of logboats exist in the Corrib, Foyle and Moy Basins. In contrast, the mountainous environments of south-eastern and south-western Ireland have a notable absence of interlinking waterways and logboats.

Scotland's logboat distribution shows the importance of its navigable rivers which enabled travel to and from its mountainous hinterland and the use of their larger lochs. This reflects not only those waterways which served as communication links, where other types of boats would also have been used. In particular, the large concentration of logboats in the Clyde Basin emphasises the importance of rivers to communication, even though 70% of Scotland's logboats are from Lochs.

River currents undoubtedly created problems when travelling up-river. The numbers of logboats located in them shows that these problems could be overcome. They may have been either towed or had a significant increase in propulsive power by taking on extra crew. Towed logboats would have required tow-paths. Encountering obstructions have been a common occurrence. This would have resulted in some rivers being more extensively used than others, since the more travelled a river is, the easier it is to maintain navigable channels. Strong currents would have impeded up river travel, to the extent that it may have been impossible to use certain rivers. This may be the reason for some apparently navigable rivers' deficiency of logboat discoveries and would have affected the overall logboat distribution.

Both Ayrshire and Dumfriesshire depart from the Scottish distribution pattern, and emulate the distribution of Irish logboats from smaller lakes and waterways. Frequently the boats share the same small lakes with evidence for settlement in them, such as crannogs, castles, ecclesiastical sites and other shore-front settlements. Although there is little or no evidence for direct association between logboats and these sites, it is reasonable to assume that they were probably contemporaneous because of the small lake size. This hypothesis is more difficult to substantiate in the case of the larger lakes.

There is an apparent correlation between the number of logboats, and evidence of lake-side settlements and crannogs in both countries larger lakes. However, with no direct association, it can only be assumed that this pattern is less than coincidental. Unfortunately many of the logboats and these sites have not been dated.

### 14.3 FORM AND SIZE

There are six basic forms or types of logboat. They are based on the shape of the external hull. Both the distribution and dating evidence show that they are neither restricted to any particular geographical environment nor any chronologically-based typological sequence.

The sizes of the boats vary considerably from less than 2m to nearly 14m in length in Scotland, and to over 16m in Ireland. There is no correlation between their sizes, forms, specific environments and dating evidence.

Logboat forms and sizes are determined by the size of the parent log and the use for which each boat was intended. Archaeological evidence from both countries show that the logboat builders did not endure unnecessary wastage, as well as the requirement for extra labour that would be entailed by using trees that were larger in girth than was necessary to make relatively small boats. If anything, the evidence of sapwood on some boats' hulls, would suggest that occasionally the builders could not find a suitably large tree and were forced to use the softer sapwood in the hull.

If there were no locally available trunks of sufficient size to make the logboat, a different type of boat could have been used. It is very unlikely the logboat user would have utilised a boat that was too small or big for his requirements.

#### 14.4 WOOD SPECIES

When the species of wood was recorded, it has been shown that 94% of the Scottish boats, were made from oak and the remainder from scots pine. In Ireland all recorded wood species were of oak, except for one recently found poplar boat, and one - possibly a second - made from alder. There is a wider variety of wood species used to make the European logboats. Of the native Irish and Scottish species, it appears that oak, poplar and scots pine were the only available species most suited to logboat manufacture. The alder tree may have been selected on the basis of a local deficiency of more suitable species.

Oak has all the best qualities of durability and ease to work. It appears that scots pine was restricted to more mountainous areas and would not have been locally available to logboat builders, who would have been situated in areas of greater settlement density. The distribution of Scotland's scots pine logboats in the highlands appears to suggest that it was more easily obtainable than oak at that period.

The early date of the poplar logboat in Ireland shows that if other logboats were also made from softwood, they would not necessarily have decayed from the archaeological record. It is likely that similar to the alder boat, either the species was more readily available than oak, or that its early date meant that it was easier to work than oak with stone tools. However, the remains of a recently found oak logboat from Ballylig which precedes the poplar boat, indicates that oak boats could be made with stone tools.

#### 14.5 CONSTRUCTION

Both evidence of tool marks and the remains of partly completed boats (as well as finished boats), has provided ample evidence for the manner in which they were made. This has been further substantiated by the detailed records of recent logboat reconstructions. It is possible that the trees were selected and cut down during the winter months when there was less vegetation to obscure examination of a suitable tree, there would have been less clearance necessary on the forest floor to create a work area, and the cooler weather would cause less drying-out and less splitting of the wood.

The trees were probably also selected on their proximity to water, since there would have been less distance to drag the finished boat, and water could be used as a tool in the construction process. The discovery of unfinished logboats show that some of them were kept relatively fresh and pliable underwater in the interim, so that they could be retrieved and completed at a later date.

Archaeological evidence has shown that the external hull was shaped before the interior was hollowed. A process of score and splintering by axe both internally and externally. Both axes and adzes were used to finish it off. In the interim, water and animal fats would have been used to prevent the wood from drying-out and splitting. Fire was never used to make indigenous logboats.

#### 14.6 FEATURES

There are several features associated with construction of logboats. Thickness gauges were used in some of the boats' bottoms to assess the rate of hollowing and prevent excessive thinning of the base.

Fitted transoms were used to seal hollowed stems. The stems were probably cut out because of inherent weaknesses in the trees such as heartwood rot. Fitted transoms did not increase functional capabilities and their use also lessened the boat's structural strength. The probable intention of the builders would have been to obtain the maximum girth possible by including the base of the tree trunk where heartwood rot occurs. There is some evidence for vegetative material such as moss were used to seal the fitted transoms and thickness gauges as well as repairs.

Other logboat features appear to have had a more skeumorphic origins, such as solid transverse ribs and false keels. They serve no practical functions and appear to emulate plank-built boat designs. There are also two Scottish boats that may have had possible carved figureheads. The remaining features had practical functions such as mooring holes, seats, washstrakes, repairs and fitted ribs. The fitted ribs appear to have been used for strengthening the hull.

The available evidence would suggest that there is no correlation between individual features and the logboats' distribution, nor is there any distinction between the type of features and the form, the size of the boats or the dating evidence.

#### **14.7 PROPULSION**

The remaining features are directly associated with the methods by which logboats were propelled.

Footrests, thole-pin holes and thwart rests were used to row logboats, while mast steps indicate that some logboats were sailed.

Experimental work on logboats show that sailed logboats did not require any form of stabilising, such as out-riggers, keels, leeboards or ballast. The available evidence also suggests that their masts were free-standing and the boats were capable of being sailed on a reach.

Methods of propulsion directly affected the logboats performance. The boats would also have been paddled and punted. However these forms of propulsion do not require attendant boat features. In their absence, it is probable that most of the logboats were paddled. Experimental work has shown that logboats not were sculled in any circumstances.

#### **14.8 NAVAL ARCHITECTURE AND EXPERIMENTAL ARCHAEOLOGY**

Experimental work on reconstructed logboats indicate that both paddling and sailing are the most efficient methods of propelling them. The length, slenderness, displacement, form and methods of propulsion directly affects a logboat's performance.

With this in mind, experimental work was performed on two logboats to compare their practical results with that of architectural models. The models and attendant formulae were specifically developed to apply them to those logboats whose hull shapes and dimensions were recorded in detail.

The models assess logboat, displacements, draughts, maximum load capacities, waterline area, stability and factors of resistance which contribute to boat speed. This has revealed the shortcomings of both sufficiently detailed records of logboat measurements and aspects of naval architecture, in particular in determining aspects of speed. The models could be applied to six logboats with varying degrees of success, which was dependent on the detail of their recorded measurements.

## 14.9 CONCLUSION

This thesis has shown that logboat builders had an extensive knowledge of both the materials they used and the naval architectural implications of the boats' hull shape and size. This gave rise to different forms of logboat, which were not based on chronological or geographical considerations. It has also defined areas in which further research and experimental work can reveal more about the logboats. Such work would determine not only greater details of logboat performance, but also the performance characteristics of individual logboats in their environments and the uses to which specific logboats were put, to a greater extent. This would contribute to logboats' recorded and probable uses.

There is no doubt that the versatility of the logboats, from their sizes, forms, functional features and variety of their environments, was directly responsible for their extensive period of use. The availability of trees (in particular oak) of suitable size also contributed to this. It was not until this raw material became scarce that the tradition of logboats finally ended.

## ABBREVIATIONS OF JOURNAL TITLES

|               |   |
|---------------|---|
| <i>A</i>      | Archaeologia  |
| <i>AA</i>     | Acta Archaeologia   |
| <i>AASRP</i>  | Associated Architectural Societies Reports and Papers                       |
| <i>AI</i>     | Archaeology Ireland   |
| <i>AJ</i>     | Antiquaries Journal   |
| <i>Arch J</i> | Archaeological Journal  |
| <i>BAR</i>    | British Archaeological Reports  |
| <i>C</i>      | Challenge   |
| <i>CA</i>     | Current Archaeology   |
| <i>CM</i>     | Cultura Maritima  |
| <i>GAJ</i>    | Glasgow Archaeological Journal  |
| <i>HA</i>     | Helvetica Archaeologica   |
| <i>IARF</i>   | Irish Archaeological Research Forum   |
| <i>IJNA</i>   | International Journal of Naval Archaeology and Underwater Exploration       |
| <i>ISR</i>    | Irish Studies Review  |
| <i>LHA</i>    | Lincolnshire History and Archaeology  |
| <i>JCHAS</i>  | Journal of Cork Historical and Archaeological Society                       |
| <i>JDA</i>    | Journal of Danish Archaeology   |
| <i>JGHAS</i>  | Journal of Galway Historical and Archaeological Society                     |
| <i>JIA</i>    | Journal of Irish Archaeology  |
| <i>JKAS</i>   | Journal of Kilkenny Archaeological Society                                  |
| <i>JKHAS</i>  | Journal of Kerry Historical and Archaeological Society                      |
| <i>JRAI</i>   | Journal of the Royal Anthropological Institute                              |
| <i>JRSAI</i>  | Journal of the Royal Society of Antiquaries of Ireland                      |
| <i>LA</i>     | London Archaeologist  |
| <i>MA</i>     | Medieval Archaeology  |
| <i>MM</i>     | Mariner's Mirror  |
| <i>OJA</i>    | Oxford Journal of Archaeology   |
| <i>PPS</i>    | Proceedings of the Prehistoric Society                                      |
| <i>PRIA</i>   | Proceedings of the Royal Irish Academy                                      |
| <i>PSA</i>    | Proceedings of the Society of Antiquaries                                   |
| <i>PSANHS</i> | Proceedings of the Somersetshire Archaeological and Natural History Society |
| <i>PSAS</i>   | Proceedings of the Society of Antiquaries of Scotland                       |
| <i>SN</i>     | Scottish Naturalist   |



*SVMÄ*

Sätryck ur Varbergs Museum Årsbok

*UJA*

Ulster Journal of Archaeology

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**A COMPARATIVE STUDY OF  
IRISH AND SCOTTISH LOGBOATS**

**VOLUME TWO**

**N. T. N. GREGORY, B.A.**

THESIS SUBMITTED FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

UNIVERSITY OF EDINBURGH

1997



**CONTENTS OF VOLUME TWO**

**APPENDIX 1: CATALOGUE OF IRISH LOGBOATS**

262



longitudinally along its axis. The surviving sides are cracked by the chines, the bow has two splits and the central portion of the stern has gone, leaving a V-shaped gap. The boat was made from a fine-grained and knot-free log. Sapwood survives in places along the chines.

In plan, the boat's main body is parallel-sided, and tapers into what was a rounded-point at the bow, while the stern was originally squared. The longitudinal section shows a flat bottom and floor with an angular rise at the bow, while the rise to the stern is steeper and is continued by a flat projecting surface which matches the boat's width. In cross section, the flat bottom rises to flared sides through rounded chines.

Boat Dimensions (in metres):

|                  | Max<br>(ext) | Max<br>(int) | Bow      | Stern    | Midship<br>(ext) | Midship<br>(int) | Ext<br>Sides | Int<br>Sides | Floor |
|------------------|--------------|--------------|----------|----------|------------------|------------------|--------------|--------------|-------|
| <b>Lengths</b>   | 5.56         | 3.71         | 0.65     | 1.20     |                  |                  |              |              |       |
| <b>Widths</b>    | 0.82         | 0.78         | 0.65 ext | 0.78 ext | 0.82             | 0.78             |              |              | 0.57  |
| <b>Thickness</b> |              |              | 0.06     | 0.07     |                  |                  | 0.05         | 0.02         | 0.06  |
| <b>Heights</b>   |              |              |          | 0.37     |                  |                  | 0.22 ext     | 0.16         |       |

12 circular holes in 4 groups of 3 have been drilled vertically through the boat. Two of the 3 holes in group 1 are located in the stern section on either side of the long axis while the 3rd is slightly forward on the starboard side of the long axis. Group 2's holes are located across the floor in a transverse arrangement, with one through either chine and the 3rd on the long axis. Both the 3rd and 4th groups follow the same pattern as group 2. Most of the holes which are plugged have differing diameters, which suggests that different sized drilling tools were used. Hole 3 in group 1, while circular externally, is oval-shaped where it meets the floor. This is the result of either erosion or wear through strain.

Holes:

| Group<br>Number | Hole<br>Number | M. from<br>Stern | Diameter<br>(cm) | Plugged | Star-C-<br>Port | Depth<br>(cm) |
|-----------------|----------------|------------------|------------------|---------|-----------------|---------------|
| 1               | 1              | 0.67             | 3                | Yes     | P               |               |
| 1               | 2              | 0.67             | 2                | Yes     | S               |               |
| 1               | 3              | 0.70             | 2*               | No      | C-S             | 7             |
| 2               | 4              | 1.18             | 2                | Yes     | P               |               |
| 2               | 5              | 1.18             | 2                | Yes     | C               |               |
| 2               | 6              | 1.18             | 3                | No      | S               | 7             |
| 3               | 7              | 3.00             | 2                | Yes     | P               |               |

|   |    |      |   |     |   |   |
|---|----|------|---|-----|---|---|
| 3 | 8  | 3.00 | 3 | Yes | C |   |
| 3 | 9  | 3.00 | 2 | Yes | S |   |
| 4 | 10 | 4.98 | 2 | Yes | P |   |
| 4 | 11 | 4.98 | 2 | No  | C | 6 |
| 4 | 12 | 4.98 | 2 | No  | S | 6 |

\*This hole is 2cm in diameter externally and broadens to 4cm x 3cm where it meets the surface.

Tool marks were evident in the floor but their signatures were too worn to give any indication of blade width.

The lake is roughly circular with an approximate diameter of 550 metres. Two sites were located in the lake, one described as a crannog while the other is described as possibly being one. Their descriptions are as follows:

|                   |                           |                           |
|-------------------|---------------------------|---------------------------|
| <b>SMR Number</b> | 027:023                   | 027:030                   |
| <b>Townland</b>   | Altdrumman                | Loughmacrory              |
| <b>Site</b>       | Crannog                   | 'Possible crannog'        |
| <b>Site Date</b>  | 'Uncertain date'          | Unknown                   |
| <b>Finds</b>      | 'Flints' and animal teeth | 2 flint flakes on crannog |

Fry, M. 1984 *Seaby Survey Files*, No. 56; Survey: 11th March, 1993



Figure 1: Aldrumman (after Bourke)

**Boat Number:** 1003 **NGR:** G 85 05  
**Boat Name:** Annagh **OD:** 45m (Water Level)  
**Townland:** Annagh, Drumanilra **Site:** Lough Key  
**County:** Roscommon

Found in August/September 1959 by Fr. H. Tonra, Lanesborough, on the northern shore of Lough Key, the 'dug-out canoe' was 'pulled up into shallow water: It was presumably left at this location, no other reference could be located.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| c.6.1  | 0.92  |

The report notes 'at least 5 pairs' of 'heel rests on the bottom of the boat', which are probably foot-rests for 5 rowers, as well as 'repairs at one end' and 'iron nails in it'.

Several sites in the vicinity of the northern shore (within 150 metres) are:

|                 |         |         |             |                     |             |
|-----------------|---------|---------|-------------|---------------------|-------------|
| <b>SMR Nos.</b> | 003-036 | 003-037 | 003-038     | 003-03901           | 003-03902   |
| <b>Townland</b> | Annagh  | Annagh  | Smutternagh | Smutternagh         | Smutternagh |
| <b>National</b> | 18366/  | 18373/  | 18390/      | 18395/              | 18395/      |
| <b>Grid Ref</b> | 30720   | 30706   | 30691       | 30646               | 30646       |
| <b>Site</b>     | Rath    | Cashel  | Rath        | Possible promontory | Enclosure   |

'Correspondence Files' *National Museum of Ireland*, 1A/155/59

**Boat Number:** I004 **NGR:** M 9 8  
**Boat Name:** Annamakiff **Site:** River Finn  
**Townland:** Annamakiff  
**County:** Monaghan

In 1937 'when working at the drainage of the River Finn, an ancient boat, hollowed from a tree was raised from the bed of the river' from a depth of 1.80m. The dredger had raised a 1.83m long portion of it while the remainder 'lay embedded in the river mud'. The raised portion no longer survives and the rest may still be *in situ*.

MacDowell, U. 1983 *Irish Logboats* No 193; 'Topographical Files'. *National Museum of Ireland*



**Boat Number:** I005 **O.S. 6'' :28**  
**Boat Name:** Ardakillin 1 **OD: 50m**  
**Townland:** Ardakillin **Site: Ardakillin Lake**  
**County:** Roscommon

A 'canoe hollowed out of a single oak' was found 'near a crannog in Ardakillin Lake' c.1851. Its present location is unknown and probably no longer survives.

Dimensions (in metres)

| Length | Bow Width |
|--------|-----------|
| 12.0   | 1.22      |

Several artefacts were found in it, which are not necessarily contemporary to the boat.

| Find  | Comments   |
|---|--|
| Human Skull                                   | Forehead perforated and 'no less than twenty sword cuts on it' |
| Bronze Pin                                    |  |
| Bronze Spear                                  |  |
| Neck piece of iron and 20 feet of rude chain' |  |

5 crannogs within 450m of each other are located in the lake, except for the 4th and 5th crannogs.

Now measuring 600 x 900m., the lake was originally longer, incorporating all the crannogs. It was not noted which crannog was referred to in the boats' location.

The details of the sites:

| SMR No.         | 028-103                 | 028-104               | 028-105         | 028-106         | 028-107         |
|-----------------|-------------------------|-----------------------|-----------------|-----------------|-----------------|
| <b>Townland</b> | Cloonmurray             | Cloonrane             | Cloonmurray     | Killurin        | Killurin        |
| <b>NGR</b>      | 18770/278111<br>, 27841 | 18821/27892<br>27894? | 18773/<br>27814 | 18806/<br>27817 | 18819/<br>27811 |
| <b>Site</b>     | Crannog                 | Crannog               | Crannog         | Crannog         | Crannog         |

MacDowell U. 1983 *Irish Logboats* No. 206 Munro, R. 1890, *The Lake Dwellings of Europe*, 368;

Troyan, MF. 1859 'Details of discoveries made at the ancient lake habitations of Switzerland and Ireland' *UJA* 7, 194; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 48, 237

**Boat Number:** 1006   **O.S.** 6":28  
**Boat Name:** Ardakillin 2                                   **OD:** 50m  
**Townland:** Ardakillin                                   **Site:** Ardakillin Lake  
**County:** Roscommon

A 'dug-out canoe' was found 'on the bottom' of Ardakillin lake before 1886. It was used for firewood. The only noted measurement is that of its length, which was 5.5m.

The lake, which is 600 by 400m in size, was originally larger and contains 5 crannogs, none of which have any obvious associations with the boat (see I005).

MacDowell, U. 1983 *Irish Logboats*, No. 207; Wood-Martin, WG 1886 *The Lake Dwellings of Ireland*, 237

**Boat Number:** I007   **OS 6":** 34, 35  
**Boat Name:** Ardbrin                                       **OD:** 60m  
**Townland:** Ardbrin                                       **Site:** Lake  
**County:** Down

A 'canoe scooped out of a single tree' was found in a bog in 1809. The bog was previously a lake up to the mid-18th century. With the canoe '4 short paddles were dug up from the peat'. It is uncertain what their association with the boat is.

MacDowell, U. 1983 *Irish Logboats*, No.90; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 126

**Boat Number:** I008   **NGR:** G 762 322  
**Boat Name:** Ardsallagh                                   **OD:** 75m  
**Townland:** Ardsallagh, Tinacarra                   **Site:** Boyle River  
**County:** Roscommon

In June 1968, Mr. Reid (F.S.A. Scotland) found 'what appeared ... to be the remains of a dug-out canoe, possibly associated with a crannog,...partly embedded in a river bank' 4km west of Boyle town. It projected 'at right angles to the bank for a distance of c 3.5m into the river with 15cm of the gunwales above the water'. It was photographed by him. The boat is probably still *in situ*.

Dimensions (in metres)

| Max Width | Min Width | Side Thickness |
|-----------|-----------|----------------|
| 0.76      | 0.46      | 0.04           |



**Boat Number:** I013 **NGR:** H 901 660  
**Boat Name:** Aughamullan **OD:** 10m (Water Level)  
**Townland:** Aughamullan **Site:** Lough Neagh  
**County:** Tyrone **Form:** Canoe

The dugout boat was found in 1984, below low water level in Washing Bay, Lough Neagh. It was examined, then left *in situ* and examined again in August 1985 by Fry and Bourke. A sample was obtained for radiocarbon analysis, giving it a date of 1360±100 (UB 2734).

Its ends are rounded, and two 'rowlock like features, on opposite sides are located c. 85cm from one end', probably the stern.

Dimensions (in metres)

| Length | Max. Width |
|--------|------------|
| 3.50   | 1.00       |

The boat is located between two sites which are 1.2 km apart. There is no evidence to associate the boat with either site.

Sites:

|                   |             |                  |
|-------------------|-------------|------------------|
| <b>SMR Number</b> | 047-001     | 047-018          |
| <b>Townland</b>   | Aughamullan | Derryloughan     |
| <b>Site</b>       | Enclosure   | Possible Crannog |

Fry, M. *Seaby Survey Files*, No.48

**Boat Number:** I014 **NGR:** H 644 287  
**Boat Name:** Ballagh **OD:** 140m  
**Townland:** Ballagh **Site:** Ballagh Lough  
**County:** Monaghan

'An artefact, described as a logboat, was found in 1975 on the shore of Ballagh Crannog, Ballagh Lough'. 'It had previously been discovered in 1945 due to a lowering of water level in the lake. Half of it was used as firewood with the remainder thrown back into the lake close to where it was found in 1975'. It was examined by Monaghan County Museum staff. A sample was obtained for dendrochronological analysis, but could not be dated. The boat's remains no longer survive. It was drawn and photographed when examined.

The oak 'artefact...was interpreted as a logboat'. It was 'roughly' parallel-sided, with both ends missing and a small portion of a side surviving for 1.20m. In cross-section it was 'rounded on the bottom, and flat on top'. It was flat-bottomed in longitudinal section.

Dimensions (in metres)

| Length | Max. width | Bottom thickness |
|--------|------------|------------------|
| 3.30   | 0.64       | 0.04             |

Five rectangular holes were located along the long axis at intervals of 56cm. They measured 6 to 7cm by 3 to 4cm. 'They were interpreted as thickness gauges'. It is unusual for thickness-gauges to be rectangular shaped. No other plausible purpose can be suggested.

Despite being found on the crannog's shore the boat is not necessarily contemporary with it.

Details of the crannog:

|            |         |
|------------|---------|
| SMR Number | 013-078 |
| Townland   | Ballagh |
| Site       | Crannog |

MacDowell, U. 1983 *Irish Logboats*, No. 195

**Boat Number:** I015 **OS 6":** 74

**Boat Name:** Ballaghadereen **O D:** 80m

**Townland:** Ballaghadereen

**County:** Roscommon

A 'dug-out canoe and a sword' were found 'on a crannog somewhere near Ballaghadereen' in 1975. Nothing else was noted. It is not clear what the associations between the sword, boat and crannog are.

'Correspondence Files' *National Museum of Ireland*, 1A/152/75

**Boat Number:** I016 **OS 6":** 14

**Boat Name:** Ballinclemsg **OD:** 5m

**Townland:** Ballinclemsg **Site:** Bog

**County:** Kerry

A dug-out boat was found in 1936 at a depth of 1.2m in a bog. It was incorporated into 'an ancient road'. Its present location is not known and presumably no longer survives. It was made from 'oak'. It was photographed by O'Connell.

It was 'roughly' parallel-sided in plan with 'rectangular ends'. The cross-section was 'triangular at the ends and rectangular amidships. A 'bulge' was left proud of one side near one end. It was pierced with a hole, which was interpreted as a thole-pin hole. A square-sectioned treenail which was pierced by a hole, projected from one end. It was interpreted as a means of securing a paddle, presumably for steering or sculling. A second hole measuring 5.1 cm in diameter and located in the floor was interpreted by O'Connell as a mooring pole. However, MacDowell suggests from the photographic evidence that it is more likely to have been the result of damage.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.94   | 0.91  |

The boat pre-dated the 'ancient road'. Upon redundancy, it would have been used in the road construction. This is consistent with the hole in the floor, which is probably the result of damage. Its find location does not imply it was used there, but was probably taken from somewhere in the vicinity.

MacDowell, U. 1983, *Irish Logboats*, No 140; McGrail, S. 1978, *The Logboat of England and Wales*, 69; O'Connell, D B. 1941, 'An Irish dug-out' *MM* 27, 81-2.

**Boat Number:** I017

**NGR:** N200 402

**Boat Name:** Ballinderry 1

**OD:** 80m

**Townland:** Ballinderry

**Site:** Ballinderry Bog

**County:** Westmeath

**Form:** Punt

The remains of a dugout boat was recovered during the excavation of Ballinderry Crannog 1. It was located upside down in the fill of a peat and brushwood layer above house 1, and associated with House 2 which dates from the 11th century AD. The boat's remains consist of the bottom and part of one end, where a small portion of one side survives. It is in very poor condition. This end is split along its long axis for c.90cm. It no longer survives. It is flat bottomed in longitudinal section with an angular rise to the one surviving end. In cross-section it is flat-bottomed, with rounded chines giving way to flared sides. It appears to have been parallel-sided in plan with a roughly squared end. It is probable that both ends were of similar form.

Surviving Dimensions (in metres)

| Length | Width | Min Thickness | Max Thickness |
|--------|-------|---------------|---------------|
| 5.00   | 0.66  | 0.03          | 0.07          |

The lake had been drained at the time of excavation and had become boggy land. A quay had been tentatively identified at the edge of the crannog.

Site:

|                          |                            |
|--------------------------|----------------------------|
| <b>SMR No</b>            | 030-118                    |
| <b>Townland</b>          | Ballinderry                |
| <b>NGR</b>               | N 2000 4022                |
| <b>Stratigraphy Date</b> | AD. 11th century or later  |
| <b>Comments</b>          | Level dated by small finds |
| <b>Boat Association</b>  | Associated with House 2    |
| <b>Site</b>              | Crannog                    |

The boat was used prior to the construction of House 2 and is contemporary or later than House 1. It is drawn in Hencken 1936, 149 fig 18. It was identified as oak.

Hencken, H. 1936 'Ballinderry Crannog No.1' *PRIA* 43, 122,149, Fig.18, PlsXV, and XXIII Fig 2; MacDowell, U. 1983 *Irish Logboats*, No 258; O'Riordan, S. P. 1965 *Antiquities of the Irish Countryside*, 21.

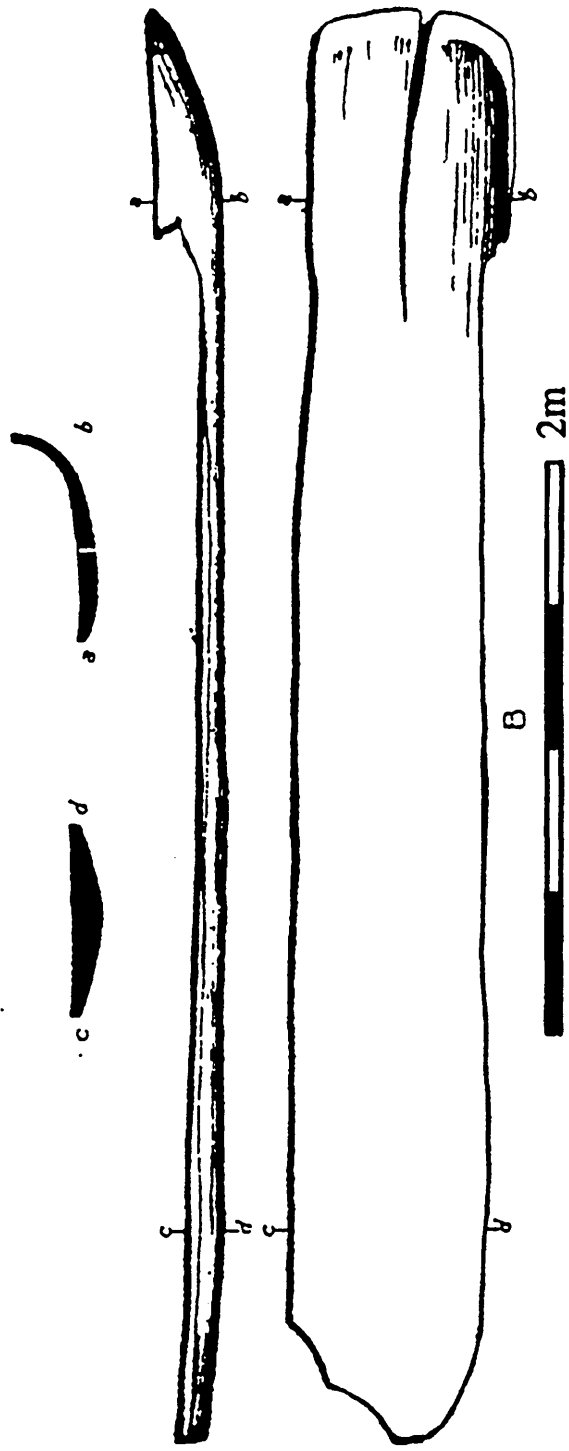


Figure 2: Ballinderry 1 (after Hencken)



**Boat Number:** I018 **NGR:** N 200 402  
**Boat Name:** Ballinderry 2 **OD:** 80m  
**Townland:** Ballinderry **Site:** Ballinderry Bog  
**County:** Westmeath

During the excavation of Ballinderry Crannog 1 in 1932, the remains of a dugout boat was recovered from 'near the top of the fill of peat' above House 1 in Section 4. It no longer survives.

There is no description or drawing in the excavation report.

Dimensions (in metres)

| Length | Width |
|--------|-------|
| 3.06   | 0.91  |

The boat is contemporary with or later than House 1 in use. The lake itself had been drained at the time of excavation and had turned to boggy land. A quay had been tentatively identified at the edge of the crannog.

Site:

|                    |   |
|--------------------|---|
| <b>SMR No</b>      | 030-118   |
| <b>Townland</b>    | Ballinderry                                     |
| <b>NGR</b>         | N 2000 4022                                     |
| <b>Date</b>        | AD. 11th Century or later                       |
| <b>Comments</b>    | Level dated by small finds                      |
| <b>Boat Assoc.</b> | Associated with fill above House 1 in Section 4 |
| <b>Site</b>        | Crannog   |

Hencken, H. 1936 'Ballinderry Crannog No.1' *PRIA* 43, 149; MacDowell, U. 1983 *Irish Logboats*, No 259

**Boat Number:** I019 **NGR:** N 200 402  
**Boat Name:** Ballinderry 3 **OD:** 80m  
**Townland:** Ballinderry **Site:** Ballinderry Bog  
**County:** Westmeath

Part of a dugout boat was recovered in 1932 during the excavation of Ballinderry Crannog 1. It consisted of part of the starboard side and a portion of one end and the floor. Drawn in Hencken 1936, it was registered and stored in the National Museum of Ireland (1932: 7324) but no longer survives.

Surviving Dimensions (in Metres):

| Length | Side Thickness |
|--------|----------------|
| 3.25   | 0.025          |

In the drawing two blocks of projecting wood marked *aa* are interpreted as the remains of thole pin hole blocks, while a third projection c.20cm from the gunwale and c.1.50m from the remaining end is a thwart rest. A second thwart rest, shown in the drawing as a horizontal groove cut into the side of the boat is situated c.0.80 m from the end and c.15cm from the gunwale.

Their details as follows (measured in metres):

| Feature        | Distance from end | Distance from gunwale |
|----------------|-------------------|-----------------------|
| Thwart Rest    | 1.50              | 0.20                  |
| Thwart Rest    | 0.80              | 0.15                  |
| Tholepin Hole  | 2.40              | 0.0                   |
| *Tholepin Hole | 1.20              | 0.1                   |

\*This may not be a tholepin hole. As shown in the drawing, it is situated approximately 10cm below where the gunwale originally was. This suggests that it marks the location of another seat as it is at the correct level from the floor to be a thwart rest and far too low to be a tholepin-hole mount.

It was found in Section 2, 'between the plank palisade and the pile palisade and about on a level with House 3'. This level was tentatively dated to AD 13th century. The lake had been drained at the time of excavation and had turned to boggy land. A quay had been tentatively identified at the edge of the crannog.

Site:

|             |   |
|-------------|---|
| SMR No      | 030-118                                 |
| Townland    | Ballinderry                             |
| NGR         | N2000 4022                              |
| Site        | AD 13th Century (tentative)             |
| Date        | Level dated by small finds              |
| Comments    | Tentative association of level and boat |
| Boat Assoc. | Tentative 13th century AD or later      |

Hencken, H. 1936 'Ballinderry Crannog No.1' *PRIA* 43, 125-30, Fig22; MacDowell, U. 1983 *Irish Logboats*, No. 260

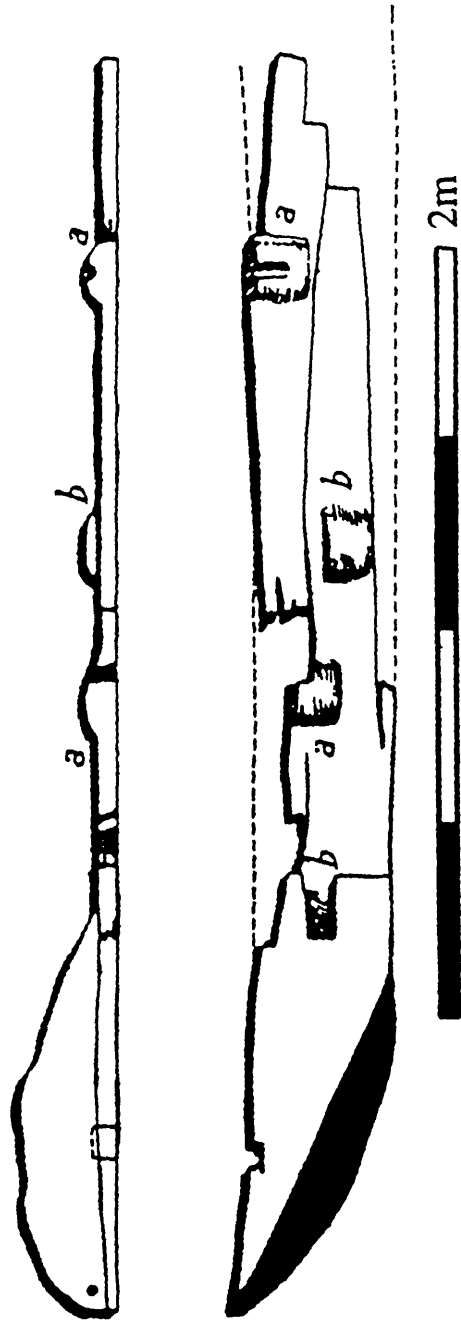


Figure 3: Ballinderry 3 (after Hencken)



A rib in the solid was also noted in the boat, as were four grooves three of them in the floor with treenails and transverse ribs. The fourth located in the stern with fragments of wood was 'interpreted as a sternboard' groove and board. The three grooves probably served to prevent further deterioration of the split. Their locations are:

| Feature                          | Distance from Stern | Dimensions  | Purpose                                |
|----------------------------------|---------------------|-------------|--|
| Groove & wood fragments          | 0.24                | 0.76 x 0.07 | Sternboard                             |
| Rib (in solid)                   | 2.38                | 0.35 x 0.12 | Strengthening or space division spacer |
| Groove & fitted rib              | 4.50                | Not noted   | Repair                                 |
| Groove, 3 treenails & fitted rib | 6.90                | Not noted   | Repair                                 |
| Groove, 3 treenails & fitted rib | 7.53                | Not noted   | Repair                                 |

MacDowell, U. 1983 *Irish Logboats*, No 261

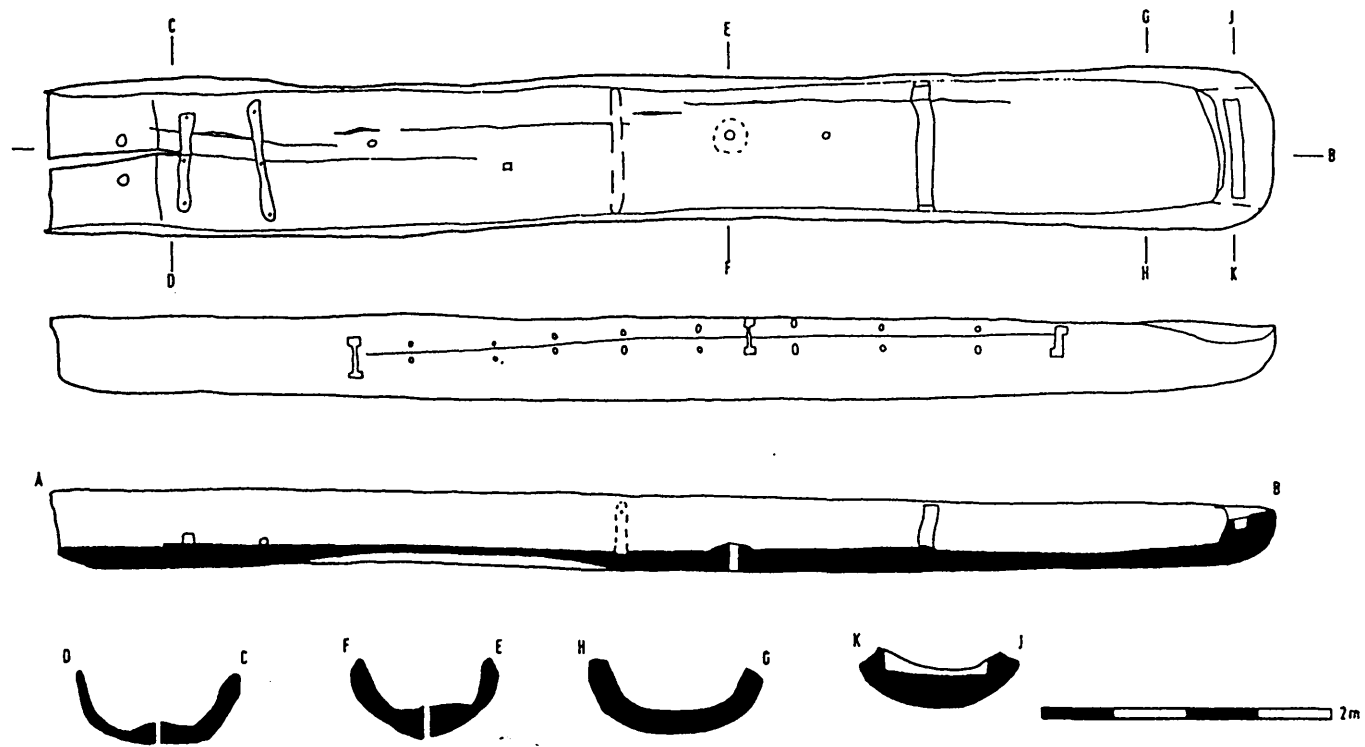


Figure 4: Ballinphort (after Westmeath Archaeological Society)

**Boat Number:** I023

**OS 6":** 21,29,89,99.

**Boat Name:** Ballintober

**OD:** 20m

**Townland:** Ballintober

**County:** Mayo

A 'dug-out canoe' was found by Mr McNally, Ballintober, c.1940, while digging a drain on his land. The boat was located diagonally under a wall. It was in poor condition and reburied *in situ*. It was 'hollowed from a huge black oak tree'. He described what he believed to be a mast hole as 'an elevation in the bottom near the centre must be for a mast'. It is 5 cm high. It may be a large knothole, but is more likely to be a mast hole. The exposed part of the boat measured 1.98m in length.

MacDowell, U. 1983 *Irish Logboats*, No. 179; 'Topographical Files' *National Museum of Ireland*

**Boat Number:** I024

**NGR:** N508 342

**Boat Name:** Ballybeg

**OD:** 75m

**Townland:** Ballybeg

**Site:** Lough-na-Shade

**County:** Offaly

**Form:** Canoe

A 'dug-out coracle of oak' was found at Lough-na-Shade, 'a grown-over lakelet,...in Derrygreenagh Bog. It was discovered, in January 1955, in a newly opened Bord na Mona drain, 80cm below the surface of the bog. It was examined by National Museum of Ireland staff, conserved and displayed at Bord na Mona Experimental Station, Newbridge. It was then examined and drawn by MacDowell in 1983. Since then the boat was removed to Peatworld where it is currently on display and was examined by the writer.

On recovery, one end was damaged by a 'mechanical cutter'. It has warped slightly since it was found. The sides do not survive to their full height. The damaged end is slightly wider than the other, and this could be the stern. The second end has a V-shaped section missing, probably as a result of radial splitting. The whole log was used in the boat's construction.

There is no indication of tool works, which could be due to the flaky nature of the boats' surface. There are two knots on the left side of the narrow end, indication that the narrow end was the root-end of the tree. No holes were noted in it.

In plan it is parallel-sided with rounded bow and stern. Its cross-section is flat-bottomed curving up to vertical sides; its longitudinal section is flat-bottomed rounding at the bow and stern. The wide end which has warped outwards is now wider than originally. The dimensions measured in metres are as follows:

|                  | Overall | Main body            | Narrow end           | Wide end             | Max sides | Min sides | Max floor | Min floor |
|------------------|---------|----------------------|----------------------|----------------------|-----------|-----------|-----------|-----------|
| <b>Length</b>    | 2.18    | 1.60                 | 0.29                 | 0.29                 |           |           |           |           |
| <b>Width</b>     |         | ext 0.49<br>int 0.45 | ext 0.42<br>int 0.38 | ext 0.51<br>int 0.42 |           |           |           |           |
| <b>Height</b>    |         |                      | ext 0.33<br>int 0.27 |                      | ext 0.25  | int 0.17  |           |           |
| <b>Thickness</b> |         |                      | 12                   | 12                   | 4         | 2         | 10        | 8         |

The boat was located close to the shore of the former lake which was approximately 400 by 200 metres.

Irish Press 13/1/55; MacDowell, U. 1983 *Irish Logboats*, No 202; 'Topographical Files' *National Museum of Ireland*



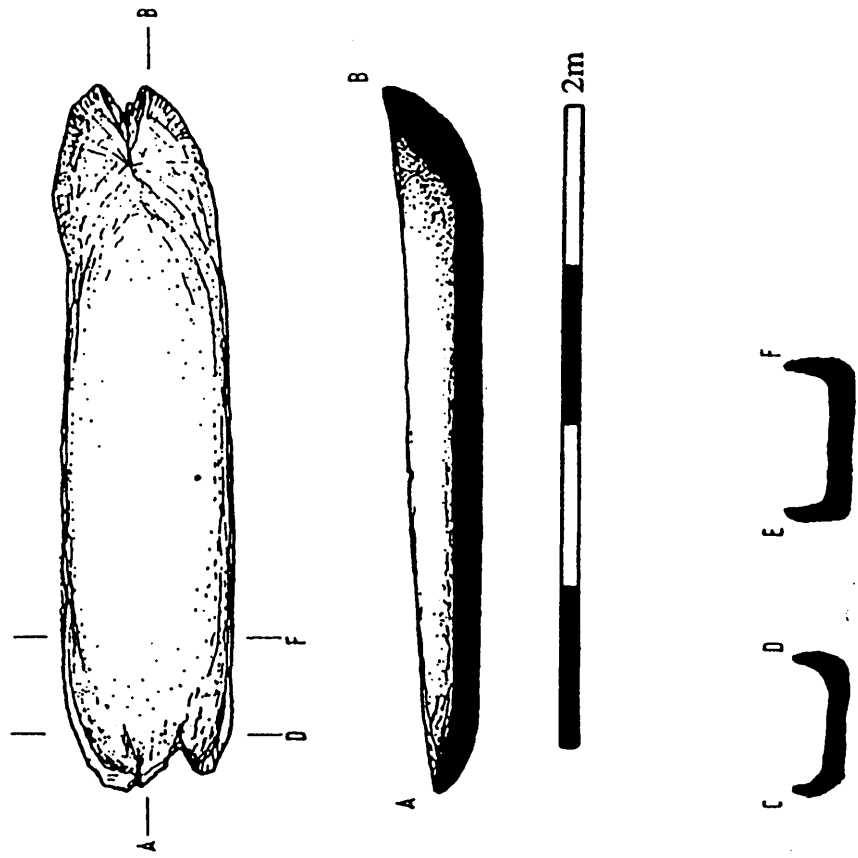


Figure 5: Ballybeg (after MacDowell)

**Boat Number:** I025

**NGR:** 118 272

**Boat Name:** Ballycally

**OD:** 20m (Water Level)

**Townland:** Ballycally

**Site:** Lough Carra

**County:** Mayo

A 'dugout' boat was found on the southern tip of Castle Island, Lough Carra in 1978 and reported to the National Museum of Ireland in 1981. It was in poor condition, with only the bottom surviving. It was presumably left *in situ*.

The remains taper from one end to the other in plan. Its cross-section is rounded on the bottom and flat on its inner surface, while in longitudinal section it is flat-bottomed.

Dimensions (in metres)

| Length | Width |
|--------|-------|
| 4.87   | 0.76  |

A 'possible castle' is located on the island.

|                  |  |
|------------------|--|
| <b>SMR No</b>    | 110-004                                    |
| <b>Townland</b>  | Castle Island                              |
| <b>NGR</b>       | 11874 27236                                |
| <b>Site</b>      | 'Possible' Castle                          |
| <b>Site Date</b> | 13th century AD                            |
| <b>Comments</b>  | Allegedly built by Felin O'Connor in 1235' |

'Correspondence Files' *National Museum of Ireland*, 1A/79/81

**Boat Number:** I026

**O.S. 6":** 14

**Boat Name:** Ballydoogan

**OD:** 20m

**Townland:** Ballydoogan

**County:** Sligo

A 'portable single-piece canoe (oak)' was found before 1886. No other information is given and the boat probably no longer survives. No lake or river could be located in the townland. There may previously have been a lake which was drained.

MacDowell, U. 1983 *Irish Logboats*, No 233; Wood-Martin, W G. 1886 *The Lake Dwellings of Ireland*, 50

**Boat Number:** I027 **NGR:** H 2849 4817  
**Boat Name:** Ballydoolough 1 **OD:** 140m  
**Townland:** Ballydoolough **Site:** Ballydoolough Lake  
**County:** Fermanagh

A 'single-piece canoe' was found in 1832 in 'Ballydoola' (Baldoolough) lake. It disintegrated after it was recovered. Both ends were 'pointed'. It measured 4.27m in length.

The lake which now measures approximately 700m by 400m contains a crannog.

Site:

|                  |                               |
|------------------|-------------------------------|
| <b>SMR No</b>    | 193-040                       |
| <b>Townland</b>  | Ballydoolough                 |
| <b>Site</b>      | Crannog                       |
| <b>NGR</b>       | H2849 4817                    |
| <b>Site Date</b> | 580±55BP                      |
| <b>Comments</b>  | Dating sample from 'oak pile' |

MacDowell, U. 1983 *Irish Logboats*, No 95; Wood-martin, WG 1886 *The Lake Dwellings of Ireland*, 181-3; Wood-martin, WG 1895 *Pagan Ireland*, 659

**Boat Number:** I028 **NGR:** H 2849 4817  
**Boat Name:** Ballydoolough 2 **OD:** 140m  
**Townland:** Ballydoolough **Site:** Ballydoolough Lake  
**County:** Fermanagh

In 1832 a 'single-piece canoe' was found on an island in 'Ballydoola' (Ballydoolough) lake. It was used as a hay trough and probably no longer survives. Made of oak, it measured 'over' 2.10m in length.

The lake which now measures approximately 700m by 400m contains a crannog.

Site:

|                  |                               |
|------------------|-------------------------------|
| <b>SMR No</b>    | 193-040                       |
| <b>Townland</b>  | Ballydoolough                 |
| <b>NGR</b>       | H2849 4817                    |
| <b>Site</b>      | Crannog                       |
| <b>Site Date</b> | 580±55BP                      |
| <b>Comments</b>  | Dating sample from 'oak pile' |

MacDowell, U. 1983 *Irish Logboats*, No 95; Woodmartin, W G. 1886 *The Lake Dwellings of Ireland*, 181-3; Woodmartin, WG. 1895 *Pagan Ireland*.659

**Boat Number:** I029-31 **NGR:** H 2849 4817  
**Boat Name:** Ballydoolough 3-5 **OD:** 140m  
**Townland:** Ballydoolough **Site:** Ballydoolough Lake  
**County:** Fermanagh

'Mr Coulter...discovered no fewer than three single-piece canoes...beneath the waters of...[Ballydoolough]...lake'. One them was used as a 'cattle trough' and later cut up for firewood. The other two 'were utilised in the roofs of out-offices' and probably no longer exist. One of them measured 6.1m in length.

The lake which now measures approximately 700m by 400m contains a crannog.

Site:

|                  |                                  |
|------------------|----------------------------------|
| <b>SMR No</b>    | 193-040                          |
| <b>Townland</b>  | Ballydoolough                    |
| <b>NGR</b>       | H2849 4817                       |
| <b>Site</b>      | Crannog                          |
| <b>Site Date</b> | 580+/-BP                         |
| <b>Comments</b>  | Dating sample from an 'oak pile' |

Wakeman, W F. 1870 'Remarks on the Crannog at Ballydoolough, County Fermanagh' *JRSAI* 1, 360-71; Wakeman WF. 1873 'Observations on the Principal Crannogs of Fermanagh' *JRSAI* 2, 317; Wood-martin W.G. 1886 *The Lake Dwellings of Ireland*, 50,183

**Boat Number:** I032 **O.S. 6":** 93  
**Boat Name:** Ballyhaunis 1 (Several)  
**Townland:** Ballyhaunis  
**County:** Mayo

'Bog-oak canoes' were found in a lake six miles from Ballyhaunis near the 'ruins of Unlare Abbey'. They were found before 1898. There is no further record of them and presumably they no longer exist.

Cochrane, R. 1898 'Ogam Inscriptions in Ireland' *JRSAI* 28, 405; MacDowell U. 1983 *Irish Logboats*, No 180

**Boat Number:** I033 **O.S. 6'':** 93  
**Boat Name:** Ballyhaunis 2 **OD:** 90m  
**Townland:** Ballyhaunis  
**County:** Mayo

A 'dug-out canoe, in good preservation', was found 2 or 3 miles north west of Ballyhaunis...in 1906, by 3 men who saw it 60 years previously. It was used by 'the young people in the neighbourhood' until the bow broke away. The boat was given to the Royal Irish Academy and registered 1910;5, (now the National Museum). It no longer survives.

When recovered the boat had a sternboard which was lost as the timber dried out. It had also been repaired by a patch 'fixed with iron nails'.

Dimensions (in metres):

| Length | Width | Sides height |
|--------|-------|--------------|
| 6.68   | 0.51  | 0.03         |

MacDowell, U. 1983 *Irish Logboats*, No 181; 'Register' 1886-1928, *National Museum of Ireland*, 364

**Boat Number:** I034 **NGR:** M44 79  
**Boat Name:** Ballyhaunis 3 **OD:** 90m  
**Townland:** Ballyhaunis **Site:** Began Lake  
**County:** Mayo

'An ancient canoe' was found in Began Lake in 1934. An unsuccessful attempt was made to raise it. It was left *in situ*.

Dimensions (in Metres):

| Length | Width |
|--------|-------|
| 7.47   | 0.91  |

*Irish Independent* 13/7/34; *Irish Press* 14/7/34; MacDowell, U. 1983 *Irish Logboats*, No 182; Topographical Files, *National Museum of Ireland*

**Boat Number:** I035 **NGR:** J444 410  
**Boat Name:** Ballykilbeg **OD:** 15m  
**Townland:** Ballykilbeg **Site:** Lough Faughan  
**County:** Down

A 'dug out of oak' was found near a crannog in Lough Faughan in 1845 during lake drainage. It probably no longer survives.

Site:

|                         |            |
|-------------------------|------------|
| <b>SMR No</b>           | 037-050    |
| <b>Townland</b>         | Ballyrolly |
| <b>Site</b>             | Crannog    |
| <b>Site Date</b>        | Not Known  |
| <b>Boat Association</b> | Not Known  |

MacDowell, U. 1983 *Irish Logboats*, No.87; Munro, R. 1888 *The Lake Dwellings of Europe*, 363, 392; Wilde, WR. 1863 *A Descriptive Catalogue of the Antiquities in the Museum of the Royal Irish Academy*, 224; Wood-Martin, WG 1886 *The Lake Dwellings of Ireland*, 50, 178

**Boat Number:** I036-7

**O.S. 6": 1**

**Boat Name:** Ballynahinch 1-2

**OD:** 50m

**Townland:** Ballynahinch

**County:** Offaly

In about 1844 'two canoes, were disinterred' from Ballinderry crannog. By 1859 the 'best of the two' had been split. Presumably the other one no longer survives.

Site

|                         |                                   |
|-------------------------|-----------------------------------|
| <b>SMR No</b>           | None                              |
| <b>Townland</b>         | Ballynahinch                      |
| <b>Site</b>             | Crannog                           |
| <b>Site Date</b>        | Late Bronze Age to 9th century AD |
| <b>Comments</b>         | Dated through finds               |
| <b>Boat Association</b> | Found interred in crannog         |

Graces, Rev. J. 1858 'What we learn from Wilde's Catalogue of Antiquities in the Museum of the Royal Irish Academy' *JRSAI* 2, 130; Hencken, H. 1942 'Ballinderry Crannog No. 1' *PRIA* 47, 5; MacDowell, U. 1983 *Irish Logboats*, No. 199-200; Wilde, WR. 1859 'Account of Three Crannoges' *PRIA* 7, 148; Wilde, WR. 1863 *A Descriptive Catalogue of the Antiquities in the Museum of the Royal Irish Academy*, 223-4; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 206

**Boat Number:** I038

**NGR:** N 214 391

**Boat Name:** Ballynahinch 3

**OD:** 45m

**Townland:** Ballynahinch

**Form:** Canoe

**County:** Offaly

A dug-out boat was found on natural lake deposits that covered a Late Bronze Age level on Ballinderry Crannog No 2. It was uncovered by Hencken through excavation. It was photographed and drawn by Hencken 1942. It no longer survives.

Part of the boat is missing. A large knothole noted by Hencken was located at the water-line near the stern by which 'the boat had been rendered useless'. In plan the boat tapers from the bow, which appears to have been rounded, to a sub-rectangular stern.

In longitudinal section it appears to have been flat-bottomed with a rounded bow and vertical stern. Its cross-section was a rounded bottom rising to vertical sides.

Dimensions (in metres):

| Length | Bow Width | Stern Width |
|--------|-----------|-------------|
| 7.50   | 1.05      | 0.80        |

Three pairs of vertical slots were located in the boat's sides through which a horizontal hole was drilled. Hencken suggested their function was as a means of attaching oars; according to MacDowell there were 'grooves for thwarts'. A more plausible explanation is as an elaborate means of securing thole pins.

Site:

|                         |   |
|-------------------------|---|
| <b>SMR No</b>           | None  |
| <b>Townland</b>         | Ballynahinch                                |
| <b>Site</b>             | Crannog                                     |
| <b>Finds</b>            | 'Brooches with geomorphic terminals'        |
| <b>Date</b>             | 7th to 9th century AD                       |
| <b>Boat Association</b> | Associated with the same level as the finds |

Hencken, H. 1942 'Ballinderry Crannog No. 2' *PRIA* 47, 60, 64, Fig 29, Pls. 9, 11, Fig 1;  
MacDowell, U. 1983 *Irish Logboats*, No 201

**Boat Number:** I039

**NGR:** H 92 95

**Boat Name:** Ballyscullion

**OD:** 10m (Water Level)

**Townland:** Ballyscullion West

**Site:** Lough Beg

**County:** Derry

**Form:** Canoe

A 'small canoe' was found in Lough Beg in Autumn 1945. It was examined and drawn at Bellaghy RUC Barracks by Mogeey. It no longer survives.

The boat 'was complete, except for a small portion broken off the bow'. The sides did not survive to their full height; the stern did not survive.

In plan, the sides are curved from their widest point amidships to the bow and stern. The stern appears to have originally been rounded and the bow is a rounded point, but terminates with a rectangular projecting block measuring 12.70 cm in width and 7.6 cm in height. In longitudinal section, it is flat-bottomed with a shallow rise to the bow. Its cross-section is rounded and terminates in vertical sides.

Dimensions (in metres):

| Length | Max Width | Bow Width | Max. Side Height (int) |
|--------|-----------|-----------|------------------------|
| 3.75   | 0.51      | 0.18      | 0.15                   |

Two pairs of L-shaped footrests were located in the stern-half of the boat and also 3 holes of which one was plugged.

Details:

| Feature      | Metres from Bow | Dimensions  | Purpose         |
|--------------|-----------------|-------------|-----------------|
| Footrest     | 2.43            | 0.13 x 0.03 | Foot support    |
| Footrest     | 2.43            | 0.13 x 0.03 | Foot support    |
| Footrest     | 3.45            | 0.09 x 0.03 | Foot support    |
| Footrest     | 3.45            | 0.09 x 0.03 | Foot support    |
| Hole         | 0.61            | 0.03 x 0.03 | Thickness Gauge |
| Hole         | 2.06            | 0.03 x 0.03 | Thickness Gauge |
| Plugged Hole | 3.40            | 0.03 x 0.03 | Thickness Gauge |

The footrests taper into the curve of the floor at the sides and each pair is 12.7 cm apart.

Lough Beg is a small lake situated on the Lower River Bann, north of Lough Neagh.

MacDowell, U. 1983 *Irish Logboats*, No 75; Mogeey, JM. 1946, 'Wooden Canoes' *UJA*, 9, 71-3;

Seaby, WAS. *Seaby Survey Files*, No 39.



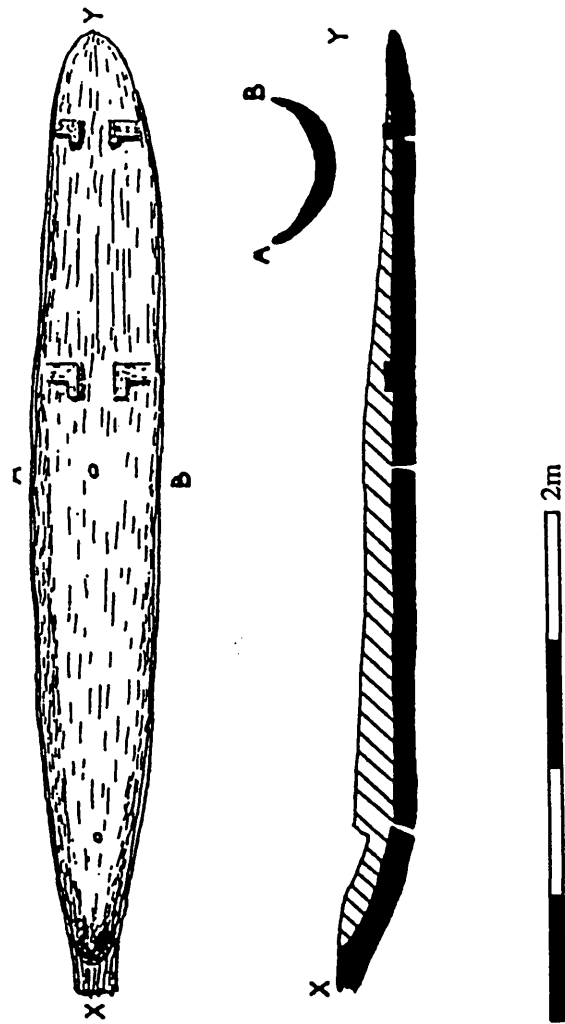


Figure 6: Ballyscullion (after Moge)

**Boat Number:** I040 **NGR:** H 959 660  
**Boat Name:** Bannmouth **OD:** 10m  
**Townland:** Bannmouth **Site:** Lough Neagh  
**County:** Armagh **Form:** Canoe

This dugout boat was caught and raised in the McGuckin family's fishing nets in Lough Neagh in June 1989. The find spot is situated 'at a point two to three miles north of the Bann mouth'. Made of oak, it was radiocarbon dated to 1245±30 BP (Gr N-17241). It was moved to the Department of the Environment depot at Moira, where it was examined and conserved. It was examined by the writer. It was drawn by Cormac Burke, Ulster Museum.

The boat is in poor condition with the remains consisting of the bottom which is incomplete at the stern end. The boat was probably between 1 and 2 m longer at the stern. This was determined by the presence of a pair of footrests located at the remains of the stern. Made from a log with a very straight grain its surface is now very flaky. In plan the boat appears to have been parallel-sided which tapered to a pointed bow. This was determined by a slight outline of the side along the boat's starboard edge. Its longitudinal section is flat-bottomed rising in a slight curve to the remains of the bow. In cross-section it is flat-bottomed which curved up to what were probably vertical sides.

Dimensions (in metres)

| Overall Length | Bow Length | Max Width | Max Side Height | Floor | Floor T |
|----------------|------------|-----------|-----------------|-------|---------|
| 3.67           | 0.82       | 0.46      | 0.2             | 0.04  | 0.02    |

2 pairs of opposing footrests, which are L-shaped, are located by the up-turn of the floor. The bow-most pair, which are in the better condition, terminate 15cm towards the long axis, from which they turn towards the bow for a distance of 12 cm. They are 5cm wide and 2cm high. The others are little more than stumps. Their locations are 1.03m and 5cm from the stern end. Fry. M. 1989, *Seaby Survey Files*, No.80; Survey: 8th March 1993

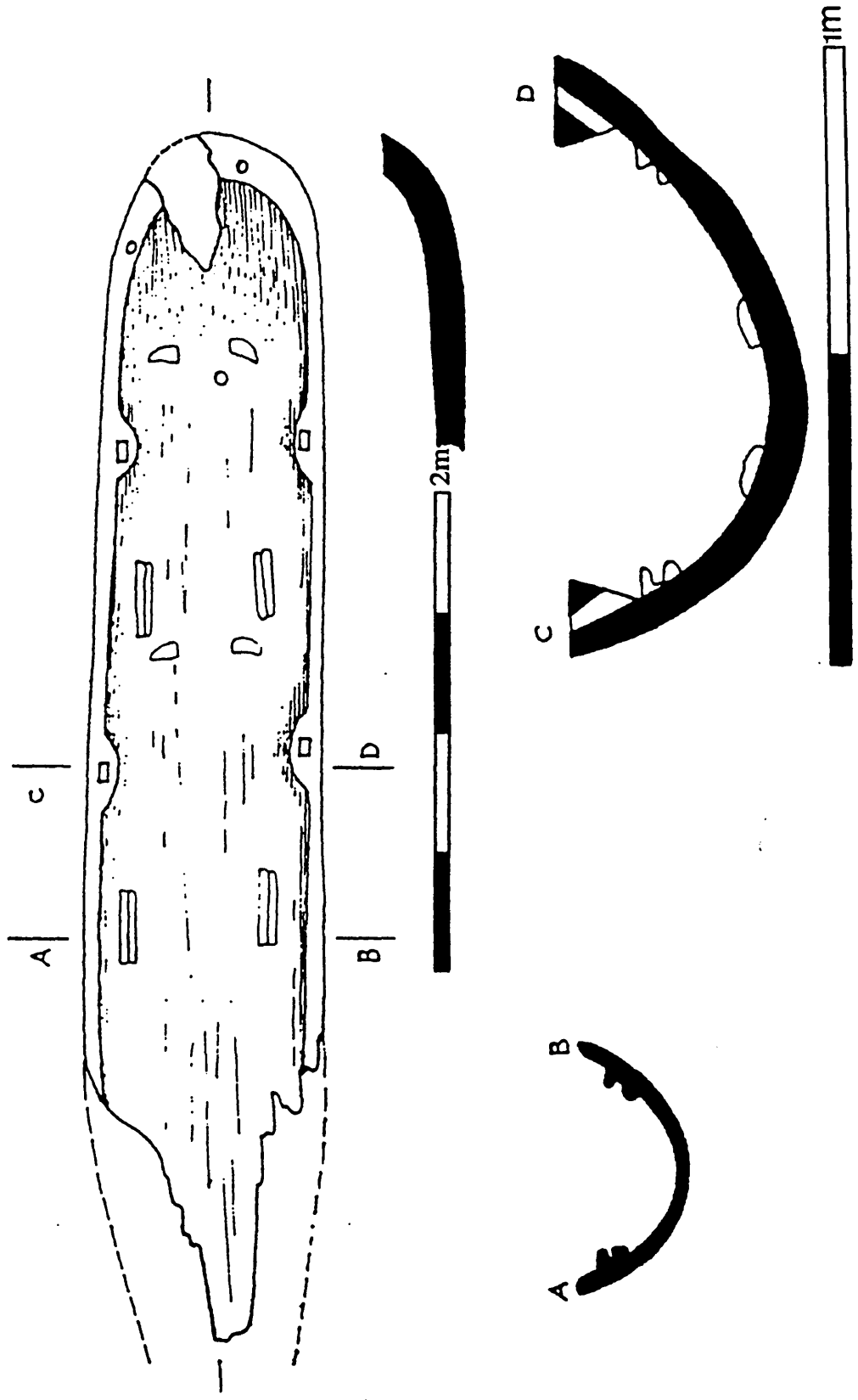


Figure 7: Bannmouth (after Raftery)

**Boat Number:** I041 **O.S. 6'':** 17, 25  
**Boat Name:** Baronscourt **OD:** 60m  
**Townland:** Baronscourt **Site:** Lake  
**County:** Tyrone **Form:** Canoe

A 'canoe...formed out of a single piece of oak' was found c1881 'imbedded in and filled with peat on an old lake shore near Baronscourt'. It was received by the Royal Irish Academy, 6 July 1881. It was drawn by Raftery. The boat no longer survives.

When first discovered it was split in the stern. Raftery's drawing shows that the bow and a small part of the stern had broken away. In plan, it was parallel-sided with a rounded stern and the bow was probably rounded since an early account described ends that similarly 'inclined inwards' towards the bottom. In longitudinal section it was flat-bottomed with rounded ends. It was rounded in cross-section.

Dimensions (in metres)

| Length | Max Width  | Stern Width | Max Floor Width | Height     |
|--------|------------|-------------|-----------------|------------|
| 5.03   | 0.86 (ext) | 0.42 (int)  | 0.41 (int)      | 0.28 (int) |

Seaby noted three rounded blisters, two of which had square vertical holes, the other pair with square depressions. They were located 'near the upper edge' of the boat. McGrail examined the boat in 1974 and noted two pairs of blisters with holes, 2 pairs of grooved ledges and two pairs of blocks on the floor. These were thole pin holes, thwart rests and footrests respectively. He measured the distance between the aft edge of the thwarts and the thole pin holes as 40cm and 43cm, and the aft edge of the thwart to the footrest as 62cm and 67cm. It is possible that there was originally a third rowing position in the boat.

MacDowell, U. 1983 *Irish Logboats*, No 240; McGrail, S. 1978, *The Logboats of England and Wales*, 62-3, 75, fig.123; 'Register' 1881 *National Museum of Ireland*, 521, No 536; Raftery, J. *Seaby Survey Files*, No 14; Seaby, WA. 1973 *Seaby Survey Files*, 2,c.; Wakeman, WF. 1894 *Catalogue of Antiquities in the Collection of the Royal Irish Academy*, 106.

**Boat Number:** I042 **NGR:** N73 90  
**Boat Name:** Bawnbreakey **OD:** 130m  
**Townland:** Bawnbreakey **Site:** Breakey Lough  
**County:** Meath

A 'dug-out' was found on the shore of Breakey Lough in 1995. It was noted as 'not worth examining' and was probably left where it was found. It probably no longer survives.

The lake is quite small, measuring approximately 800 by 200 metres. A crannog is situated in the centre of the lake.

Site:

|                 |             |
|-----------------|-------------|
| <b>SMR No</b>   | 005-003     |
| <b>Townland</b> | Brawnbreaky |
| <b>NGR</b>      | N7348 9050  |
| <b>Site</b>     | Crannog     |

MacDowell, U. 1983 *Irish Logboats*, No.185. 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I043

**NGR:** C669 296

**Boat Name:** Bellarena

**OD:** 5m

**Townland:** Bellarena

**Site:** River Roe

**County:** Derry

**Form:** Dissimilar-ended

Found in August 1954 below Bellarena Bridge on the River Roe, it was examined and drawn by Seaby on the riverbank where it was left. It probably no longer survives.

The sides survived from the stern for two-thirds of its length. The stern had a large crack in the middle and the bow was only partially intact. In plan, it was parallel-sided with a slight taper towards the stern which was rectangular. In cross-section the boat is sub-rectangular while the longitudinal-section was flat-bottomed with a vertical and stern and duck-billed projection. The bow inclined upwards.

Dimensions (in metres):

| <b>Length</b> | <b>Max Width</b> |
|---------------|------------------|
| 4.17          | 0.86             |

The boat had been repaired in the stern with a board held by treenails. Seaby noted that a second repair may have been executed at the bow, using the same method. There were a number of features in the boat:

Features (in metres):

| <b>Feature</b>   | <b>Distance from stern</b> | <b>Side</b> | <b>Length</b> | <b>Width</b> | <b>Height</b> | <b>Purpose</b> |
|------------------|----------------------------|-------------|---------------|--------------|---------------|----------------|
| Thole pin hole   | 1.60                       | Port        | 0.06          | 0.05         |               | Rowing         |
| Thole pin hole   | 1.60                       | Star        | 0.06          | 0.05         |               | Rowing         |
| Seat rest Thwart | 2.13                       | Port        | 0.06          |              |               |                |
| Seat rest        | 2.06                       | Star        | 0.06          |              |               |                |

|                |       |      |  |  |  |                   |
|----------------|-------|------|--|--|--|-------------------|
| Thwart         |       |      |  |  |  |                   |
| Hole           | Stern | Port |  |  |  | Mooring or repair |
| Hole or repair | Stern | Star |  |  |  | Mooring           |

The thole pin holes were set in raised blisters. Seaby suggested the holes were for mooring, but they could also have been to prevent the boat from splitting at this end using a transverse board and treenails. Form

MacDowell, U. 1983 *Irish Logboats*, No. 76; Seaby, WAS. 1954 *Seaby Survey Files*, No. 42.

**Boat Number:** I044

**NGR:** J406 910

**Boat Name:** Beltoy 1

**OD:** 180m (Water Level)

**Townland:** Beltoy

**Site:** Lough Mourne

**County:** Antrim

**Form:** Punt

When Lough Mourne's level was temporarily lowered by 3 metres in summer 1882 when converting it into a reservoir, a 'dugout' boat was discovered. It was sent to the Ulster Museum, but no longer survives. It was drawn by Gray.

It was originally in good condition. However, when Seaby examined it, the bottom had warped upwards along its long axis. It was also damaged at both ends. In plan, the oak boat was parallel-sided with square ends. Its longitudinal section was flat-bottomed with inclined ends and in cross-section it was flat-bottomed with flared sides.

Dimensions:

| Length | Max Width | Height (ext) |
|--------|-----------|--------------|
| 3.89   | 0.72      | 0.25         |

Six circular holes pierced the floor on the long axis at 61 cm intervals. Their diameters were 2cm and they were probably thickness-gauges.

Gray, W. 1884 'A crannog canoe from Lough Mourne' *JRSAI* 16, 371-2; MacDowell, U. 1983 *Irish Logboats*, No 8; Munro, R. 1890 *The Lake Dwellings of Europe*, 386-9, fig 125

Seaby, W A. *Seaby Survey Files*; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 50, 171-2.



Figure 8: Beltoy 1 (after Gray)

Boat Number: I045

NGR: J405 910

Boat Name: Beltoy 2

OD: 180m (Water Level)

Townland: Beltoy

Site: Lough Mourne

County: Antrim

Form: Canoe

In the summer of 1884, 'a very fine canoe of oak' was found on the lakebed of Lough Mourne, now a reservoir. It was given to the Belfast National History and Philosophical Society and then to the Ulster Museum (1911-386). Munro noted the bow was damaged and the boat in poor condition. When Seaby examined it in the 1950s, the sides and ends were worn down. It no longer survives. In plan it had rounded ends and was rounded in cross-section.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 3.96   | 1.07  |

Several Features were noted:

| Feature           | Length | Width | Height | Purpose    | Location    |
|-------------------|--------|-------|--------|------------|-------------|
| 2 footrests       |        |       |        | Rowing     | Floor       |
| 2 footrests       |        |       |        | Rowing     | Floor       |
| 2 Thole Pin Holes |        |       |        | Rowing     | Gunwale     |
| 2 Thole Pin Holes |        |       |        | Rowing     | Gunwale     |
| 2 Seat Thwarts    |        |       |        | Rowing     | Sides (int) |
| 4 Holes           | 2.5cm  |       |        | Fitted Rib | Floor       |

The tholepin holes were vertically set in projecting blisters. The 4 holes were in a transverse line across the floor and probably held a fitted rib whose most likely function was to strengthen the hull. MacDowell, U. 1983 *Irish Logboats*, No 9; McGrail, S. 1978 *The Logboat of England and Wales*, 76, fig 121; Munro, R. 1890 *The Lake Dwellings of Europe*, 389, fig 124; Seaby, WA. *Seaby Survey Files*; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 172-3.



**Boat Number** I046 **OS 6":** Sheet: 11,15  
**Boat Name:** Belturbet 1 **OD:** 50m  
**Townland:** Belturbet  
**County:** Cavan

In the Proceedings of the Royal Society of Antiquarians, 'Mr Seaton F. Milligan...showed some drawings of a canoe found recently near Belturbet' c 1893. It is unlikely to have survived.

MacDowell, U. 1983 *Irish Logboats*, No 40; Milligan, S. 1895 'Proceedings', *JRSAI* 23, 337.

**Boat Name:** I047 **O.S. 6":** 11, 15.  
**Boat Name:** Belturbet 2 **OD:** 45-60m:  
**Townland:** Belturbet **Site:** Derryerry Bog  
**County:** Cavan

This 'canoe was found buried' about 90cm. deep 'in a bog hole in Derryerry Bog' through turf cutting in 1932. It was in a 'fairly good state of preservation' and was 'one complete piece of wood and appears to have been hollowed out'. The figure '1732' was found carved on it. This figure does not necessarily indicate a year of use. The boat was 'not acquired' and probably no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 2.74   | 0.75  |

MacDowell, U. 1983 *Irish Logboats*, No 49; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I048 **NGR:** M3 5  
**Boat Name:** Black River **OD:** 15m  
**County:** Galway-Mayo **Site:** Black River  
**Form:** Canoe

A 'logboat was found c.1973 in the Black River on the Galway/Mayo border'. It was placed in 'Mr Murphy's garden' where MacDowell examined and drew it. Mr Murphy has since died and the writer was unable to locate the boat. Presumably it no longer survives.

The boat 'appears to be of oak' of which the remains consisted of the floor and one end. From the drawing the timber has warped along its long axis. In plan it is parallel-sided with a rounded end. Its longitudinal section is flat bottomed with a rounded end, while the cross-section appears to have been flat-bottomed with vertical sides. This is determined by the chines in the drawing.

Two sets of three holes were 'set transversely' across the floor 'near either end'. These were probably for fitted ribs to strengthen the hull.

MacDowell, U. 1983 *Irish Logboats*, No. 129.

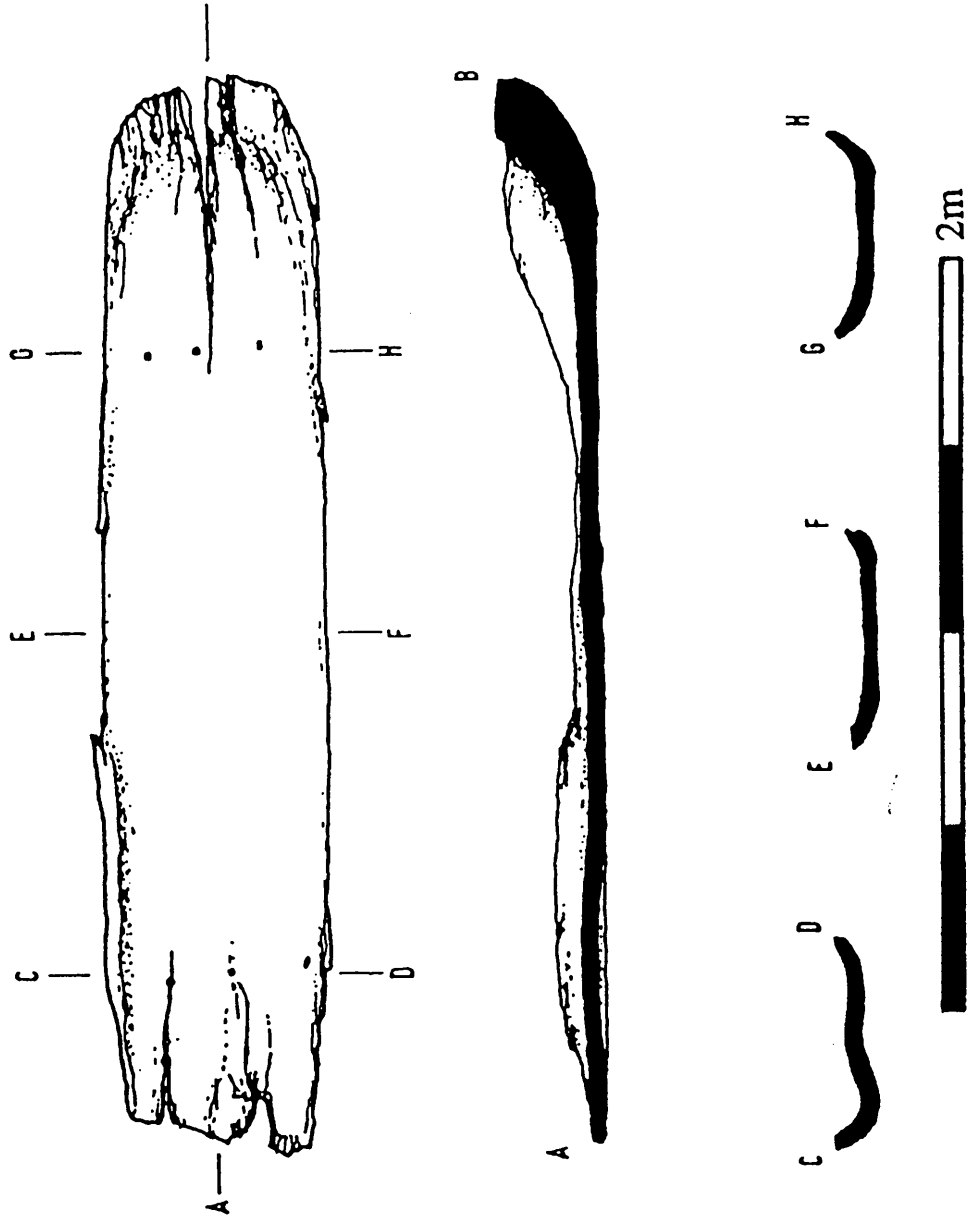


Figure 9: Black River (after MacDowell)

**Boat Number:** I049                                      **NGR:** H816 09  
**Boat Name:** Blackwater Town 1 (several)      **OD:** 15m  
**Townland:** Blackwater Town                      **Site:** River Blackwater  
**County:** Armagh

'Several ancient canoes' were found in September 1852 'close to the town of Blackwater' at about 1.2m. 'below the bed of the River Blackwater'. One was 9.1m long. They probably no longer exist. Grace, W. 1862-3, 'Photographs of Ancient Crania' *JRS* 4, 343; MacDowell, U. 1983 *Irish Logboats*, No 32; Wood-Martin, WG. 1895 *Pagan Ireland*, 252.

**Boat Number:** I050                                      **NGR:** 10m  
**Boat Name:** Brockish                                      **OD:** 10m  
**Townland:** Brockish Point                              **Site:** Lough Neagh  
**County:** Antrim    **Form:** Dissimilar-ended

In 1954 a 'canoe' was found in Lough Neagh in a small bay on the eastern side of the southern end of the navigation canal at Toomebridge. 'It was examined by Seaby and Townsley in 1961. The boat pointed towards deep water and it 'rested on a pebble beach'. It was covered by 45cm of sand. It was drawn by Townsley in Woodman 1978, fig 1, and left *in situ*.

When it was examined by Seaby and Townsley the oak boat was in good condition and almost complete. 'Some areas of the outer surface were pitted and fragile'. No sections were noted, but in plan it was roughly parallel-sided and tapered to a sub-rectangular stern and a pointed bow.

Dimensions (in metres):

| Length | Max. Width |
|--------|------------|
| 6.22   | 0.62       |

'On the starboard side of the stern was a carved solid seat and beside it on the port side was a boulder, presumably a counterweight to seat a canoeist'.

A number of sticks which were interpreted as fishing spears were found. It is unclear whether they were found in the boat or near it as were a number of flint flakes. A flint core was found 'in the stern'. A site was located 'about' 500 metres from the boat.

Site:

|                         |                                  |
|-------------------------|----------------------------------|
| <b>SMR No</b>           | Not Known                        |
| <b>Townland</b>         | Brockish                         |
| <b>Site</b>             | Not Known                        |
| <b>Site Date</b>        | Mesolithic and Neolithic         |
| <b>Finds</b>            | Flint, thick bar form            |
| <b>Finds Date</b>       | Mesolithic?                      |
| <b>Boat Association</b> | Possible Mesolithic or Neolithic |

MacDowell, U. 1983 *Irish Logboats*, No 2; Seaby, WAS. *Seaby Survey Files*, No 26; Woodman, PC. 1978 'The Mesolithic in Ireland: Hunter-Gatherer in an insular Environment' *BAR* 58, 246-7, 337-9, fig.100.

**Boat Number:** I051

**NGR:** G 024 224

**Boat Name:** Bunduvowen

**OD:** 10m (Water Level)

**Townland:** Bunduvowen

**Site:** Lough Cullen

**County:** Mayo

**Form:** Dissimilar-ended

A 'dugout canoe' was reported to the National Museum of Ireland in 1978 and examined by their staff in August 1984. It was discovered partly buried in lake sand 'on the western side of Lough Cullen'. It was drawn by Ragnall O'Floinn. The boat's discovery was the result of drainage work on the Moy river. The boat was reburied in sand.

The gunwales, bow and stern were badly damaged. In plan it tapered from the stern to the bow which appears to have been rounded. A shorter taper on the stern was sub-rectangular. The longitudinal section was flat-bottomed with a stern board groove. The bow was not noted. In cross-section the boat was U-shaped.

Dimensions (in metres)

| <b>Length</b> | <b>Stern Width</b> | <b>Midship Width</b> | <b>Bow Width</b> | <b>Max. Height (ext)</b> |
|---------------|--------------------|----------------------|------------------|--------------------------|
| 5.75          | 1.40               | 1.30                 | 1.05             | 0.45                     |

There were a number of features other than the sternboard groove. There were 4 'peg-holes' set on the boats' long axis, a groove running at right angles to the sternboard groove 'along one side' which was angular shaped, and a third 'angular groove' set internally into the starboard side.

Features (in metres):

| Feature           | Distance from Stern | Length | Width | Depth | Purpose         |
|-------------------|---------------------|--------|-------|-------|-----------------|
| Hole              | 1.20                |        | 0.04  | 0.04  | Thickness Gauge |
| Hole              | 2.35                |        | 0.04  | 0.04  | Thickness Gauge |
| Hole              | 3.50                |        | 0.04  | 0.04  | Thickness Gauge |
| Hole              | 4.65                |        | 0.04  | 0.04  | Thickness Gauge |
| Sternboard Groove | 0.25                | 1.10   | 0.10  | 0.10  | Sternboard      |
| 2nd Groove        |                     | 0.60   | 0.10  | 0.10  | Not known       |
| 3rd Groove        | 0.65                | 0.95   | 0.02  | 0.07  | Not known       |

Four sites close to the western lakeshore are:

|          |              |              |              |               |
|----------|--------------|--------------|--------------|---------------|
| SMR No   | 060-007      | 060-008      | 060-009      | 060-010       |
| Townland | Lough Cullin | Lough Cullin | Lough Cullin | Lough Cullin  |
| NGR      | 12123 30241  | 12142 30236  | 12159 30237  | 12211 30244   |
| Site     | Poss.Crannog | Poss.Crannog | Poss.Crannog | Island Cashel |

'Correspondence Files' *National Museum of Ireland*, 1A/122/79.

**Boat Number: I052**

**NGR: H 202 542**

**Boat Name: Bunintubber**

**OD: 45m (Water Level)**

**Townland: Bunintubber**

**Site: Lower Lough Erne**

**County: Fermanagh**

'The submerged remains of a dugout canoe' was found 0.54km 'north-west of Killadeas church' on the shores of lower Lough Erne in 1976. A 4.75m long and 10cm. high section of one gunwale was exposed above the water level. It was left lying beside a jetty oriented in a north-west to south-east direction. The boat was 'probably oak'. The only measurement taken was the gunwale which was 1 to 2cm thick.

Fry, M. 1976 *Seaby Survey Files*, No 84.

Boat Number: I053

NGR: T 21 52

Boat Name: Cahore 1

OD: 0m

Townland: Cahore

Site: Cahore Estuary

County: Wexford

Form: Dissimilar-ended

A 'canoe' was found before 1857 in a bog by the coast. The bog was liable to flooding from both the sea and freshwater. It was discovered during drainage work at a depth of 3.5 m below the surface. It was drawn by Raftery and Wilde on separate occasions. The boat is now at the National Museum of Ireland stores at Daingean, Co. Offaly. An attempt was made to examine it, but it was inaccessible as other boats had been placed on top of it. It was registered with the Royal Irish Academy, 1859; 182.

This oak boat was in good condition when found, but by 1857 it had warped significantly. It was originally parallel-sided with a rounded bow and rectangular stern in plan. In longitudinal section it was flat-bottomed with a vertical stern and rounded bow, which rose higher than the rest of the boat. The stern was made from a sternboard. Its cross-section is rounded. Several measurements were taken, some of which differ. The earlier measurements are taken into account here since they would be less affected by the boat's warping.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 6.70   | 0.76  | 0.28         |

As well as the sternboard groove, which had the board *in situ* and was caulked with 'bark', there were 4 holes, 2 of which were on the long axis on the other 2 close to either side. 3 transverse ribs (solid) crossed the floor. Their details are as follows

Features (in metres):

| Feature           | Distance from Stern | L | W    | H | Purpose         |
|-------------------|---------------------|---|------|---|-----------------|
| Sternboard Groove |                     |   | 0.05 |   | Sternboard      |
| 3 Ribs            |                     |   |      |   | Strengthening   |
| Hole              | 4.00                |   |      |   | Thickness-gauge |
| Hole              | 2.60                |   |      |   | Thickness-gauge |
| Hole              | 1.40                |   |      |   | Thickness-gauge |
| Hole              | 1.40                |   |      |   | Thickness-gauge |

MacDowell, U. 1983 *Irish Logboats*, No 274; McGrail, S. 1978 *The Logboats of England and Wales*, 66; Raftery, R. *Seaby Survey Files*, Raftery No.4; Seaby, WA. *Seaby Survey Files*; Wakeman, WF. 1894 *Catalogue of Antiquities in the Collection of the RIA*, 106, No. 737; Wilde,

WR. 1863 *A Descriptive Catalogue of the Antiquities in the Museum of the Royal Irish Academy*,  
203, fig. 136 No. 1; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 48



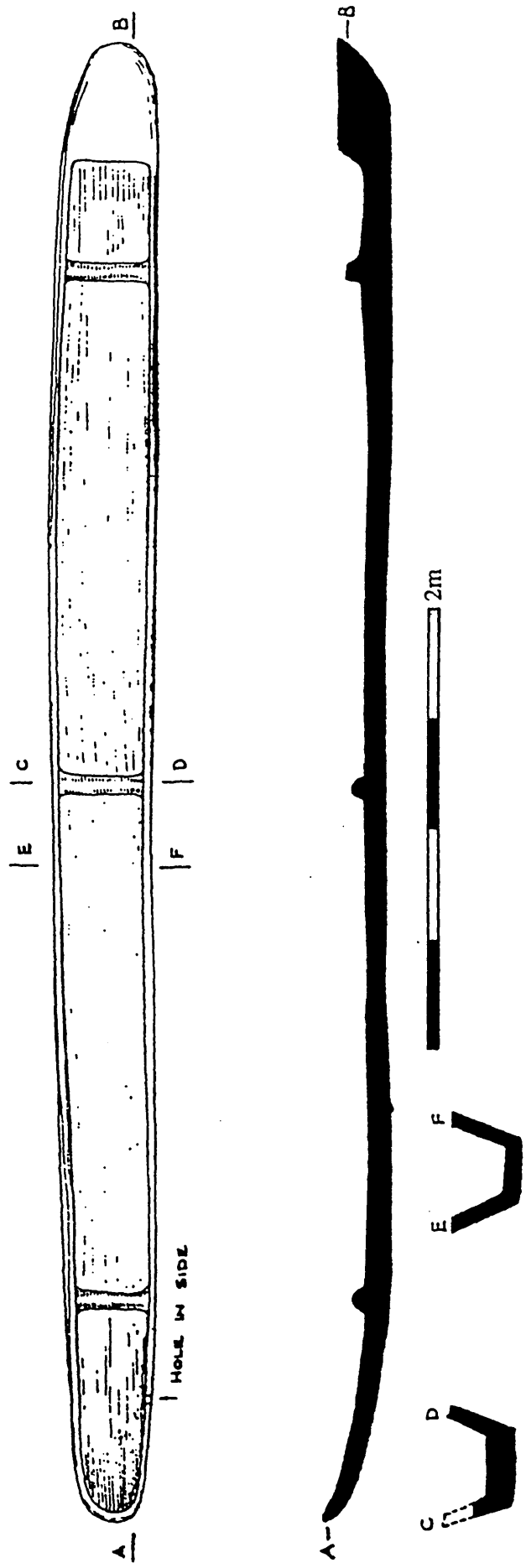


Figure 10: Cahore 1 (after Rafferty)

Boat Number: I054

NGR: T 21 52

Boat Name: Cahore 2

OD: 0m

Townland: Cahore

Site: Cahore Estuary

County: Wexford

Form: Punt

An 'oak boat...hollowed out of a single stem' was found in a bog by the coastline prior to 1857. It was registered 1859:183 by the Royal Irish Academy and is now stored in the National Museum of Ireland Stores, Daingean, Co. Offaly. It was drawn by Wilde and Raftery. The boat is now inaccessible in the store as other boats have been placed on top of it. It is now in poor condition, but was complete when recovered.

In plan it is parallel-sided with a rounded stern and the bow in the form of a rounded point. The longitudinal section is flat-bottomed with a rounded stern and inclined bow, while its cross-section is flat-bottomed with flared sides. The bow is now split and the sides have collapsed outwards. Half of the log was used in constructing the boat, and the presence of knots indicates that the stern was the root end of the tree.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 6.42   | 0.46  | 0.20         |

Its several features were: 2 holes, one in the port side near the bow and the other in the floor; 3 transverse ribs in the solid; and a 'seat... left solid in the stern'. This seat, which was a flat area level with the sides where the interior of the boat was not hollowed out for a length of c.40cm, may also have served to strengthen the hull and prevent radial splitting of the timber at that end.

Features (in metres):

| Feature | Distance from Stern | L    | W    | H    | Purpose                  |
|---------|---------------------|------|------|------|--------------------------|
| Seat    | 0.00                | 0.40 | 0.30 | 0.20 | Seat and strengthening   |
| Hole 1  | 5.81                |      |      |      | Not Known                |
| Hole 2  |                     |      |      |      | Thickness Gauge in Floor |
| Rib     | 0.90                |      |      |      | Strengthening            |
| Rib     | 3.00                |      |      |      | Strengthening            |
| Rib     | 5.50                |      |      |      | Strengthening            |

MacDowell, U. 1983 *Irish Logboats*, No275; Raftery, R. *Seaby Survey Files*, No.4; Seaby, WAS. *Seaby Survey Files*; Wakeman, WF. 1895 *Catalogue of Antiquities in the Collection of the RIA*, 106, No.738; Wilde, WR. 1863 *A Descriptive catalogue of the Antiquities in the Museum of the Royal Irish Academy* 1, 203, fig. 137 No.2.

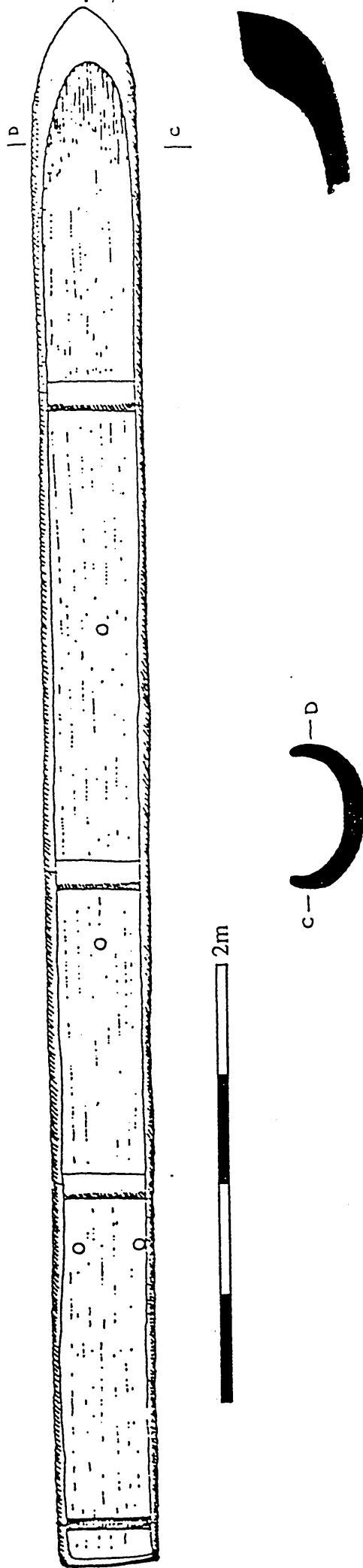


Figure 11: Cahore 2 (after Raftery)



From the sketch it can be discerned that in plan the boat was parallel-sided with a rounded stern and pointed bow. In longitudinal section it is flat-bottomed and inclines at both ends, while it's cross-section appears to be U-shaped.

'Correspondence Files' *National Museum of Ireland*, 1A/550/47.

|                     |              |              |                   |
|---------------------|--------------|--------------|-------------------|
| <b>Boat Number:</b> | I057         | <b>NGR:</b>  | G 700 273         |
| <b>Boat Name:</b>   | Castledargan | <b>OD:</b>   | 50m (Water Level) |
| <b>Townland:</b>    | Castledargan | <b>Site:</b> | Lough Dargan      |
| <b>County:</b>      | Sligo        | <b>Form:</b> | Punt              |

In 1970 a 'dug-out canoe' was found by the Garda Diving Unit in Lough Dargan at a depth of c.2m. It was raised by them in June of that year and examined and drawn by Rynne. The oak boat was then placed in a 'fish pool' in Castledargan. It can no longer be located. The boat was radio-carbon dated to  $430 \pm 30$  B.P (Gr.N.-18747).

Made from a whole log, the pith was situated in the centre of the surviving end. Most of one end no longer survives and the sides were missing from this end. In plan the boat tapered from the wide end to the surviving one. Its longitudinal section was flat-bottomed with inclined ends and rectangular in cross-section. The narrow end was interpreted by Rynne as the bow.

Dimensions (in metres):

| Length | Max Width | Min Width |
|--------|-----------|-----------|
| 3.12   | 0.64      | 0.43      |

In the floor near the bow was a 3.5cm diameter hole which was plugged with a treenail of softer wood than the boat. The hole was probably a thickness gauge.

The lake measures approximately 500m by 100m. Two sites are located in the boats vicinity.

Sites:

|                         |                  |               |
|-------------------------|------------------|---------------|
| <b>SMR Number</b>       | 012-018          | 021-045       |
| <b>Townland</b>         | Killeduff        | Castledargan  |
| <b>Nat.Grid Ref.</b>    | 17224 32816      | 17249 32803   |
| <b>Site</b>             | Possible Crannog | Castle        |
| <b>Site Date</b>        | Not Known        | Built in 1422 |
| <b>Boat Association</b> | Not Known        | Not Known     |

MacDowell, U. 1983 *Irish Logboats*, No, 234; 'Topographical Files' *National Museum of Ireland*.

**Boat Number** I058 **NGR:** W 313 339  
**Boat Name:** Castlefreke **OD:** 10m  
**Townland:** Castlefreke **Site:** Lough Rahavarrig  
**County:** Cork **Form:** Punt

A 'log-boat' registered 1979:101, was found in 1978 during dredging operations in Lough Rahavarrig. It had been dredged from the lake bottom. It was intact when found. However on examination in 1979 it broke into four parts along its axis and across the midships. It was sketched by Mr Kains, Trinity College, Dublin. It was sent to the National Museum Stores, Daingean, Co. Offaly, but could not be discerned from other boat remains.

In plan it was parallel-sided with square ends. Its longitudinal section is flat-bottomed with inclined ends, while its cross-section is also flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width | Height | Thickness |
|--------|-------|--------|-----------|
| 8.40   | 1.44  | 0.30   | 0.04      |

The boat had five holes piercing the floor, one near each corner and the fifth centrally placed in the floor. They were probably thickness-gauges.

There is a site by the lake whose details are as follows:

|                   |              |
|-------------------|--------------|
| <b>SMR Number</b> | 143-074      |
| <b>Townland</b>   | Castlefreke  |
| <b>Site</b>       | Tower House  |
| <b>Site Date</b>  | 14th Century |

'Topographical Files' *National Museum of Ireland.*

**Boat Number:** I059 **NGR:** G 954 214  
**Boat Name:** Cavan **OD:** 50m (Water Level)  
**Townland:** Cavan **Site:** Lough Allen  
**County:** Leitrim

A 'dug-out canoe' was found in 1959 by the shore of Lough Allen. It was taken out of the water and examined and drawn by Rynne. No mention is made of the boat's destination. It was probably left *in situ*. 'Made of a single piece of wood' the sides were almost entirely missing as were both the bow and stern.

In plan it was parallel-sided with a squared stern and the bow was in the form of a rounded point. In longitudinal-section it was flat bottomed with an inclined bow and stern. The cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Max Width | Bow Width | Max Height (int) | Floor T |
|--------|-----------|-----------|------------------|---------|
| 6.20   | 0.65      | 0.28      | 0.07             | 0.12    |

Five circular holes were drilled at right angles to the bottom of the boat. Three of them were located along the long axis and the remaining two in a transverse line on either side of the long axis near the stern.

Features (in metres):

| Hole | Distance from Bow | Diameter | Purpose         |
|------|-------------------|----------|-----------------|
| 1    | 0.70              | 0.035    | Thickness-gauge |
| 2    | 3.35              | 0.035    | Thickness-gauge |
| 3    | 5.50              | 0.035    | Thickness-gauge |
| 4    | 5.95              | 0.035    | Thickness-gauge |
| 5    | 5.95              | 0.035    | Thickness-gauge |

MacDowell, U. 1983 *Irish Logboats*, No 152; 'Topographical Files' National Museum of Ireland.

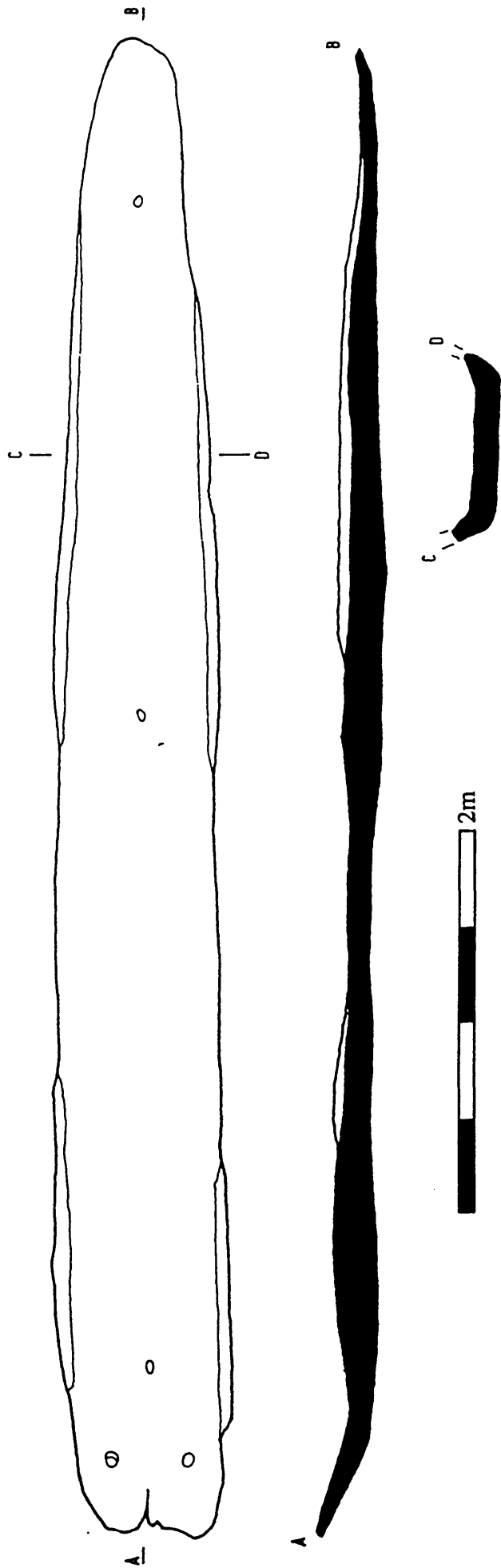


Figure 12: Cavan (after Rynne)



**Boat Number:** I060

**NGR:** H 973 948

**Boat Name:** Church Island

**OD:** 10m (Water Level)

**Townland:** Church Island-Intake

**Site:** Lough Beg

**County:** Derry

An oak 'dug-out' boat was found on the north shore of Church Island, Lough Beg in May 1087. It was examined and drawn by Fry and Bourke. It was buried at the Department of the Environment Depot at Markethill. When found only the bottom survived which had dried out and was 'broken and split'. It was radiocarbon dated  $940 \pm 15$  B.P (Gr.N-16870).

From the drawing, not enough survives to determine the boat's original form in plan. In longitudinal section it was flat bottomed with a very slight rise to one end. The bottom's cross-section had a slight curve to its profile.

Dimensions (in metres)

| Length | Maximum Width |
|--------|---------------|
| 6.00   | 1.10          |

The remains consisted of four transverse ribs 'cut from the solid', and three holes which were located on the long axis, one at the bow, stern and amidships. The stern one held a dowel. The purpose of the ribs would have been to strengthen the hull while the holes were thickness gauges.

The remains of a church are located on the island.

Site

|                         |                                    |
|-------------------------|------------------------------------|
| <b>SMR Number</b>       | 042-014                            |
| <b>Townland</b>         | Intake                             |
| <b>Site</b>             | Church                             |
| <b>Site Date</b>        | Founded in 1129, in use up to 1788 |
| <b>Boat Association</b> | Not Known                          |

Fry, M. 1987 *Seaby Survey Files*, No.66.

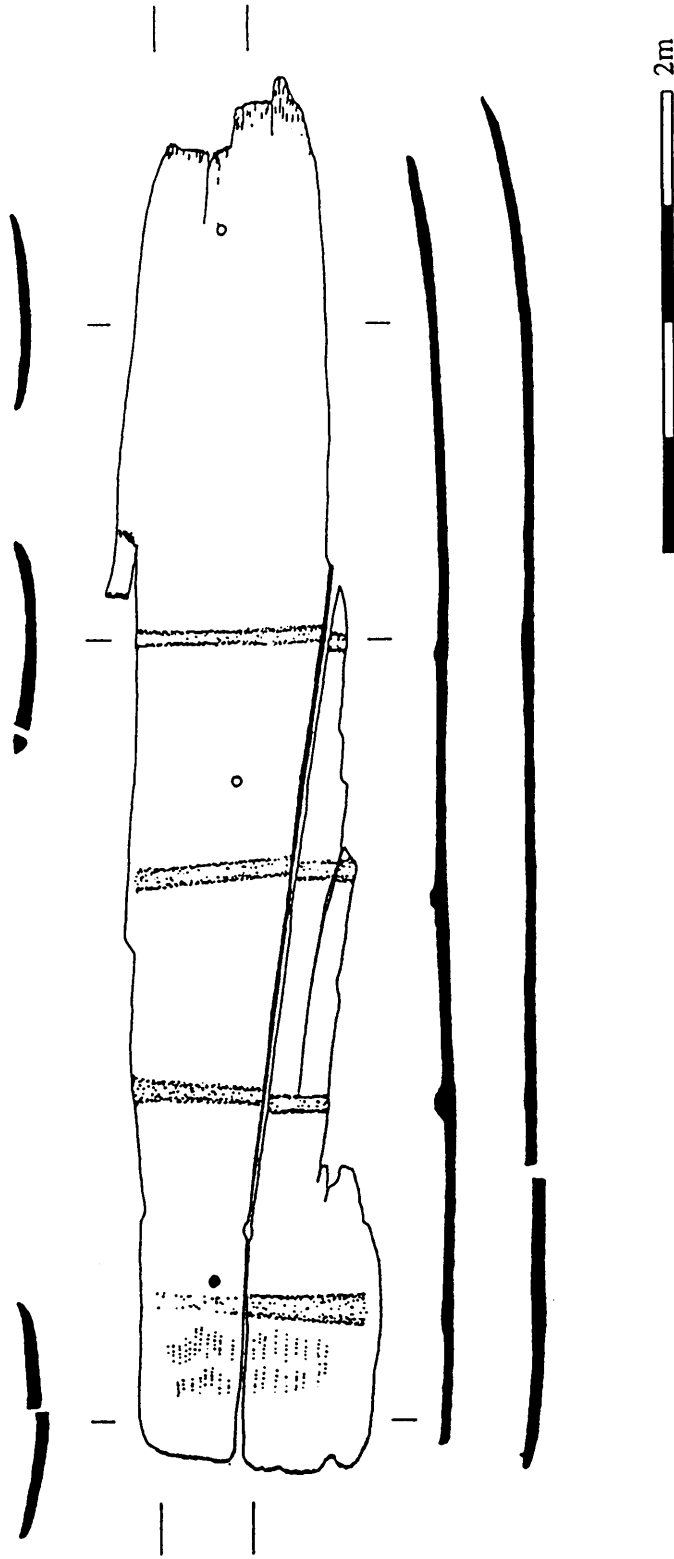


Figure 13: Church Island (after Bourke)

Boat Number: I061-3  
 Boat Name: Church Island 1-3  
 Townland: Church Island-  
 County: Sligo  
 NGR: G 746 338  
 OD: 7m (Water Level)  
 Site: Lough Gill  
 Form: (I061) Canoe

In July 1990, two 'dug-out canoes' were found by the Garda Sub-Aqua Unit in Lough Gill. They were located off the island north and southern shore.

They were examined in September 1990 by the Irish Underwater Archaeological Research Team. During the examination a third dugout boat was discovered by two of the team members. This boat contained 'skeletal remains'. Measurements and a sketch was made of only one of the boats. It was located 25m 'off shore' at an approximate depth of 4.6m. All three boats were left *in situ*.

From the sketch it appears to be parallel-sided for much of its length with a rounded stern and a rounded-point at the bow. The bow was damaged and a 'crack' of 1m in length 'ran back' from it. Its longitudinal section was not noted, but its cross-section was rounded.

Dimensions (in metres)

| Length | Width | Maximum Height (int) |
|--------|-------|----------------------|
| 5.25   | 0.76  | 0.31                 |

Two 'large boulders' were noted in the boats stern section as was 'a keelson attached to the bottom of the boat on the inside...its presence cannot be stated with certainty'. The boulders were possibly used to keep the boat weighted in the water. The 'keelson' could be a rib in the solid along the boats' long axis.

The details of a site on Church Island are as follows:

|              |                               |
|--------------|-------------------------------|
| SMR Number   | 015-094                       |
| Townland     | Cottage Island                |
| Nat Grid Ref | 17249 33284                   |
| Site         | Church and Possible Enclosure |

'Correspondence Files' *National Museum of Ireland*, 1A/168/90.

**Boat Number:** I064 **NGR:** H 11 33  
**Boat Name:** Claddagh River **Site:** Claddagh River  
**Townland:** Not Known  
**County:** Fermanagh

A 'canoe' was found on the bed of the River Claddagh in 1895. It was removed by the Earl of Enniskillen. It probably no longer survives.

Its description 'is a little obscure'. It had 'sloped square ends projection about one foot above the gunwale, pierced with four holes'. The holes were 3.8cm in diameter. There were also 'two pieces of bog oak attached to the sides with rudely formed iron nails'. The purpose of the holes and the 'two pieces of bog oak' cannot be ascertained without further information, although McGrail identified them tentatively as external longitudinal timbers

Dimensions (in metres):

| Length | Width | Height (int) | Min Thickness | Max Thickness |
|--------|-------|--------------|---------------|---------------|
| 6.85   | 0.91  | 0.61         | 0.06          | 0.08          |

Day, R. 1888 'Report on certain dugouts found in Lough Erne' *PSA* 12, 66-7; MacDowell, U. 1983 *Irish Logboats*, No.101; McGrail, S. 1976 'Problems with Irish Nautical Archaeology' *IARF* 3, 23; McGrail, S. 1978 *The Logboats of England and Wales*, 53.

**Boat Number:** I065 **NGR:** M 098 778  
**Boat Name:** Claggarnagh **OD:** 30m (Water Level)  
**Townland:** Claggarnagh East **Site:** Islandeady Lough  
**County:** Mayo **Form:** Punt

A 'dugout boat' hollowed out of a single piece of wood was found in July 1964 in Islandeady Lough. It was examined and photographed in August 1964 by O'Riordain. It was left by the lake shore and in 1966 it was 'cut up' and was 'used to make lamp shades, letter openers and nail files in Liverpool'. However, part of the bow was sent to the National Museum of Ireland. There is no further record of it and probably no longer survives. The boat was identified as oak. One side survived to its full height. The floor was also split in two locations.

When examined the stern and one end were missing. In plan it was parallel-sided with a rounded bow. Its longitudinal section was not noted except that it was flat-bottomed, while its cross-section was flat-bottomed with flared sides.

Dimensions (in metres)

| Length | Width | Height(int) | Bow Thickness | Floor Thickness |
|--------|-------|-------------|---------------|-----------------|
| 2.70   | 0.64  | 0.27        | 0.07          | 0.04            |

Near the stern end 'a somewhat rectangular depression' was situated in the floor of 20 cm in length, 10cm in height and 5 mm in depth. It was interpreted as a possible footrest. It is difficult to ascertain if this was its intended function. No tholepin hole or thwart rest was noted on the surviving side of the boat.

The two splits in the floor were located running from the bow on one side of the long axis and on the 'curve of' the bow respectively. The first split had a 'double-spaced row of small wooden wedges...[which]... had been hammered' into the floor on either side of the split. The other split had one row of wedges which alternated with every second wedge located on either side of the split. The wedges were tentatively identified as alder and were set 2 to 3cm apart. Their lengths varied from 3.2 to 1.6cm, their maximum widths from 1.5 to 0.9cm, minimum widths from 1cm to 5mm and thickness at a maximum of 5mm and a minimum, of 1mm. O'Riordain interpreted these as a means of 'stitching' splits together.

The lake which is 2.5 by 1.2km has a possible crannog:

|                   |                  |
|-------------------|------------------|
| SMR Number        | 078-045          |
| Townland          | Claggarnagh East |
| National Grid Ref | 10958 28728      |
| Site              | Possible Crannog |

*Connaught Telegraph*, September 1966; 'Topographical File' *National Museum of Ireland*.

**Boat Number:** I066

**NGR:** R 040 610

**Townland:** Clenagh

**OD:** 5m

**Boat Name:** Clenagh

**Site:** River Fergus

**County:** Clare

An oak dugout boat was found in February 1987 in a small L-shaped tidal creek in the eastern bank of the estuary of River Fergus. It was examined by Kelly and Walsh in the same year. The sides and the stern no longer survived. No record was made of its subsequent treatment. It was possibly left *in situ*.

In plan it was sub-rectangular at the bow. Its longitudinal section was flat-bottomed with an inclined bow, while its cross-section rounded both internally and externally.

Surviving Dimensions (in metres):

| Length | Width | Bow Thickness | Min T | Max T |
|--------|-------|---------------|-------|-------|
| 2.88   | 0.83  | 0.30          | 0.05  | 0.10  |

The thick bow was interpreted as 'designed to counter the threat of impact damage'. However, a more likely reason is to prevent radial splitting of the log.

'Correspondence Files' *National Museum of Ireland*, 1A/42/87.

**Boat Number:** I067 **NGR:** 041 326  
**Boat Name:** Clonascra **OD:** 45m  
**Townland:** Clonascra **Site:** Curraghboy River  
**County:** Offaly **Form:** Punt

A 'dugout canoe' was found in 1965 'in a bog close to Curraghboy River', a tributary to the River Shannon. It was examined by O'Riordain. It was found partly lying under 60cm of water and the remainder under 70cm of peat. It was not acquired and is still *in situ*.

Both ends were noted as missing. However the Irish Archaeological Wetland Unit partially excavated one intact end c.1992, which was rounded on all three planes. In plan it was parallel-sided while its cross-section was flat-bottomed with flared sides and its longitudinal-section was flat-bottomed.

Dimensions (in metres);

| Length | Width | Height (int) | Side Thickness |
|--------|-------|--------------|----------------|
| 11.10  | 1.10  | 0.28         | 0.03           |

MacDowell, U. 1983 *Irish Logboats*, No 203; 'Topographical Files' National Museum of Ireland; McDermott, C. *Irish Archaeological Wetland Unit*, (*pers. comm.*) OF-CNS-0002.

**Boat Number:** I068-072 **NGR:** N 32 12  
**Boat Name:** Clonaslee 1-5 **OD:** 80m (Water Level)  
**Townland:** Clonaslee **Site:** Lough Annagh  
**County:** Laois

'An ancient...boat, formed in the solid out of a single oak tree' was found c.1850 in Lough Annagh (now a bog). It was sent to and examined by Cooke. It probably no longer survives. When found its port side was missing and there was a large split in the starboard side through the stern. It was found with 'three or four other boats' in the lake mud. They probably no longer survive. The only section noted was that of its flared sides.

Dimensions: (in metres):

| Length | Width |
|--------|-------|
| 6.88   | 0.79  |

At 79cm from either end 'two straight ridges of solid timber' ran across the boat so that 'between them...cavities have been scooped out of the timber'. Cooke is describing either transverse ribs cut out of the solid or bulkheads it is unclear which. A 3.8cm diameter hole was drilled horizontally through the stern near the top. Cooke interpreted its function as securing a mooring rope.

Cooke, T L. 1852 'Observations on an Ancient Irish Boat' *JRSAI* 2, 71-5; MacDowell, U. 1983 *Irish Logboats*, No 147-51; Seaby, WAS. *Seaby Survey Files*

**Boat Number: I073**

**NGR: N 38 67**

**Boat Name: Clonava**

**OD: 60m (Water Level)**

**Townland: Clonava**

**Site: Lough Derravaragh**

**County: Westmeath**

In 1991, a 'dugout canoe' was found in 1.2m of water by the shore of Lake Derravaragh. The gunwales were exposed above the lakebed. It was noted as being in good condition and was left *in situ*.

There were two lengths noted as 7.62m and 7.92m for its length. By the north-western corner of the lake where the boat was found, there are two sites:

Sites:

|                           |                      |            |
|---------------------------|----------------------|------------|
| <b>SMR Number</b>         | 006-025              | 006-026    |
| <b>Townland</b>           | Derryavaragh Clonava | Clonava    |
| <b>National Grid Ref.</b> | N 3924 6856          | N3940 6715 |
| <b>Site</b>               | Mesolithic Site      | Castle     |
| <b>Site Date</b>          | Mesolithic           | Not Known  |

'Correspondence Files' *National Museum of Ireland*, 1A/113/71.

**Boat Number:** I074 **OD:** 50m  
**Boat Name:** Cloncorick **Site:** Castle Lough  
**Townland:** Cloncorick  
**County:** Fermanagh

A 'canoe' was found before 1886 in Castle Lough. No other record was made of it and it probably no longer survives.

MacDowell, U. 1983 *Irish Logboats*, No 153; Munro, R. 1890 *The Lake Dwellings of Europe*, 390.

**Boat Number:** I075 **NGR:** N 27 38  
**Boat Name:** Clonlisk **OD:** 45m  
**Townland:** Clonlisk **Site:** River Brosna  
**County:** Offaly

In May 1929, during drainage operations a 'dugout canoe' was recovered from 'the dried out bed' of a tributary of the River Brosna. It was found c.60cm below the original riverbed. Most of its sides and ends no longer survived. However, at 'each corner rough pegs were found driven down into the gravel against the sides of the canoe, seemingly to hold it in position. The boat was left on the bank, where it would have disintegrated. It was identified as oak.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 3.05   | 0.46  |

'Some holes' were noted, through one of them 'was found thrust, what might be the remains of a rude paddle'. Three pieces of bone were found 'on the floor of the canoe...of which two might be human'. Details of the mooring posts and paddles are as follows:

Objects (in centimetres):

| Object   | Min L | Max L | Min W | Max W | Min T | Max T | Wood Type |
|----------|-------|-------|-------|-------|-------|-------|-----------|
| 4 Posts  | 22.8  | 30.5  | 7.6   | 8.9   | 5.1   | 6.4   | Oak       |
| 'Paddle' |       |       | 96.5  |       | 7.6   | 2.5   | Oak       |

A sample of the boat and the posts were registered in the National Museum of Ireland as 1929: 1331.

'Topographical Files' *National Museum of Ireland*; MacDowell, U. 1983 *Irish Logboats*, No 204; McCluskey, PG. 1929 'Dug-out Canoe from Clonlisk' *JRSAI* 59, 182-3.



**Boat Number:** I076

**NGR:** H 274 343

**Boat Name:** Clontycoora

**OD:** 45m (Water Level)

**Townland:** Clontycoora

**Site:** Lough Derg

**County:** Fermanagh

An oak 'canoe' was found in May 1943 in Lough Derg. It was situated 15 to 20m from the shore at an approximated depth of 1.2m. When it was recovered it was in poor condition with the stern, most of the bow and sides missing. The surface was 'much eroded by rotting'. It was examined and drawn by Mogeey. It probably no longer survives.

From the drawing it appears as if the boat originally tapered from the stern to the bow which appears to have been pointed. In longitudinal section it was flat-bottomed with an inclined bow while its cross-section was rectangular.

Dimensions (in metres)

| Length | Max Width | Max Height (int) | Floor Thickness |
|--------|-----------|------------------|-----------------|
| 4.57   | 0.99      | 0.15             | 0.08            |

There were 'faint traces of axe or adze strokes on the floor'. Where the bow had split into a jagged 'V' shape there were five circular holes set 12.7 cm apart. They were 1.3cm in diameter and 3.8cm in depth. Mogeey interpreted them as peg holes for a repair patch. 'A thin lamina of wood' measuring 38.1 x 12.7 x 0.3cm, with three holes was found in the boat, 'but its perforations did not correspond with the holes in the hull'.

MacDowell, U. 1983 *Irish Logboats*, No 97; Mogeey, JM, 1946 'Wooden Canoes' *UJA* 9, 69-70, fig 1.

**Boat Number:** I077-078

**NGR:** M 570 882

**Boat Name:** Cloonacolly 1-2

**OD:** 80m (Water Level)

**Townland:** Cloonacolly

**Site:** Cloonacolly Lough

**County:** Roscommon

Two 'dug-out canoes' were found c.1922 in Cloonacolly Lough. They were left *in situ* and by 1953, only one was still visible. Both were then removed, one to be used 'for roofing a house, the other...to fill a gap'.

The lake which now measures approximately 1.4 km by 700m. contains two sites.

|                      |             |             |
|----------------------|-------------|-------------|
| <b>SMR Number</b>    | 013-028     | 013-031     |
| <b>Townland</b>      | Cloonacolly | Cloonacolly |
| <b>Nat. Grid Ref</b> | 15603 28851 | 15689 28810 |



Dimensions (in metres):

| Length | Width |
|--------|-------|
| 9.14   | 0.76  |

Two holes were noted, one near one end which was caulked with 'plant debris' and the other located centrally in the boat was plugged with a treenail. Eight two-piece fitted ribs were used to 'strengthen the sides' which were treenailed into place. 'Side planks' were also noted. The boat's remains consisted largely of the floor at the time of Raftery's drawing. No indication of the side planks are given. However, the two-piece ribs are L-shaped with a slight outward curve at the gunwale end.

The wood was identified as follows:

| Boat Part   | Wood type |
|-------------|-----------|
| Hull        | Oak       |
| Side Planks | Oak       |
| Fitted Ribs | Yew       |
| Treenail    | Hazel     |

Details of two sites in the vicinity of the find spot are as follows:

|                |             |                  |
|----------------|-------------|------------------|
| SMR Number     | 036-013     | 036-019          |
| Townland       | Clooncoe    | Clooncoe         |
| Nat. Grid Ref. | 21016 29289 | 21045 29120      |
| Site           | Crannog     | Possible Crannog |

MacDowell, U. 1983 *Irish Logboats*, No 156; 'Topographical Files' National Museum of Ireland; Raftery, JR. *Seaby Survey Files*, Raftery No 15.

Boat Number: I081-2

NGR: N 01 95

Boat Name: Clooncoe 2-3

OD: 40m (Water Level)

Townland: Clooncoe

Site Lough Rinn

County: Leitrim

Two 'bottoms of old dugouts' were found in 1933 near the east shore of Lough Rinn. Their lengths were taken as c.6.10 and c.3.05 metres. They were left *in situ*.

Sites:

|                |             |                  |
|----------------|-------------|------------------|
| SMR Number     | 036-013     | 036-019          |
| Townland       | Clooncoe    | Clooncoe         |
| Nat. Grid Ref. | 21016 29289 | 21045 29120      |
| Site           | Crannog     | Possible Crannog |



port side broke in four parts and its 'ribs, seat brackets and repairing boards were torn from their positions and left lying on the bank'. Both the bow and stern were also damaged. 'Local people had carried away pieces containing nails as souvenirs'. It was examined by O hEailidhe. An iron staple, nine iron nails, a seat bracket, a sample of the hull's wood and two ribs were taken to the National Museum of Ireland. The boat was left on the river bank and no longer survives.

In plan the boat was parallel-sided with squared ends. The wider end was taken to be the stern. The longitudinal section was not noted, but the cross-section was flat-bottomed with vertical sides.

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Min Side T | Max Side T |
|--------|-------|--------------|---------|------------|------------|
| 7.85   | 0.83  | 0.45         | 0.07    | 0.02       | 0.04       |

A number of features are present in the boat. Two circular holes, 4cm in diameter and of unknown function are located 30cm below gunwale level in the stern. Three pairs of L-shaped fitted ribs which extend to the gunwales are dowelled and nailed into place. The remains of three seats were found. They were held in place by two opposing pairs of dowels which are located at the stern, 1.30m and 3.20m from the stern. A 'large staple and chain link' of unknown function was found 'attached to a piece of timber in the bow'. Six repairs were conducted on the boat. Their details are as follows:

Repairs (in centimetres):

| Repair No | Location          | Repair Purpose      | Materials Used                         | Board Size   |
|-----------|-------------------|---------------------|--|--------------|
| 1         | Stern (int)       | 'over old fracture' | Board Nails                            | 47 x 17cm    |
| 2         | Under Stern       | 'over fracture'     | Board, Dowels, 6 nails                 | 60 x 30      |
| 3         | Below Stern       | 'over fracture'     | 'Oval patch', Board, Nails, Dowels     | 55 x 22      |
| 4         | Below Seat 2(ext) | 'over 2 knot holes' | Plank, Nails                           | 118 x 16     |
| 5         | Starboard Gunwale | Replace Gunwale     | 1 Board, 2 small boards, Dowels, Nails | 315 x 23 x 3 |
| 6         | 'In low' (ext)    | Not noted           | Board, 7 Dowels, 18 Nails              | 44x40x25     |

There were two sizes of dowel used, 2.5cm and 1.25cm in diameter. The nails had square shanks with slightly domed heads. Although the location of the footrests was not noted, it is possible they served as rower's footrests as well as to strengthen the hull. However, no tholepin holes were noted.

'Topographical Files' National Museum of Ireland.

Boat Number: I085-086

NGR: M 90 78

Boat Name: Cloonfinlough

OD: 50m (Water Level)

Townland: Cloonfinlough

Site: Finn lake

County: Roscommon

Two 'single-piece oak canoes' were found in 1852 between a crannog and a ruined church on the mainland of Finn lake. They probably no longer survive.

Both boats were 'hollowed out of single oak trees'. They were no more than 61cm in width. The stern of one was pierced by 'numerous' holes of unknown function. Their diameters were 2.5cm.

The lake which presently measures approximately 900x400m contains a crannog:

|               |                  |
|---------------|------------------|
| SMR Number    | 029-052          |
| Townland      | Cloonfinlough    |
| Nat Grid Ref. | 19006 27840      |
| Site          | Crannog          |
| Site Date     | Bronze Age Finds |

Graves, Rev. J. 1858 'What we learn from Wilde's Catalogue of Antiquities in the Museum of the Royal Irish Academy' *JRSAI* 2, 131-2; MacDowell, U. 1983 *Irish Logboats*, No 211-2; Troyan, MF. 1859 'Details of Discoveries made at the Ancient Lake Habitations of Switzerland and Ireland' *JRSAI* 2, 131-2; Wilde, WR. 1863 *A Descriptive Catalogue in the Museum of the Royal Irish Academy* 1, 227; Wood-Martin, WG. 1866 *The Lake Dwellings of Ireland*, 50, 233-4.

Boat Number: I087-089

NGR: G 3 1

Boat Name: Cloongee 1-3

OD: 30m

Townland: Cloongee

Site: River Moy

County: Mayo

A 'piece of dugout canoe' was found in 1966 or before in the bed of the River Moy. A sample of end and portion of the gunwale, 57cm long was preserved. The rest was in extremely poor condition and could not be saved. The remainder consisted of the boat's floor. Two other boats 'were found in the same areas', both of which were incomplete. They were presumably left *in situ*.

The recovered boat's end was rectangular in plan. In longitudinal-section it was flat-bottomed with an inclined end and 'a flat top'.

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Side T | End T |
|--------|-------|--------------|---------|--------|-------|
| 4.40   | 0.37  | 0.38         | 0.08    | 0.03   | 0.10  |

'Through the flat' top two circular holes were bored at an angle to the outer face of the end of the boat'. They were set 20cm apart and 9cm 'from the edge of the boat'. Their diameters were 3cm. The function of the holes was not noted.

'Acquisitions for the year 1966' *JRSAI* 99, 1969, 113-4.

**Boat Number:** I090 **NGR:** M 589 817  
**Boat Name:** Cloontarsna **OD:** 80m (Water Level)  
**Townland:** Cloontarsna **Site:** Lough O'Flynn  
**County:** Roscommon

In 1973 a 'dugout canoe' was found on the northeastern shore of Lough O'Flynn. It was examined, drawn and photographed by Wallace. It was in 'good condition' when found, 'hollowed out of a single oak trunk', but part of the stern by the sternboard groove was missing. It is now on display in Knock Folk Museum where it was visited in February 1993. It is wall mounted and inaccessible to examination. The boat's remains now consist of the bottom which has warped considerably and its surface is very flaky.

In plan the boat tapered from the stern to the bow which was a rounded-point in shape. The stern had held a stern board part of which was recovered from the lake. In cross-section it was U-shaped with flared sides while its longitudinal-section was flat-bottomed with an inclined bow. Internally the bow had a step.

Dimensions (in metres)

| Length | Bow Length | Height (int) | Min Side T | Max Side T |
|--------|------------|--------------|------------|------------|
| 3.77   | 0.37       | 14.5         | 0.02       | 0.03       |

A number of widths were noted ( in centimetres).

| Distance from Stern: | Stern | 100  | 200  | 300 |
|----------------------|-------|------|------|-----|
| Width (int)          |       | 46   | 43   | 42  |
| Width (ext)          | 57.0  | 50.5 | 46.5 | 48  |

The stern board was 'D-shaped' while the groove was rectangular in section with a width of 6cm and depth of 4.8cm. It was located 37cm from the stern.

The lake which measures approximately 3 by 1.2km has a crannog in it which is located c.350m from the boat's find spot.

|                      |             |
|----------------------|-------------|
| <b>SMR</b>           | 025-004     |
| <b>Townland</b>      | Cloontarsna |
| <b>Nat. Grid Ref</b> | 15822 27873 |

|      |         |
|------|---------|
| Site | Crannog |
|------|---------|

'Topographical Files' *National Museum of Ireland*

**Boat Number:** I091-095 **NGR:** M 58 81  
**Boat Name:** Cloontarsna 2-6 **OD:** 80m (Water Level)  
**Townland:** Cloontarsna **Site:** Lough O'Flynn  
**County:** Roscommon

Survey work by the Irish Underwater Archaeological Research Team, in Lough O'Flynn in 1989-90, revealed 'at least five' dugout boats. They are situated in the structure of a crannog from which they protrude. They remain *in situ*. The relevant details of the crannog are as follows:

|                         |                                     |
|-------------------------|-------------------------------------|
| <b>SMR Number</b>       | 025-004                             |
| <b>Townland</b>         | Cloontarsna                         |
| <b>Nat Grid Ref</b>     | 15822 27873                         |
| <b>Site</b>             | Crannog                             |
| <b>Site Date</b>        | Not Known                           |
| <b>Boat Association</b> | Incorporated into crannog structure |

Boland, D. 1993 *Irish Underwater Archaeological Research Team, pers. comm.*

**Boat Number:** I096 **NGR:** H 31 30  
**Boat Name:** Clowninny **OD:** 50m (Water Level)  
**Townland:** Clowninny **Site:** Upper Lough Erne  
**County:** Cavan **Form:** Canoe

An oak 'canoe' was found before 1872 when a 'steamer' which ran aground in Upper Lough Erne pushed it out of the water. Neither the bow nor the stern survived and little of either side remained. It was in the National Museum of Ireland up to the 1970s, but now no longer survives. However, it was drawn at some stage by Raftery.

In plan the boat was parallel-sided with rounded ends. Both its longitudinal and cross-section were flat-bottomed, and the sides rose vertically through rounded chines.

Dimensions (in metres):

| Length | Width (ext) | Width (int) | Height (ext) | Height(int) | Floor T | Sides T |
|--------|-------------|-------------|--------------|-------------|---------|---------|
| 2.44   | 0.50        | 0.40        | 0.20         | 0.12        | 0.08    | 0.05    |



Three sets of three holes cross the floor near either end and amidship. The central holes are located along the long axis and the remainder are set vertical to the wood through the chines. Their most likely function is that of thickness gauges and/or fitted ribs.

MacDowell, U. 1983 *Irish Logboats*, No 41; MacAlister, R A S. 1949 *The Archaeology of Ireland*, 318; Raftery, R. *Seaby Survey Files*; Wakeman, WF. 1872 'On Some Antiquities of Oak' *JRSAI* 2, 17-8; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 49.

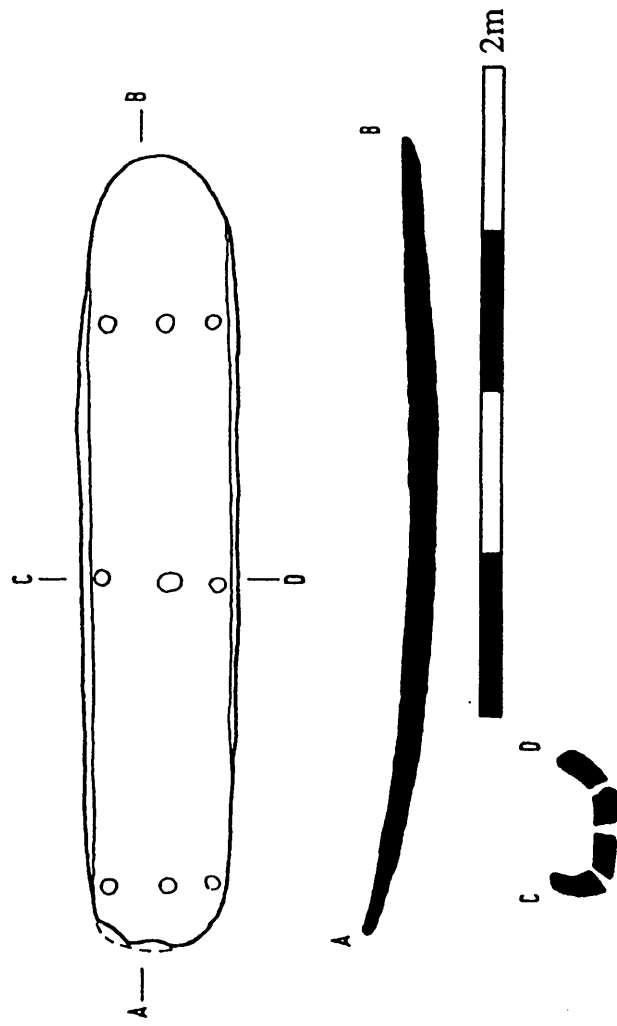


Figure 14: Clowninny (after Raftery)

**Boat Number:** I097

**Boat Name:** Co. Cavan

**County:** Cavan

'An oak boat, hollowed out of a single tree' was found c.1859 in County Cavan. It was given to the Royal Irish Academy in 1859. It probably no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 7.24   | 0.74  |

'Register' 1859 *National Museum of Ireland*, No.176.

**Boat Number:** I098

**Boat Name:** Co. Galway

**County:** Galway

A 'canoe' made from a 'single oak piece' was found c.1880 'after a bogslip on the Galway side of the river'. Neither the river nor what happened to the boat are noted. It probably no longer survives. It was flat-bottomed and 'shallow'.

Dimensions (in metres):

| Length | Width (ext) | Height |
|--------|-------------|--------|
| 7.32   | 0.71        | 0.30   |

Wakeman, W F. 1895 *Catalogue of Antiquities in the Collection of the RIA*, 106, No 740.

**Boat Number:** I099

**NGR:** C 80 33

**Boat Name:** Coleraine

**OD:** 5m

**Townland:** Coleraine

**Site:** Lower River Bann

**County:** Derry

A logboat was found in the centre of the Lower Bann River. It was embedded in the mud and one side was missing. It was 'formed out of the trunk of an oak tree'. There is no further record of it and it probably no longer survives. Its shape was not noted.

Dimensions (in metres):

| Length | Width | Height (ext) | Height (int) |
|--------|-------|--------------|--------------|
| 4.88   | 0.81  | 0.43         | 0.36         |

On the surviving side, two thwart supports were located with two tholepin holes. The tholepin holes situated 30.5cm to the stern of each thwart support were noted as holes in the gunwale. The Thwart supports were 'grooves' located 7.6cm below the gunwale and were 7.6cm wide and 1.9cm deep.

MacDowell, U. 1983 *Irish Logboats*, No 81; Unnamed Source, *Seaby Survey Files*.

**Boat Number:** I100 **NGR:** N 534 685  
**Boat Name:** Collinstown **OD:** 95m (Water Level)  
**Townland:** Collinstown **Site:** Lough Lene  
**County:** Westmeath **Form:** Punt

A 'dug out canoe' was found in 1968 close to the shore of Lough Lene by a member of Mullingar Sub-Aqua Club. It was brought ashore and examined by National Museum of Ireland staff, photographed and drawn, then replaced *in situ*. The boat was in poor condition with 'over half of the gunwales' missing along with part of the stern. It was also split from end to end.

In plan the boat is parallel-sided with a square stern and a rounded point at the bow. Its cross-section is flat bottomed with flared sides, while its longitudinal section shows a flat bottom with an inclined bow.

Dimensions (in metres):

| Length | Width | Height (int) | Bow L | Min. Floor T | Max .Floor T | Bow T |
|--------|-------|--------------|-------|--------------|--------------|-------|
| 7.17   | 1.22  | 0.33         | 0.35  | 0.03         | 0.05         | 0.15  |

On the underside of the boat at the stern are 'two runners' on either side which are 50cm long and protrude 5cm beyond the stern. Internally on the starboard side two 'mortices' are located 60cm apart. The port side does not survive to the same height. The foremost one is 2.30m from the bow. Both are 7cm wide, 4cm high and 3.5cm deep. They were intended for thwarts at 53cm from the stern most mortice on the starboard side is a vertical slot. It was not noted where on the side it was. Its intended function is not clear.

Near the shore and approximately 400m to the east of the boat is a monastic site:

|                      |               |
|----------------------|---------------|
| <b>SMR Number:</b>   | 008-025       |
| <b>Townland</b>      | Collinstown   |
| <b>Nat. Grid Ref</b> | N5216 6777    |
| <b>Site</b>          | Monastic Site |

'Correspondence Files' *National Museum of Ireland*, 1A/165/68.



**Boat Name:** Copney

**Site:** River Blackwater

**Townland:** Copney

**County:** Armagh

In 1987, due to drainage work on the River Blackwater, an oak 'dug-out' boat was found. It was examined and drawn by Fry (Department of the Environment) and Bourke (Ulster Museum), and buried at the Department of the Environment Depot, Markethill. The drawing shows that the ends survived as a slight up-turn of the floor. While the are sides missing, the chines survive. The boat was radiocarbon-dated to  $585 \pm 30$  BP (Gr.N-16866).

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 1.90   | 0.46  |

Amidships in the floor are an opposing pair of 'raised features' which appear to be footrests.

Fry, M. 1988 *Seaby Survey Files*, No. 73.

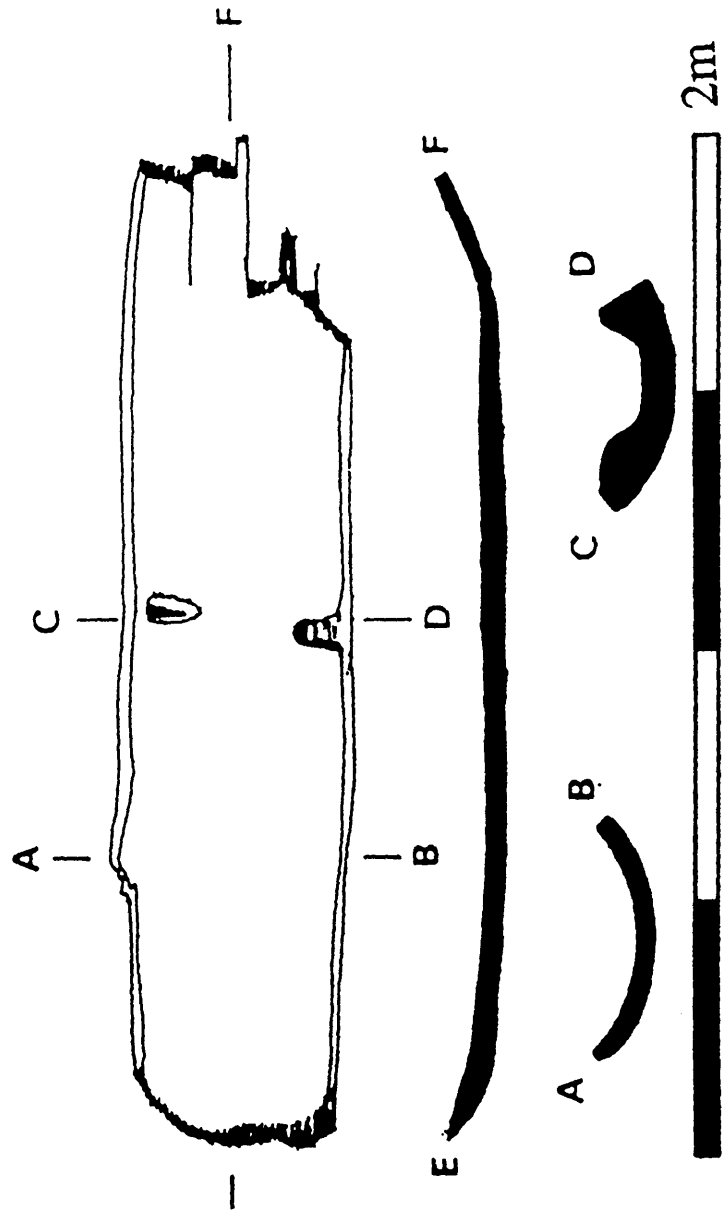


Figure 15: Copney (after Bourke)







Site:

|                         |   |
|-------------------------|---|
| <b>SMR Number</b>       | 021-014                                 |
| <b>Townland</b>         | Cornagall                               |
| <b>Nat. Grid Ref.</b>   | 24920 30887                             |
| <b>Site</b>             | Crannog                                 |
| <b>Boat Association</b> | Found near crannog, may be contemporary |

The lake now measures approximately 90x60 metres. It is surrounded by marshy land (probably the previous extent of the lake) of approximately 300x150 metres.

MacDowell, U. 1983 *Irish Logboats*, no 42; Munro, R. 1890 *The Lake Dwellings of Europe*, 391; 'Topographical Files' *National Museum of Ireland*; Wakeman, WF. 1871 'Observation on some Iron Tools and other Antiquities lately discovered in the Crannog of Cornagall, Co. Cavan.' *JRSAI* 11, 461-5, Pl.2.

**Boat Number:** I111

**NGR:** N 424 988

**Boat Name:** Cornaseer 1

**OD:** 120m

**Townland:** Cornaseer

**Site:** Lake

**County:** Cavan

A 'very fine canoe...made from the trunk of a single oak' was found prior to 1885 beside Lough Cornaseer. It was embedded in peat above the former lake bottom. Its fate is not known.

The lake which now measures approximately 400x200 metres contains a crannog.

Site:

|                      |             |
|----------------------|-------------|
| <b>SMR Number</b>    | 025-024     |
| <b>Townland</b>      | Cornaseer   |
| <b>Nat. Grid Ref</b> | 24157 29889 |
| <b>Site</b>          | Crannog     |

MacDowell, U. 1983 *Irish Logboats*, No 43; Milligan, SF. 1885 'Crannogs in County Cavan' *JRSAI* 17, 149; Munro, R. 1890 *The Lake Dwellings of Europe*, 319.

**Boat Number:** I112 **NGR:** N 424 988  
**Boat Name:** Cornaseer 2 **OD:** 120m  
**Townland:** Cornaseer **Site:** Lake  
**County:** Cavan

A 'canoe' was found in the lake prior to 1885. It was used 'to bridge across a deep drain'. It probably no longer survives.

Dimensions (in metres)

| Length | Width |
|--------|-------|
| 5.48   | 0.61  |

The lake which now measures approximately 400x200 metres contains a crannog.

Site:

|                       |             |
|-----------------------|-------------|
| <b>SMR Number</b>     | 025-024     |
| <b>Townland</b>       | Cornaseer   |
| <b>Nat. Grid Ref:</b> | 24157 29889 |
| <b>Site</b>           | Crannog     |

MacDowell, U. 1983 *Irish Logboats*, No 44; Milligan, SF. 1885 'Crannogs in County Cavan', *JRSAI* 17, 149; Munro, R. 1890 *The Lake Dwellings of Europe*, 319.

**Boat Number:** I113 **NGR:** G 99 19  
**Boat Name:** Corrachuill **OD:** 50m (Water Level)  
**Townland:** Corrachuill **Site:** Lough Allen  
**County:** Leitrim **Form:** Punt

A 'dugout' boat was found in 1984 on the east shore of Lough Allen. It was examined, photographed and drawn by Cahill, National Museum of Ireland. Its fate is not known. When examined it was found to be badly damaged with both ends worn away and little of the sides remaining.

The boat's plan was not noted. However, it was flat bottomed in longitudinal section and flat-bottomed with flared sides in cross-section.

Dimensions (in metres)

| Length | Max. Width | Max. (int) Height |
|--------|------------|-------------------|
| 4.9    | 0.65       | 0.05              |

There were 3 holes set transversely across the floor at 1.5 metres from one end. Their diameters varied between 3 and 3.5cm, and one of them was plugged. They were used to fasten a fitted rib.

The boat was found in a 2km by 800m inlet of Lough Allen, in which there are two crannogs.

Site:

|                      |             |             |
|----------------------|-------------|-------------|
| <b>SMR Number</b>    | 023-005     | 023-027     |
| <b>Townland</b>      | Lough Allen | Lough Allen |
| <b>Nat.Grid Ref.</b> | 19663 31154 | 19663 31140 |
| <b>Site</b>          | Crannog     | Crannog     |

'Correspondence Files' *National Museum of Ireland*, 1A/173/84.

**Boat Number:** I114

**NGR:** H 35 30

**Boat Name:** Corradillar

**OD:** 45m

**Townland:** Corradillar-

**Site:** Upper Lough Erne

**Derryad-Geaglum**

**County:** Fermanagh

An oak 'dugout canoe' was found in October 1947 in Upper Lough Erne between Lord Craigavon Bridge and Derryad Quay. When found it was in very poor condition with both ends and sides damaged. It was drawn and sketched by Major H. Cavendish Butler. It probably no longer survives.

In plan it was parallel-sided. Its longitudinal-section was flat-bottomed with rounded ends, while its cross-section was flat-bottomed with vertical sides.

Dimensions (in metres):

| <b>Surviving Length</b> | <b>Possible original Length</b> | <b>Max. Width</b> |
|-------------------------|---------------------------------|-------------------|
| 4.9                     | 5.5                             | 0.76              |

Visible in the sketch is a repair patch on one side of the floor which consists of a flat board held in place by treenails.

MacDowell, U. 1983 *Irish Logboats*, No. 102; Seaby, W.A. *Seaby Survey Files*, No.9.

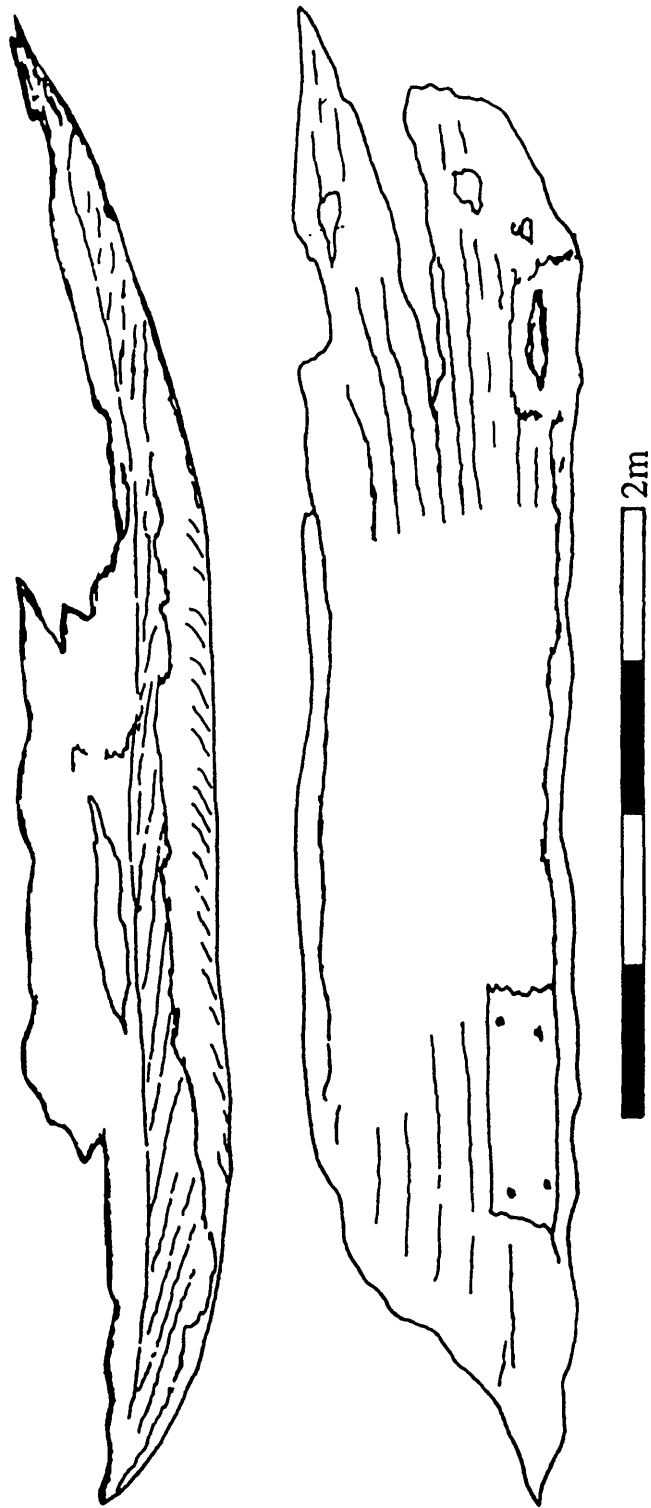


Figure 16: Corradillar (after Butler)

**Boat Number:** I115 **NGR:** G 966 238  
**Boat Name:** Corry 1 **OD:** 50m (Water Level)  
**Townland:** Corry **Site:** Lough Allen  
**County:** Leitrim **Form:** Canoe

An 'oak...dug-out canoe' was found in 1944 on the shore of Lough Allen, due to a drop in the water level. It was examined and drawn by Tohall. When found both ends were damaged and the sides did not survive to their full height. Its fate was not noted. It probably no longer survives. Another dugout boat was found nearby, of which both 'canoes appear to be duplicates in every way' (Corry 2, boat number I116).

In plan the boat was parallel-sided with rounded ends both internally and externally, between which a flat platform composed their thickness. In cross-section it was flat-bottomed with vertical sides, while its longitudinal-section was flat bottomed with inclined ends.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 7.3    | 0.81  | 0.30         |

Site:

|                        |                          |
|------------------------|--------------------------|
| <b>SMR Number</b>      | 018-036                  |
| <b>Townland</b>        | Corry                    |
| <b>Nat. Grid. Ref.</b> | 19587 32310              |
| <b>Site</b>            | Castle, c.200m from boat |

MacDowell, U. 1983 *Irish Logboats*, No154; 'Topographical Files' *National Museum of Ireland*;  
 Tohall, P. 1945, 'Two Dug-out Canoes from Co. Leitrim', *JRSAI* 75, 59; Tohall, P. 1948,  
 'Supplementary Note on a Dug-out Canoe', *JRSAI* 77-8, 181.

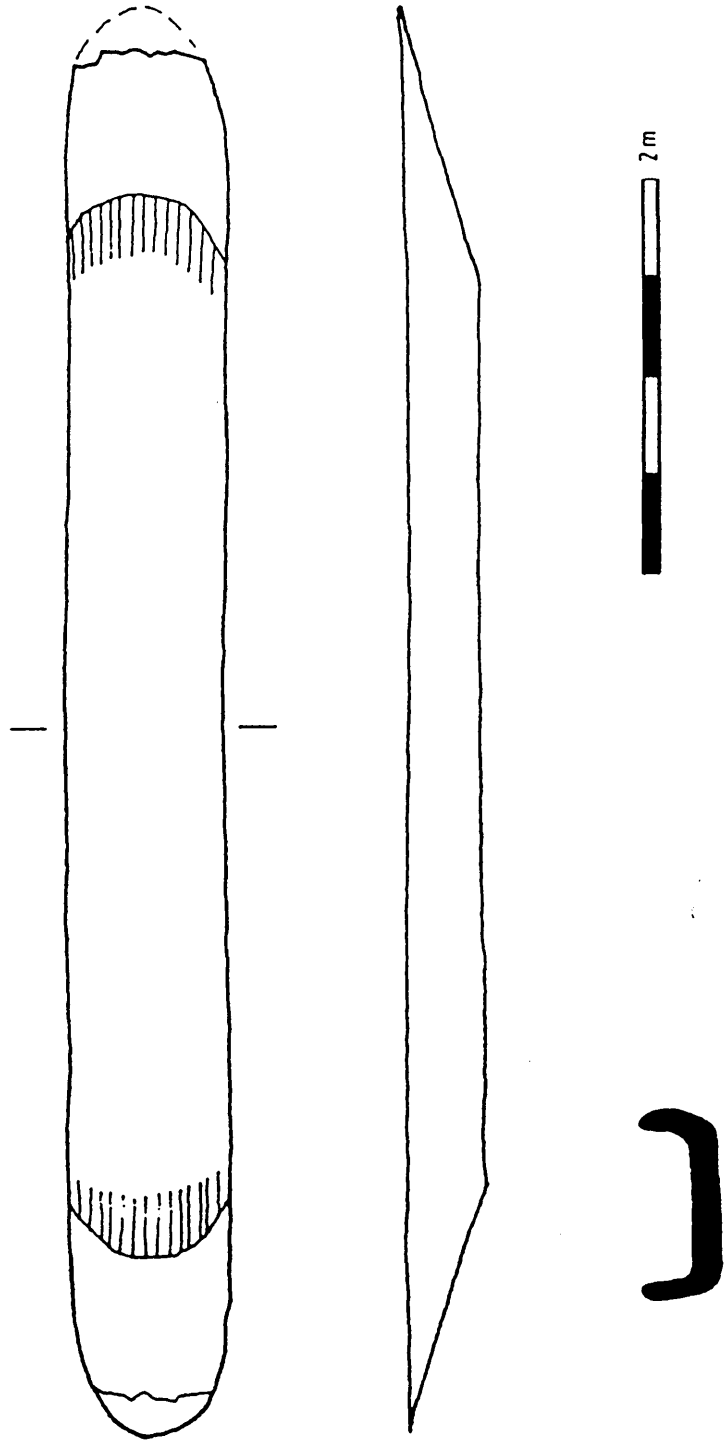


Figure 17: Corry 1 (after Tohall)

**Boat Number:** I116 **NGR:** G 968 238  
**Boat Name:** Corry 2 **OD:** 50m (Water Level)  
**Townland:** Corry **Site:** Lough Allen  
**County:** Leitrim **Form:** Canoe

In 1944, an 'oak...dug-out canoe' was found on the shore of Lough Allen, due to a drop in the water level. It was found near its 'duplicate' except it was not in as good as condition as the first (Corry 1, Boat Number: I115). It was examined by Tohall, who did not note its fate. It probably no longer survives.

It was parallel-sided with rounded ends both internally and externally, between which a flat platform composed their thickness. In cross-section it was sub-rectangular with a flat bottom and inclined ends in longitudinal section. The Dimensions noted were that the sides were worn down to a height of 10cm.

Sites:

|                        |                          |
|------------------------|--------------------------|
| <b>SMR Number</b>      | 018-036                  |
| <b>Townland</b>        | Corry                    |
| <b>Nat. Grid. Ref.</b> | 19587 32310              |
| <b>Site</b>            | Castle, c.200m from boat |

MacDowell, U. 1983 *Irish Logboats*, No.155; 'Topographical Files' *National Museum of Ireland*;

Tohall, P. 1945 'Two dug-out Canoes from Co. Leitrim', *JRSAI* 75, 59.

**Boat Number:** I117 **Form:** Barge  
**Boat Name:** Co. Tyrone  
**County:** Tyrone

An oak 'dug-out' boat was found at an unknown date and location in County Tyrone. When found it was 'broken and charred'. It was drawn by Bourke (Ulster Museum) in 1986 at St. Patrick's Secondary School, Ballymena where it probably remains. From the drawing, it can be noted that the sides are damaged and central parts of both the bow and stern are missing through radial splitting which continues along the bottom from both ends. The report notes it was 'badly damaged in a recent fire'.

In plan it is parallel-sided with a squared stern and a bow which length is rounded-point in form. In longitudinal-section it is flat-bottomed with a vertical stern and rounded bow, which in cross-section, the flat-bottom rises to slightly flared sides.



Dimensions (in metres):

| Length | Width | Height(int) | Height(ext) | Side T | Floor T |
|--------|-------|-------------|-------------|--------|---------|
| 1.95   | 0.50  | 0.20        | 0.25        | 0.02   | 0.05    |

Fry, M. *Seaby Survey Files*, No 76.

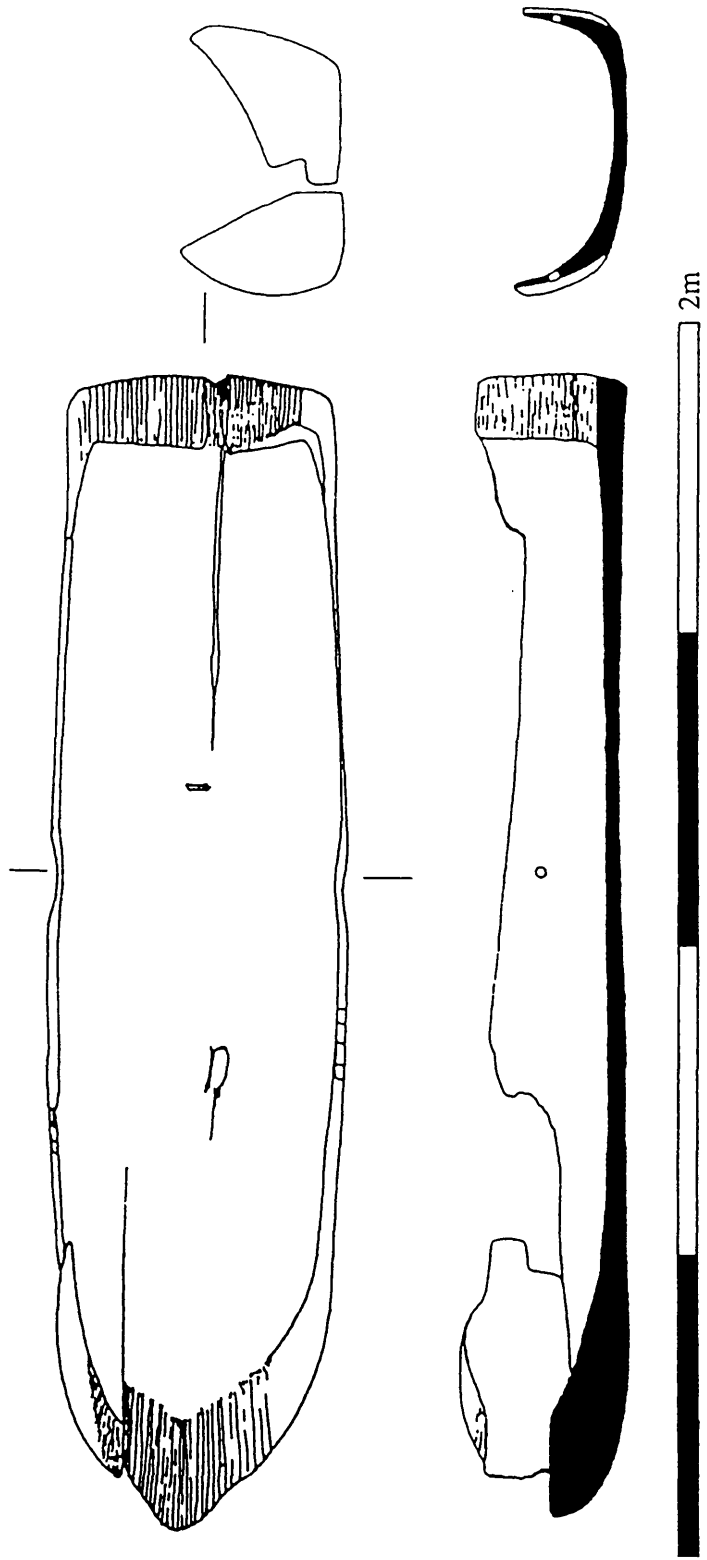


Figure 18: Co. Tyrone (after Bourke)

**Boat Number:** I118

**Boat Name:** Co. Waterford

**County:** Waterford

An 'ancient boat' was found in a bog prior to 1842 on Sir Charles Kennedy's estate. It probably no longer survives. It was rounded in cross-section and had a 'keel'.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 2.59   | 0.86  |

The keel or keelson probably consisted of an external ridge running externally along the boat's length which would have been used to protect the boat's bottom from wear.

Hughes, W.I. 1840-44 'On an Ancient Boat found near Drogheda' *PRIA* 2, 247; MacDowell, U. 1983 *Irish Logboats*, No 257.

**Boat Number:** I119

**OD:** 50m

**Boat Name:** Cranaghan

**Site:** River Rag

**Townland:** Cranaghan

**County:** Cavan

An oak 'dug-out canoe' was found in River Rag in 1935. It was discovered during dredging operations. It was in a poor condition with only the bottom and 'parts of the sides' surviving. The boat was left on the riverbank.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.57   | 0.61  |

MacDowell, U. 1983 *Irish Logboats*, No 61; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I120

**NGR:** H 955 894

**Boat Name:** Creagh 1

**OD:** 10m

**Townland:** Creagh

**Site:** Moyola River

**County:** Derry

Part of an oak 'dug-out' boat was found during dredging operations in Moyola River in 1954. It was examined and drawn by Seaby and Thompson. Its fate was not noted and probably no longer survives. When found, both ends were missing and it was longitudinally split so that only half of its width survived.

From the drawing, little can be determined of the boat's original form. It 'looks like a large, jagged plank, straight along one side, widest in the middle' and tapers to either end.

Dimensions (in metres):

| Length | Max surviving Width | Floor Thickness |
|--------|---------------------|-----------------|
| 3.35   | 0.91                | 0.02            |

A large knothole was noted as a large semi-circular indentation along one side which was originally on the long axis of the boat.

Features (in centimetres)

| Feature     | Location       | Length  | Width   | Purpose                  |
|-------------|----------------|---------|---------|--------------------------|
| Thwart rest | Midship side   |         |         | Thwart rest              |
| Foot Rest   | Floor          |         |         | Rowing                   |
| 4 Holes     | Floor near end | 1.2-2.5 | 1.2-2.5 | Possible Repair Patch    |
| 4 Holes     | Along Floor    | 1.2-2.5 | 1.2-2.5 | Possible Thickness-Gauge |

MacDowell, U. 1983 *Irish Logboats*, No 78; Seaby, WAS. 1954 *Seaby Survey Files*, No 43.

**Boat Number:** I121

**NGR:** H 955 1894

**Boat Name:** Creagh 2

**OD:** 10m

**Townland:** Creagh

**Site:** Moyola River

**County:** Derry

Part of an 'oak dug-out' boat was found in 1954 in Moyola River during dredging operations. It was examined and drawn by Seaby (DOE.) and Thompson (Ulster Museum). Both ends and most of the sides were missing. Its fate is not known and probably no longer survives.

Only its longitudinal section was noted in the drawing, which was flat-bottomed rounding up to one end.

Dimensions (in metres):

| Length | Height (ext) | Height (int) | Floor Thickness |
|--------|--------------|--------------|-----------------|
| 3.99   | 0.42         | 0.38         | 0.04            |

Features (in centimetres):

| Feature     | Distance from rounded end | Length | Width | Height/Depth | Purpose                  |
|-------------|---------------------------|--------|-------|--------------|--------------------------|
| Thwart seat | 221 (side)                |        |       |              | Seat                     |
| Hole        | Midship Floor             | 1.3    | 1.3   | 3.8          | Possible thickness Gauge |

|        |                           |  |  |  |           |
|--------|---------------------------|--|--|--|-----------|
| Groove | 7.6<br>(Transverse Floor) |  |  |  | Not known |
|--------|---------------------------|--|--|--|-----------|

The Groove was noted by Seaby as a possible stern board groove. However, this is very unlikely since from the drawing it appears to be 3cm in width and 2cm in depth. These dimensions are much smaller than other sternboard grooves. Also in longitudinal section the floor curves up prior to this point. All other boats with stern grooves are flat-bottomed in longitudinal-section at that end.

MacDowell, U. 1983 *Irish Logboats*, No 79; Seaby, W.A. 1954 *Seaby Survey Files*, No 44.

**Boat Number:** I122

**NGR:** H 955 894

**Boat Name:** Creagh 3

**OD:** 10m

**Townland:** Creagh

**Site:** Moyola River

**County:** Derry

**Form:** Canoe

A 'dug-out' boat was found in 1954 in Moyola River during dredging operations. It was recovered at the same time as two other boats (I120-1). It was examined and drawn by Seaby and Thompson. Its fate was not noted and probably no longer survives. The drawing depicts a plan and elevation of the boats main body and one end only.

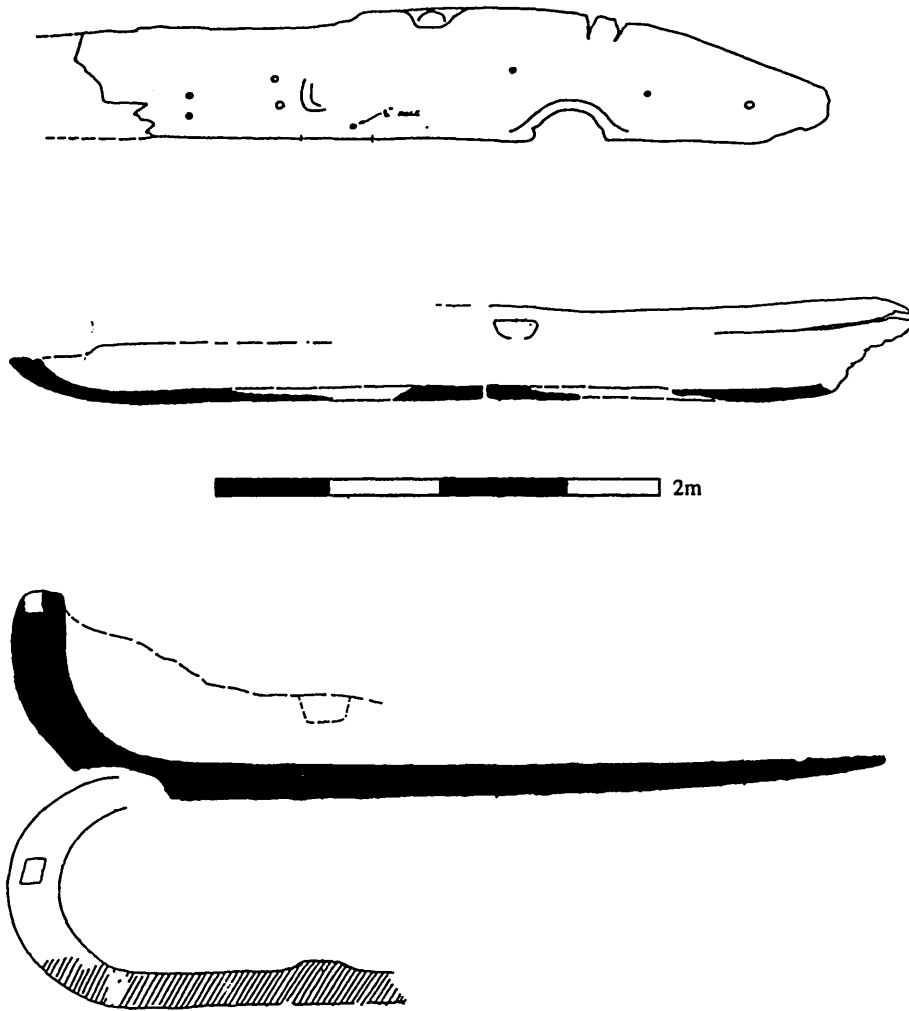
In plan it was parallel-sided with a rounded stern and a bow in the form of a rounded-point. Its longitudinal-section was flat-bottomed with rounded ends.

Dimensions (in metres):

| Length | Width | Height(ext) | Height(int) | Floor T | Site T |
|--------|-------|-------------|-------------|---------|--------|
| 3.86   | 0.99  | 0.91        | 0.76        | 0.15    | 0.22   |

A rectangular hole situated in the stern and measuring 10x7.5cm and 7.5cm in depth may have served as some form of mooring arrangement. At 1.37m from the stern a thwart rest survived internally on the starboard side as an internal projection.

MacDowell, U. 1983 *Irish Logboats*, No 80.



Figures 19, 20 and 21: Creagh 1, 2 and 3 (after Seaby and Thompson)

Boat Number: I123

NGR: H 169 634

Boat Name: Crevinish 1

OD: 45m (Water Level)

Townland: Crevinish

Site: Lower Lough Erne

County: Fermanagh

Form: Dissimilar-ended

An oak 'dug-out canoe' was found in Crevinish Bay, Lower Lough Erne, in 1961, and was raised in 1975 when the water level dropped. It was examined by Ulster Museum staff and drawn by Warner and Williams. It was raised from the lake sands, conserved and is now on display in the Forestry Visitors Centre at Castle Caldwell. Radiocarbon analysis at Queens University dated it to 2855±50 BP (UB-2396). However Fry (*pers. comm.*) says that the sample from which the date was obtained was contaminated by conservative materials and that a date of *circa* 0AD is more realistic.

When found, the boat consisted of the length of the bottom. Both chines survive along parts of its length. There has been little deterioration since its original examination. However it is slightly distorted through splitting and warping. One knothole indicated that the stern was the root end of the tree.

In plan the boat is parallel-sided with a double sternboard terminating the squared stern and a pointed bow or a rounded point. In longitudinal-section it is flat-bottomed with an angled bow and flat stern. In cross-section it is flat-bottomed with rounded chines which would have given way to vertical sides.

Dimensions (in metres):

| Length | Max Width | Max internal Height | Floor T | Stern Floor T | Side T |
|--------|-----------|---------------------|---------|---------------|--------|
| 10.5   | 0.68      | 0.16                | 0.06    | 0.12          | 0.04   |

Both sternboard grooves are rectangular-sectioned and traverse the floor for the boat's surviving width. The stern-most one is 5cm wide and 7cm deep while the other is 3cm wide and 6cm deep. At 25cm from the stern to the stern the floor thickness by 4.5cm giving a raised area in which both grooves are set.

Five ribs in the solid are located across the floor, the bow-most of which curves slightly at either end towards the stern. All were rectangular in section but have been worn down in places. Their details are tabulated below.

| Rib No | Distance from stern | Length | Height | Max Width | Min Width |
|--------|---------------------|--------|--------|-----------|-----------|
| 1      | 2.98m               | 29cm   | 4cm    | 8.5cm     | 2.5cm     |
| 2      | 3.58m               | 29     | 3      | 7         | 2         |

|   |      |    |     |   |     |
|---|------|----|-----|---|-----|
| 3 | 4.86 | 33 | 1.5 | 9 | 9   |
| 4 | 7.33 | 57 | 8   | 8 | 5.5 |
| 5 | 9.60 | 54 | 3.5 | 7 | 3.5 |

They were probably used to strengthen the boat's hull, to prevent warping, and or, used as footrests for possible rowing. However, the two stern-mast ribs are located close together, between which is a most step. The former is the most likely purpose.

The mast step and hole is located on the boat's long axis at 3.22m from the stern. The hole vertically pierces the bottom, it is sub-rectangular in plan and set into a raised oval area. The hole measures 12x8.5cm and 12.5cm in depth. The mound rises 6cm above the surface of the floor and measures 35x27cm. A series of small indentations or wedge-shaped marks are visible inside the hole which is the residue of enlarging the mast-step by chisel.

Other tool marks are visible on the floor. They consist of both axe and adze marks of which the average surviving blade length marks are 7.5 and 4cm respectively.

A series of 7 holes are located on the floor, of which 5 are located along the long axis which are probably thickness gauges and the remaining across the bow where they could have been thickness-gauges or method of holding a fitted rib in place to prevent bow splitting.

Holes:

| Hole No | Distance from Stern | Diameter | Depth | Plugged |
|---------|---------------------|----------|-------|---------|
| 1       | 4.61m               | 2cm      |       | Yes     |
| 2       | 6.10                | 2        |       | Yes     |
| 3       | 7.62                | 2        |       | Yes     |
| 4       | 8.86                | 2        |       | Yes     |
| 5       | 9.45                | 2        |       | Yes     |
| 6       | 9.95                | 2        | 3cm   | No      |
| 7       | 9.95                | 2        | 3.5cm | No      |

Fry, M. 1988 'Paddle Your Own!' *The Logboat in the North of Ireland*, Back cover; Fry, M. *Seaby Survey Files*, No 49; *Impartial Reporter* 25-9-75; *Impartial Reporter* 7-11-76; MacDowell, U. 1983 *Irish Logboats*, No 98; Survey: 15-2-92



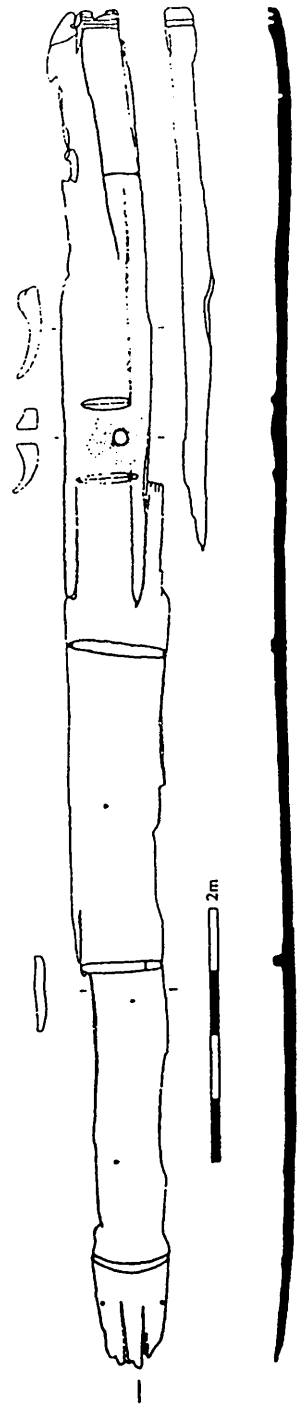


Figure 22: Crevinish 1 (after Warner and Williams)



| Length | Max Width | Min Width | Ends T | Floor T | Max Height (int) | Max Height (ext) |
|--------|-----------|-----------|--------|---------|------------------|------------------|
| 5.45   | 0.80      | 0.55      | 0.11   | 0.06    | 0.25             | 0.31             |

Eight holes were set vertically through the floor, some of them in three groups of two, one central on the longitudinal axis and the last near the wide end on one side of the long axis. The floor no longer survives at the other side of the last hole where there was probably a ninth hole. The group and eighth hole were probably used to secure fitted ribs and, or thickness-gauges, which the hole on the long axis was probably a thickness-gauge hole. Some of them which were originally circular were worn to an oval shape. Their diameters varied from 2cm to 5cm.

MacDowell, U. 1983 *Irish Logboats*, No 262; 'Topographical Files' *National Museum of Ireland*.

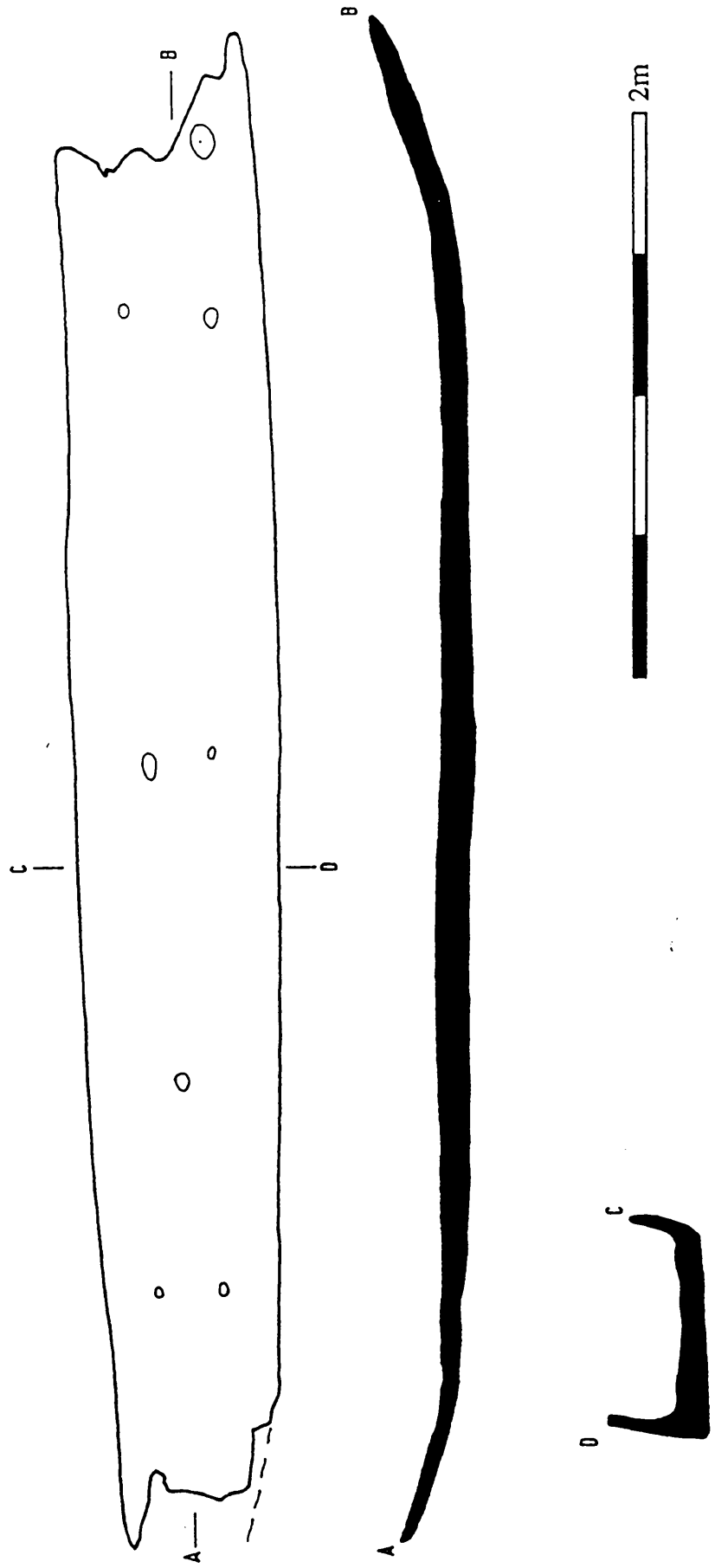


Figure 23: Culleen More (after Raftery)

**Boat Number:** I128 **NGR:** G 7 0  
**Boat Name:** Cuppanagh **OD:** 70m (Water Level)  
**Townland:** Cuppanagh **Site:** Lough Gara  
**County:** Sligo **Form:** Tapered

During drainage operations in 1952, a 'dug-out canoe' was found 'embedded in the silt of the new foreshore in Lough Gara, near Cuppanagh Bridge. When found, it was 'badly damaged' with sides and both ends worn down. A diagonal crack ran across the bottom. Its fate is not known. In plan it was parallel-sided, with a rectangular stern and a rounded point to the bow.

Its longitudinal-section was flat-bottomed with inclined ends, while its cross section was rectangular. No measurements were noted.

Cross, R. E. 1953 'Lough Gara; A Preliminary Survey' *JRSAI* 83, 94; MacDowell, U., 1983 *Irish Logboats*, No 235; McGrail, S. 1976 'Problems with Irish Nautical Archaeology' *IARF* 3, 23; 'Topographical File' *National Museum of Ireland*.

**Boat Number:** I129 **NGR:** N 233 790  
**Boat Name:** Currygrane **OD:** 75m  
**Townland:** Currygrane **Site:** Currygrane Lough  
**County:** Longford

A 'single-piece canoe' made of oak was found prior to 1885 at the northern end of Currygrane Lough. Its fate was not noted and probably no longer survives.

Dimensions (in metres):

| Length | Width | Surviving Height |
|--------|-------|------------------|
| 2.90   | 0.51  | 0.13             |

Two repairs were noted as 'two small pieces of wood nailed to the floor, and fastened with iron nails, very broad in the head and originally' 5.5cm long.

MacDowell, U. 1983 *Irish Logboats*, No 172; Munro, R. 1890 *The Lake Dwellings of Europe*, 391; Wood-Martin, WG. 1885 'Notes on Crannogs in Longford' *JRSAI* 7, 410.

**Boat Number:** I130 **NGR:** J 08 67  
**Boat Name:** Deerpark **OD:** 10m (Water Level)  
**Townland:** Deerpark **Site:** Lough Neagh  
**County:** Antrim **Form:** Tapered

A 'dug-out canoe carved from a single piece of oak' was found in January 1967 in Selshan Harbour, Lough Neagh. It 'had been uncovered in the bank of the Selshan Drain by a mechanical dredger. It was 'extensively damaged' during removal from the drain. Most of both the bow and stern and all of the port side no longer survived. It was examined and drawn by Warner (Ulster Museum). The boat was 'left at Selshan'. It probably no longer survives.

In plan the boat tapered slightly from near the stern to the bow. The stern was probably rounded, and not enough survived of the bow to determine its plan. In longitudinal-section it was flat-bottomed with a rounded stern, while its cross-section was rectangular with tumblehome at the gunwales.

Dimensions (in metres):

| Length | 'Original Length' | Width | Height (ext) |
|--------|-------------------|-------|--------------|
| 3.00   | 3.50              | 0.60  | 0.44         |

A number of features consistent with rowing were noted, they are as follows:

| Feature        | Metres from Stern | Location       | Height from Floor |
|----------------|-------------------|----------------|-------------------|
| 2 Footrests    | 0.75              | Floor          | 0.00              |
| Thwart Rest    | 1.75              | Starboard Star | 0.17              |
| Thole pin hole | 1.15              | Starboard Star | Gunwale           |

MacDowell, U. 1983 *Irish Logboats*, No.14, fig25; 'Topographical Files' *National Museum of Ireland*; Seaby, WA. *Seaby Survey Files*, No.31.

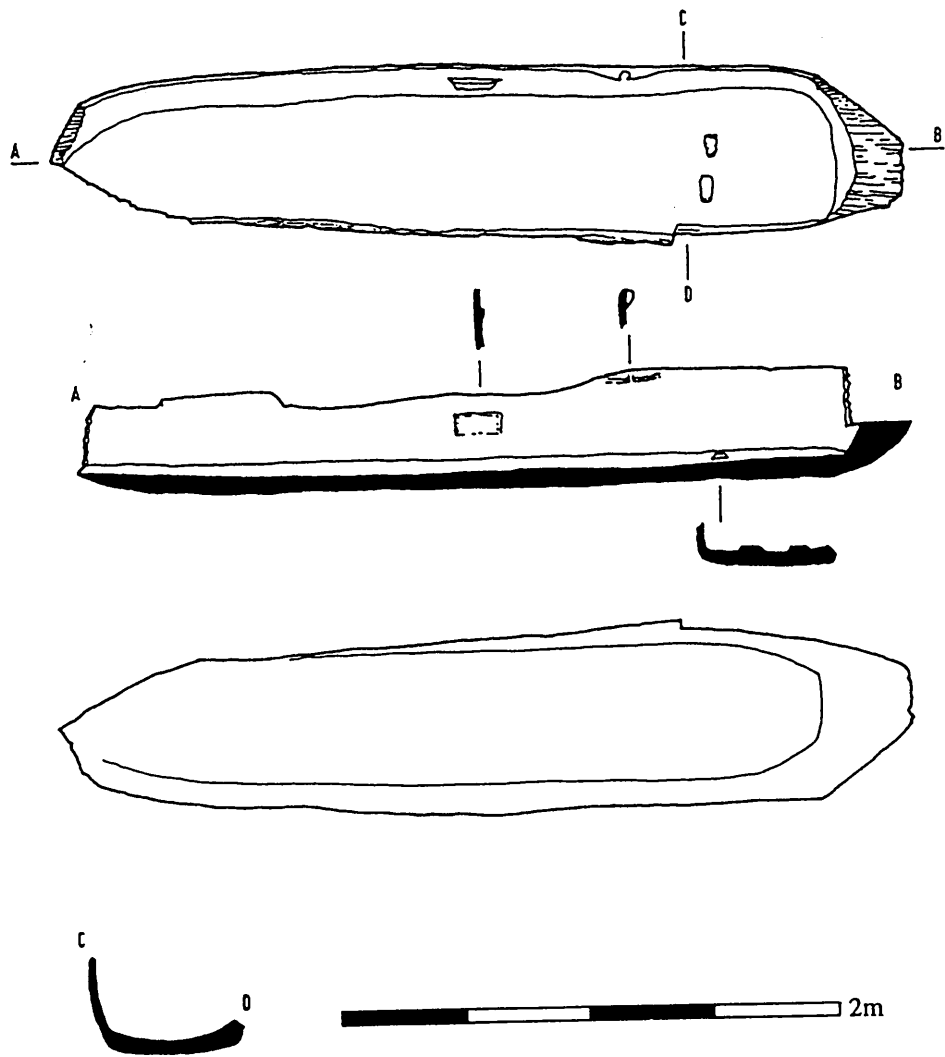


Figure 24: Deerpark (after Warner)





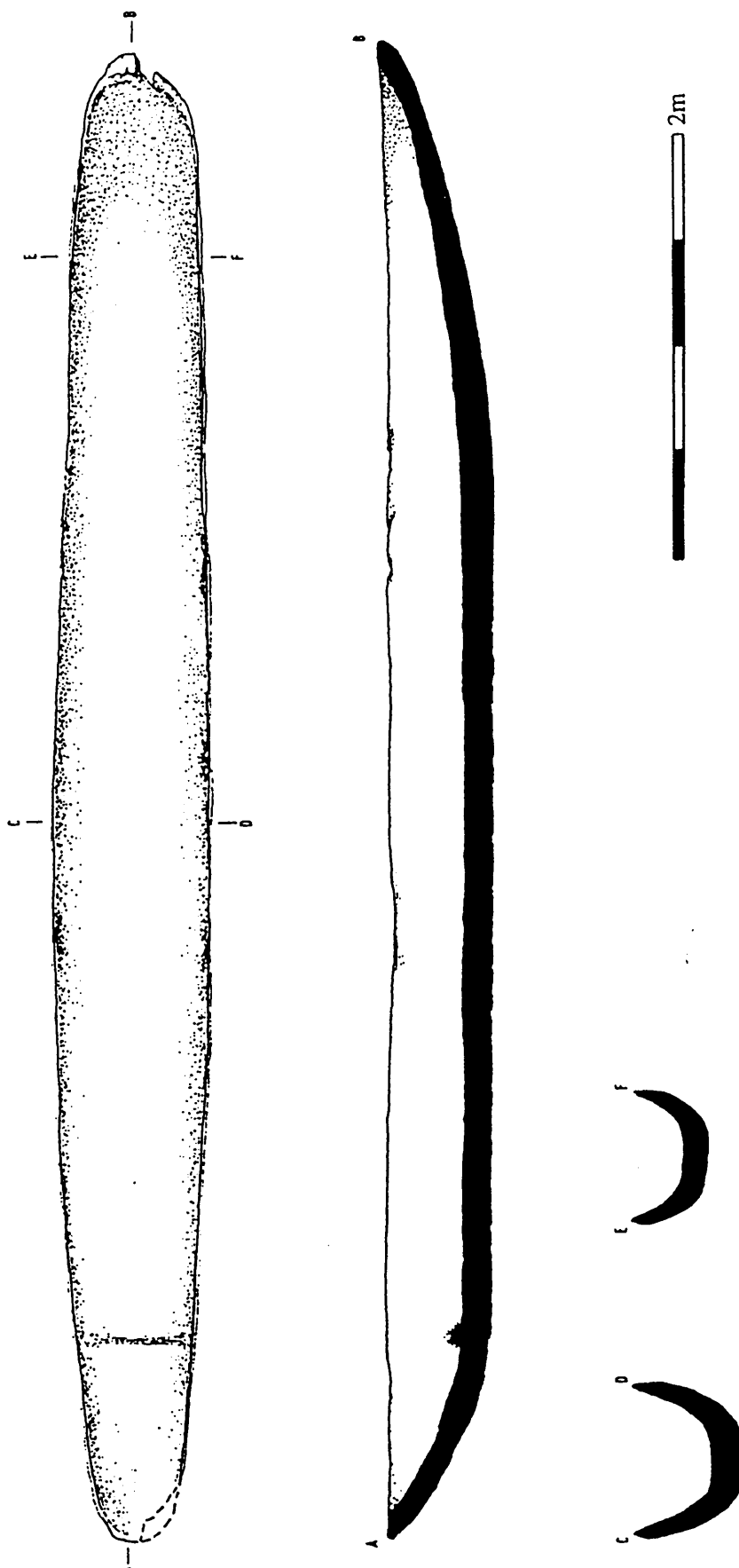


Figure 25: Derries Lower 4 (after MacDowell)

**Boat Number:** I135

**NGR:** N 394 685

**Boat Name:** Derrya 1

**OD:** 60m (Water Level)

**Townland:** Derrya

**Site:** Lough Derravaragh

**County:** Westmeath

**Form:** Canoe

An oak 'dugout canoe' was found in 1968 on the foreshore of Lough Derravaragh. It was examined and drawn by National Museum of Ireland personnel and then relocated in Tullyally Castle. It was also examined and drawn by MacDowell in 1983. The museum registered as 1968:244, and two iron nails from it as 1968:197-8. When it was found, only the bottom and both chimes survived. By February 1993 it had changed little, except that the surface of the wood has become very flaky.

In plan it is parallel-sided and both ends were rounded. Its cross-section is rectangular, and in longitudinal-section, it is flat-bottomed with what were rounded ends.

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Side T |
|--------|-------|--------------|---------|--------|
| 4.35   | 0.70  | 0.10         | 0.06    | 0.03   |

Five circular holes are set in one group of three across the floor near one end and the fourth near the other end and the last is on the long axis amidships.

Holes:

| Hole Number | Diameter | Plugged   | Purpose                    |
|-------------|----------|-----------|----------------------------|
| 1,2,3       | 2cm      | 1 plugged | Thickness-gauge/Fitted Rib |
| 4 & 5       | 1.3cm    | No        | Thickness-gauge            |

A repair patch is situated at the end with one hole. It consisted of a thin board 35x17cm held in place by eight treenails and four iron nails, two of which have been registered with the National Museum of Ireland.

The two iron nails measured 5cm in length, the shanks were 6mm thick and the heads were 2.1cm in diameter. The shanks were lozenge-shaped in cross-section while their heads were broad flat and irregularly shaped. Only one nail now remains in the patch.

*Irish Press* 28-6-68; MacDowell, U. 1983 *Irish Logboats*, No.264, fig 11; McGrail, S. 1978 *The Logboats of England and Wales*, 37; 'Acquisitions' 1979 *JRSAI* 101; 'Topographical Files' *National Museum of Ireland*.



Figure 26: Derrya 1 (after MacDowell)

Boat Number: I136

NGR: N 384 681

Boat Name: Derrya 2

OD: 60m (Water Level)

Townland: Derrya

Site: Lough Derravaragh

County: Westmeath

Form: Tapered

An 'oak dugout boat' was found in 1968 on the foreshore of Lough Derravaragh. It was examined and drawn by National Museum of Ireland personnel and then relocated in Tullyally Castle. It was also examined and drawn by MacDowell in 1983. The museum registered it on 1968:225. By February 1993 its condition had not changed since the 1983 examination. When it was found, it consisted of the bottom and small portions of the side. While both ends were damaged. By 1983, the condition had worsened to a very flaky nature to the wood with both the stern and parts of the starboard side split.

In plan, the boat tapers from its stern board groove to what appears to have been a rounded bow. Its cross-section is flat-bottomed rounding to flared sides, while in longitudinal-section, it is flat-bottomed with a rounded bow.

Dimensions (in metres)

| Length | Stern Width (ext) | Bow Width (ext) | Height (int) | Floor T | Sides T |
|--------|-------------------|-----------------|--------------|---------|---------|
| 7.35   | 0.80              | 0.40            | 0.06         | 0.06    | 0.04    |

The rectangular-section sternboard-groove contained fragments of willow from the previous sternboard:

| Feature           | Distance from Stern | Length | Max Width | Min Width | Depth |
|-------------------|---------------------|--------|-----------|-----------|-------|
| Sternboard Groove | 20cm                | 6.8cm  | 6.5cm     | 5cm       | 4cm   |

A mast step is located on the boat central axis:

|                | Length | Width | D/H  | Distance from Stern |
|----------------|--------|-------|------|---------------------|
| Mast Step Hole | 8cm    | 6cm   | 10cm | 2.70m               |
| Mast Step      | 21cm   | 17cm  | 4cm  | 2.56m               |

A number of holes were located along the long axis: their details are as follows:

| Hole Number | Distance from Stern | Length | Width | Depth | Plugged? | Plug type  | Purpose         |
|-------------|---------------------|--------|-------|-------|----------|------------|-----------------|
| 1           | 2.70m               | 4cm    | 2cm   | 6cm   | Yes      | Ash & Moss | Thickness gauge |
| 2           | 4.20m               | 4cm    | 4cm   | 6cm   | Yes      | Ash & Moss | Thickness gauge |
| 3           | 5.50m               | 4cm    | 2.5cm | 6cm   | Yes      | Ash        | Thickness gauge |

MacDowell suggests that Hole Number 2 was used to secure the mast. However, if the mast required securing, a more elaborate arrangement would have been necessary by perhaps securing guy-lines to the gunwales which no longer exists. A more plausible explanation is that of a thickness-gauge.

Running from hole number 3 is a 27cm and long and 2cm wide shallow groove of unknown purpose. It terminates by the port side.

*Irish Press* 28-6-68; MacDowell, U. 1983 *Irish Logboats*, No 265, Fig 12; McGrail, S. 1978 *The Logboats of England and Wales*, 17; 'Topographical Files' *National Museum of Ireland*.

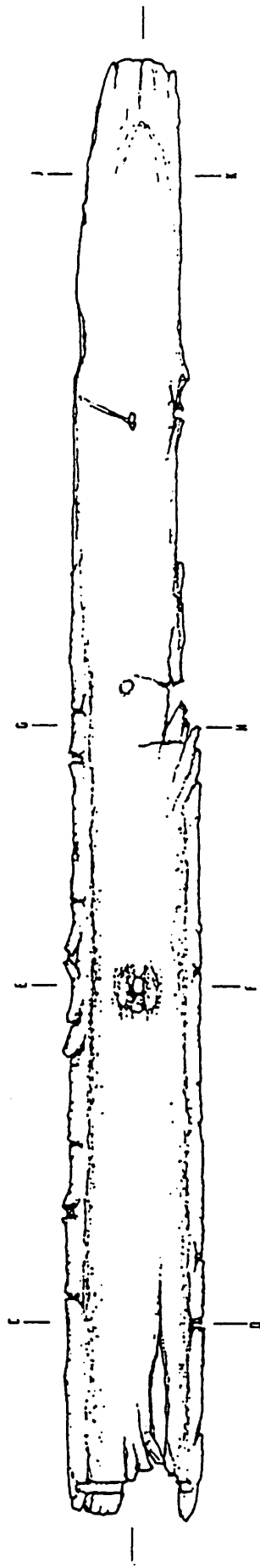


Figure 27: Derrya 2 (after MacDowell)

**Boat Number:** I137 **NGR:** N 38 67  
**Boat Name:** Derrya 3 **OD:** 60m (Water Level)  
**Townland:** Derrya **Site:** Lough Derravaragh  
**County:** Westmeath

In 1968 a 'dugout boat' was found in Lough Derravaragh. It was examined by National Museum of Ireland personnel and left *in situ*.

The description notes that in longitudinal-section, the bottomed curved gently from midship to either end, while its cross-section was rounded and was 4.85m in length.

A repair patch located in the floor consisted of a thin board (which was missing) secured by 27 iron nails which were between 4 and 6cm apart.

MacDowell, U. 1983 *Irish Logboats*, No, 266; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I138 **NGR:** H 338 286  
**Boat Name:** Derryad 1 **OD:** 45m (Water Level)  
**Townland:** Derryad **Site:** Upper Lough Erne  
**County:** Fermanagh

An 'oak dugout' was found in 1932 in several feet of water at Corradillar Bay, Upper Lough Erne. Its sides were worn down and a paddle was found in it. 'An attempt was made to raise' it but 'it broke into pieces in the process'. It probably was left *in situ*.

Dimensions (in metres):

| Length | Width | Thickness |
|--------|-------|-----------|
| 10.06  | 1.22  | 0.07      |

At c. 90cm from either end was a fitted rib secured by treenails. They were probably used to strengthen the boat.

MacDowell, U. 1983 *Irish Logboats*, No 103; Mogeey, J M. 1946 'Wooden Canoes' *UJA* 9, 70; Seaby, WA. *Seaby Survey Files*, No 10.

**Boat Number:** I139 **NGR:** H 33 28  
**Boat Name:** Derryad 2 **OD:** 45m (Water Level)  
**Townland:** Derryad-Derrylea **Site:** Upper Lough Erne  
**County:** Fermanagh

An 'oak dugout canoe' found in 1887 in an inlet in Upper Lough Erne was located in 60cm of peat. Its fate was not noted and it probably no longer survives. Its form was not noted.

Dimensions (In metres):

| Length | Max Width | Ends Width |
|--------|-----------|------------|
| 9.14   | 1.22      | 0.91       |

The boat's gunwales had been repaired where they 'had been stove in'. 'Pieces of oak scantling of 60cm in length were held in place by 'oak dowels'. They 'projected over the sides' by 2.5cm.

Five opposing pairs of triangular sectioned blocks in the solid projected from the sides internally.

Their purpose was as thwart supports.

Day, R. 1888 'Report on certain dugouts found in Lough Erne' *PSA* 12, 66; Day, R. 1895 'On some prehistoric remains from Lough Erne' *UJA* 2, 50-1; MacDowell, U. 1983 *Irish Logboats*, No 104; McGrail, S. 1976 'Problems in Irish Nautical Archaeology', *IARF* 3, 23; McGrail, S. 1978 *The Logboats of England and Wales*, 53.

**Boat Number:** I140

**NGR:** H 89 64

**Boat Name:** Derryalla 1

**OD:** 15m

**Townland:** Derryalla-Maghery

**Site:** River Blackwater

**County:** Armagh

A 'logboat' was found in 1968 during dredging on the west bank of River Blackwater between the above two townlands. When found, one end was damaged, with the sides worn down to the same end. It was examined and drawn by Lynn (Archaeological Survey of Northern Ireland). It probably no longer survives as it was left on the riverbank.

In plan the boat was parallel-sided with rectangular ends. In longitudinal-section was flat-bottomed with inclined ends, and its cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width | Max Height (ext) | Max Height (int) | Bottom T |
|--------|-------|------------------|------------------|----------|
| 3.81   | 1.00  | 0.50             | 0.44             | 0.06     |

Nine circular holes were noted, of which five were located in the floor, two set transversely near either end and the fifth amidship near one side. Two other holes horizontally pierced one side by the complete end. While the remaining two pierced the damaged end. They were all 2.5cm in diameter and were plugged by birch treenails. The purpose of the five in the floor was probably that of thickness gauges, while the purpose of the remainder is not known.

Internally in plan the complete end has right angle blocks in the solid projecting from the corners which rise from the floor to the boats full height. Their purpose is not known.



MacDowell, U. 1983 *Irish Logboats*, No 33, Fig.31.

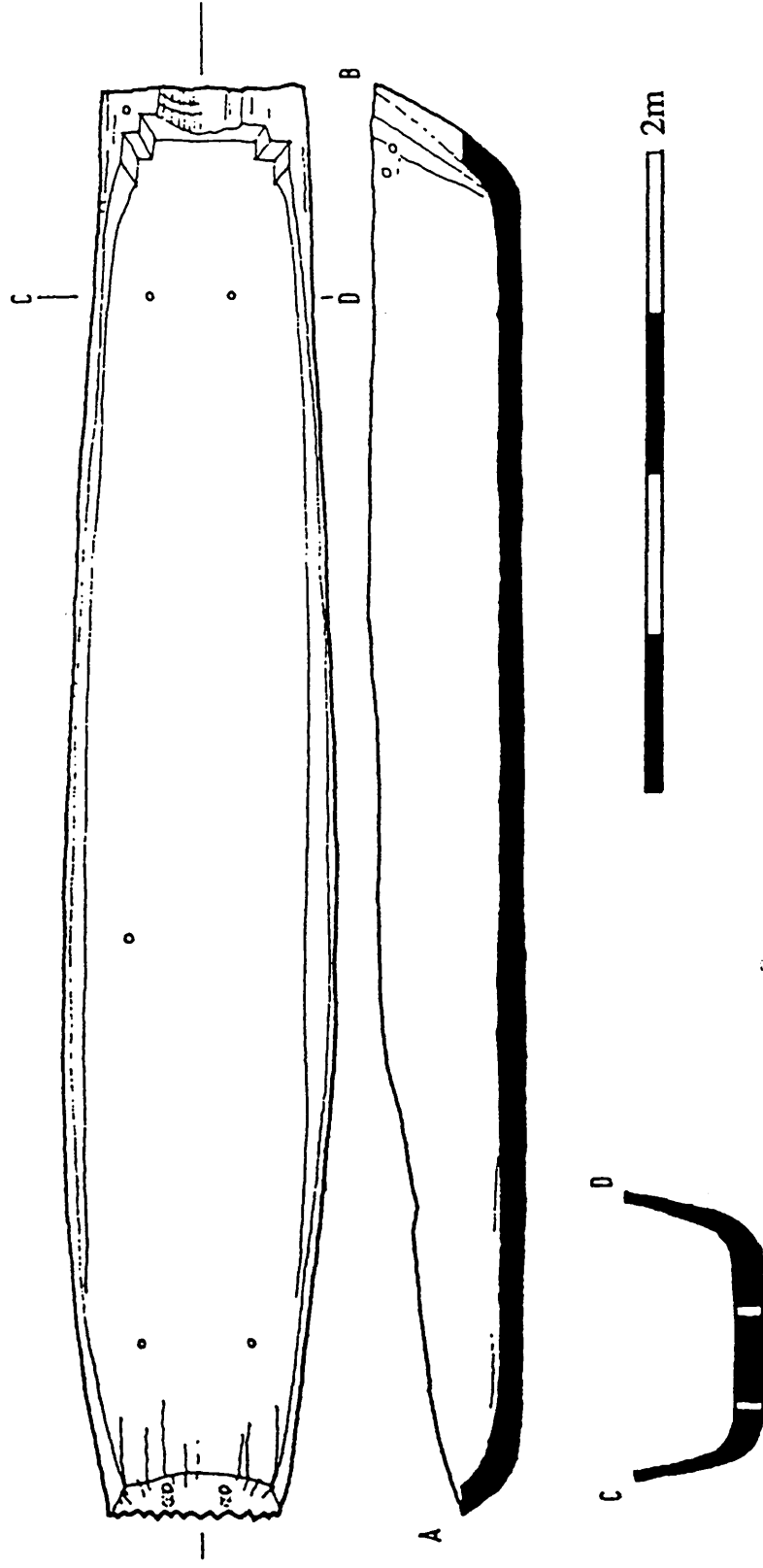


Figure 28: Derryalla 1 (after Lynn)

**Boat Number:** I141

**NGR:** H 89 64

**Boat Name:** Derryalla 2

**OD:** 15m

**Townland:** Derryalla-Maghera

**Site:** River Blackwater

**County:** Armagh

**Form:** Punt

A 'logboat' was found in 1968 during dredging on the west bank of River Blackwater, between the above two townlands. When found only portions of the sides survived and both ends were damaged. It was examined and drawn by Lynn (Archaeological Survey of Northern Ireland). It probably no longer survives as it was left on the riverbank.

In plan it was parallel-sided with rectangular ends. In longitudinal-section it was flat-bottomed with inclined ends, while its cross-section was rectangular.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.42   | 0.80  |

Six holes in two sets of three were located transversely across the floor, two sets near either end and the third amidship. They were 3cm in diameter. They were probably thickness-gauges.

MacDowell, U. 1983 *Irish Logboats*, No 34, Fig 32.



Figure 29: Derryalla 2 (after Lynn)

**Boat Number:** I142-6 **NGR:** H 89 64  
**Boat Name:** Derryalla 3-7 **OD:** 15m  
**Townland:** Derryalla-Maghery **Site:** River Blackwater  
**County:** Armagh

‘Fragments’ of five ‘artefacts described as logboats were found on the west bank of River Blackwater’ between the above two townlands in 1968. ‘They were in poor condition and were left on the river bank’. They no longer survive. No descriptions were noted. Two other dugout boats were found with them (Boat Numbers I140 and I141).

MacDowell, U. 1983 *Irish Logboats*, No 35-9.

**Boat Number:** I147 **NGR:** Q 868 370  
**Boat Name:** Derrya More **OD:** 5m  
**Townland:** Derrya More-Rahoonagh **Site:** River Casheen  
**County:** Kerry **Form:** Dissimilar-ended

An oak ‘dugout boat’ was found in 1979 ‘embedded in sand and silt in the middle of the broad tidal slob of the Casheen River between the above two townlands. It was examined and drawn by Healy (National Museum of Ireland). Its fate was not noted. When found, both gunwales were ‘broken away except for a piece of each side of the prow’. The stern was also damaged.

Its longitudinal-section was noted as flat-bottomed with an inclined bow and vertical stern.

Dimensions (in metres):

| Length | Max Width | Max Bottom T | Min Floor T | Sides T |
|--------|-----------|--------------|-------------|---------|
| 5.68   | 0.98      | 0.10         | 0.07        | 0.03    |

A slot located centrally across the bow at 20cm from the end is 10cm long and 1cm wide, 2 pairs of transverse holes also in the bow section are 22cm and 90 cm from the bow. They are 3cm in diameter, the first pair are 6cm apart and the second 15cm apart. Their treenails were *in\_situ*. The purpose of the above features is not known. They were probably used in conjunction with each other to secure some form of fixture.

Healy, P. 1981 ‘Dugout wooden Boat in the Estuary of the Casheen’ *JKAHS* 14, 115-6; ‘Correspondence Files’ *National Museum of Ireland*, IA/127/83.

Boat Number: I148

NGR: J 017 587

Boat Name: Derrybroughas

OD: 10m

Townland: Derrybroughas

Site: Upper River Bann

County: Armagh

Form: Canoe

A dugout 'canoe' was found in Autumn 1978 during drainage operations in the River Bann. It remained on the river bank until 1979, when it was examined, drawn and conserved. It was then put on display at Adress House, Portadown. During conservation parts of the missing hull were replaced. In February, 1993, part of the port gunwale by the bow was missing and there were a series of small cracks in the bow. A knot free whole log was used. It was radiocarbon-dated '487 bp' (UB.2397) and dendro-dated to the '15th century AD'.

In plan, it is parallel-sided with a rounded stern and a bow in the form of a rounded point. Its cross-section is rectangular, and in longitudinal-section it is flat bottomed with a rounded bow and stern.

Dimensions (in metres):

| Length | Width | Floor T | Max Sides T | Min Sides T | Ends T | Height (ext) |
|--------|-------|---------|-------------|-------------|--------|--------------|
| 4.29   | 0.66  | 0.04    | 0.04        | 0.02        | 0.08   | 0.45         |

Five holes were set through the floor, three on the boats long axis and two transversely across the floor at the bow. Three holes were drilled vertically into the stern as were another three into the bow:

| Hole No | Metres from stern | Location        | Length | Width | Purpose                |
|---------|-------------------|-----------------|--------|-------|------------------------|
| 1       | 0.02              | Stern           | 3      | 2     | probably strengthening |
| 2       | 0.02              | Stern           | 3      | 2     | strengthening          |
| 3       | 0.02              | Stern           | 3      | 2     | strengthening          |
| 4       | 4.24              | Bow             | 3      | 2     | strengthening          |
| 5       | 4.24              | Bow             | 3      | 2     | strengthening          |
| 6       | 4.24              | Bow             | 3      | 2     | strengthening          |
| 7       | 1.08              | Floor long axis | 2      | 2     | Thickness gauge        |
| 8       | 2.80              | Floor long axis | 2      | 2     | Thickness gauge        |
| 9       | 3.80              | Floor long axis | 3      | 3     | Thickness gauge        |
| 10      | 4.04              | Near Bow        | 2.5    | 2.5   | Thickness gauge        |
| 11      | 4.09              | Near Bow        | 4      | 4     | Thickness gauge        |

The holes at either end were probably used as a means of dowelling across either end to prevent the radial splitting of either end.

Amidships, two opposing pairs of thwart supports are set as ledges left proud of the sides.

Fry, M. *Seaby Survey Files*, No 52; MacDowell, U. 1983 *Irish Logboats*, No 24, Fig 28.

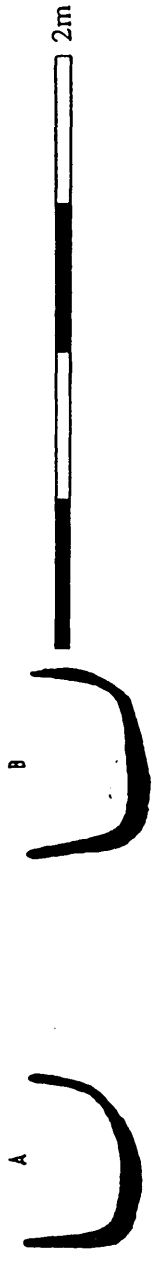
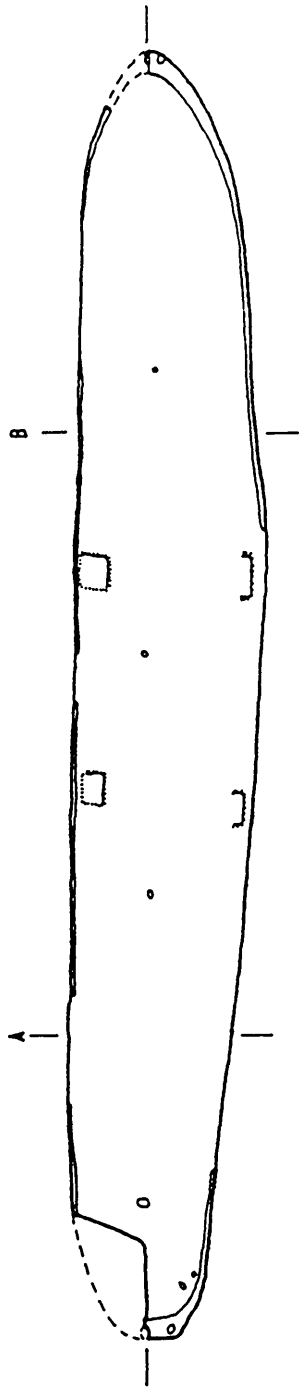


Figure 30: Derrybroughas 2 (after Brannon)



**Boat Number:** I149 **NG:** Q 84 38  
**Boat Name:** Derryco **OD:** 5m  
**Townland:** Derryco **Site:** River Casheen  
**County:** Kerry **Form:** Canoe

An oak 'log boat' was found in December 1978 in the estuary of the river Casheen. It was removed 'to the home of Mr D. O'Connor where it was examined by Kelly and drawn by Murphy (National Museum of Ireland). When found, part of the starboard bow and part of the stern were missing. The floor was also split. It was moved to Muckcross House Museum, Killarney and by February 1993, it was on display at Rattoo Heritage Society Museum, Ballyduff. It was examined and drawn by MacDowell in 1993. By February 1993 the condition of the boat had deteriorated considerably. The hull is now warped along its longitudinal axis, most of the sides and ends are now missing and the wood is very flaky in nature. A knot-free log was used.

In plan, the boat is parallel-sided with a rounded stern and the bow is rounded-point in form. Its longitudinal-section is flat-bottomed with rounded ends and in cross-section it is flat-bottomed rounding to vertical sides originally terminating in tumblehome at the gunwales.

Dimensions (in metres):

| Length | Width (ext) | Height (ext) | Floor T | Sides T | Ends T |
|--------|-------------|--------------|---------|---------|--------|
| 5.97   | 0.86        | 0.27         | 0.04    | 0.02    | 0.04   |

Three oval holes two of which were plugged are on the longitudinal axis at 70cm, 2.10m and 5.24m from the stern. They measure 3x2cm but were originally circular and 2.5cm in diameter. Their purpose was that of thickness-gauges. There are five pairs of thwart rests which are triangular-section blocks of wood projecting upwards and out from the sides. In plan they are roughly rectangular in which a recessed area held the seats in place.

| Thwarts No | Side | M from Stern | Height from Floor | Length | Width |
|------------|------|--------------|-------------------|--------|-------|
| 1          | Part | 0.87         | 6cm               | 7.5    | 3.5   |
| 2          | S    | 0.87         | 6                 | 7.5    | 3.5   |
| 3          | P    | 1.52         | 6                 | 13     | 3.5   |
| 4          | S    | 1.52         | 6                 | 15     | 3.5   |
| 5          | P    | 2.10         | 9.5               | 15.5   | 3.5   |
| 6          | S    | 2.10         | 9.5               | 11.5   | 3.5   |
| 7          | P    | 2.93         | 9                 | 15.5   | 3.5   |
| 8          | S    | 2.93         | 9                 | 13     | 3.5   |
| 9          | P    | 3.78         | 9                 | 13.5   | 3.5   |

|    |   |      |   |    |     |
|----|---|------|---|----|-----|
| 10 | S | 3.78 | 9 | 13 | 3.5 |
|----|---|------|---|----|-----|

Tool marks made by 'pointed adze having a blade at least 10cm. in width' were noted in the stern.  
They no longer survive.

Kelly, E P. 1981 'A Log Boat from Derryco' *JKAHS* 14, 11-12, Fig 1-2; MacDowell, U. 1983  
*Irish Logboats*, No 141, Fig 6.

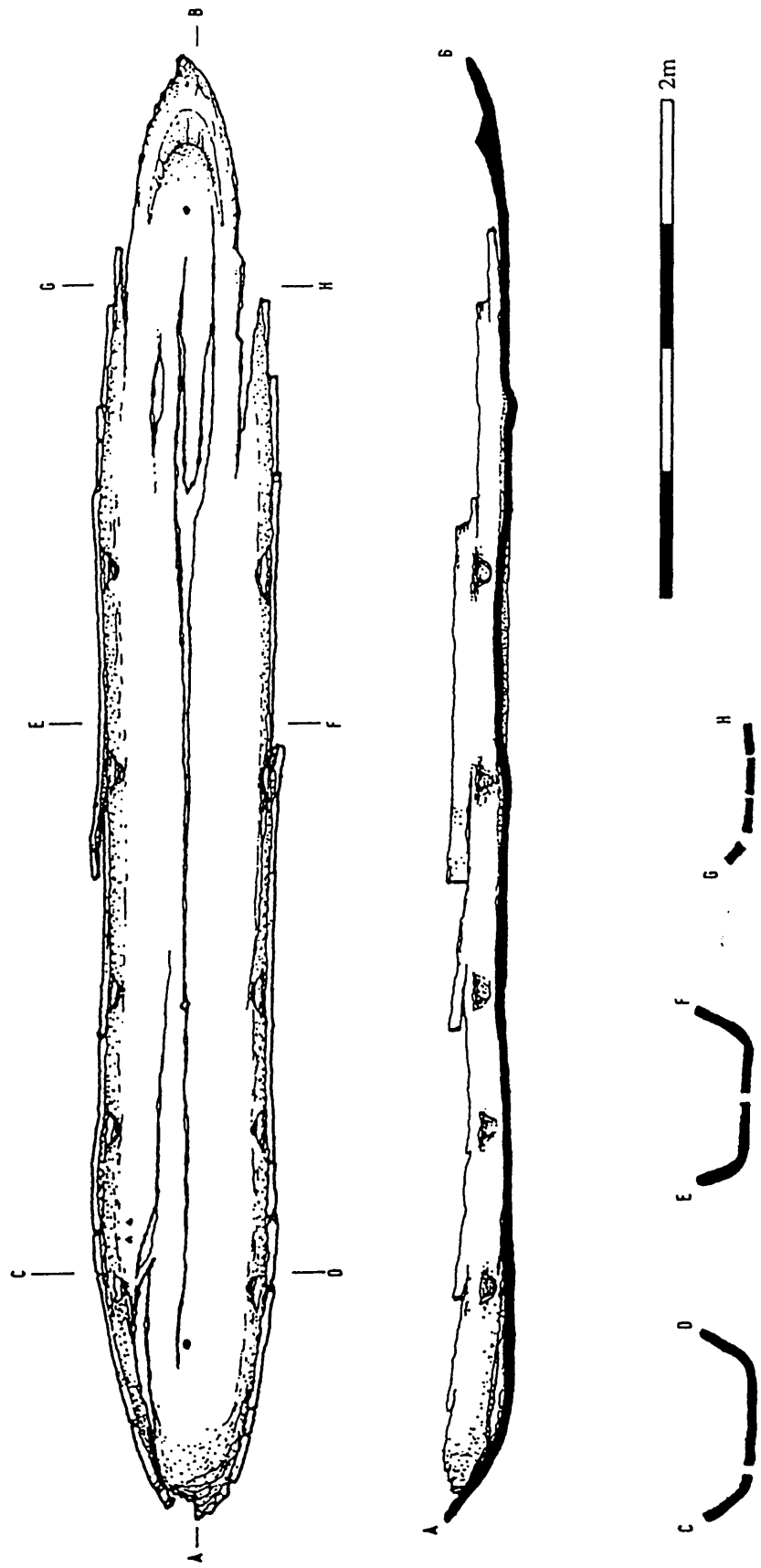


Figure 31: Derryco (after Kelly)

**Boat Number:** 150 **NGR:** M 728 976  
**Boat Name:** Derrycoagh **OD:** 70m (Water Level)  
**Townland:** Derrycoagh **Site:** River Gara  
**County:** Roscommon

A 'dug out canoe' was found in June 1975 on the right bank of a river which connects Upper and Lower Lough Gara. It was examined by Mr. J. Sweeney. Its fate was not noted.

Dimensions (in metres):

| Length | Width | Height (int) | Sides T |
|--------|-------|--------------|---------|
| 6.40   | 0.73  | 0.23         | 0.03    |

Two holes located on the floor at the stern are 1.5cm in diameter. They may be thickness-gauge holes. Also on the floor is a 1.19m by 12.5cm patch covering a crack. It was secured by trenails set 12.5cm apart.

'Topographical Files' *National Museum of Ireland*

**Boat Number:** I151 **NGR:** H 86 56  
**Boat Name:** Derrycrew **OD:** 15m  
**Townland:** Derrycrew **Site:** River Blackwater  
**County:** Armagh **Form:** Punt

An 'oak dugout' boat was found at Agory Bridge, River Blackwater in 1954. It was examined and drawn by Seaby and Thompson and then moved to the 'Landsteward's House'. When found, one end was damaged and the other was longitudinally split. It is now longitudinally split into two halves.

In plan it tapers very slightly from its midpoint to either end which are rectangular. In longitudinal section it is flat-bottomed with inclined ends, while its cross-section is flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Max Width | Max Height (int) | Floor T | Side T |
|--------|-----------|------------------|---------|--------|
| 3.05   | 0.53      | 0.27             | 0.04    | 0.02   |

Three circular thickness-gauge holes pierce the floor along the longitudinal axis, one located near either end and the third amidships. Their diameters are 2.5cm.

MacDowell, U. 1983 *Irish Logboats*, No.23, Fig 27; Seaby, WAS. *Seaby Survey Files*, No. 35.

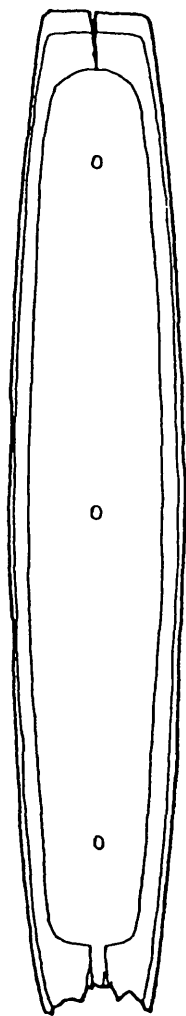


Figure 32: Derrycrew (after Seaby and Thompson)

**Boat Number:** I152

**NGR:** H 878 590

**Boat Name:** Derrygally I

**OD:** 15m

**Townland:** Derrygally

**Site:** River Blackwater

**County:** Tyrone

**Form:** Canoe

During drainage operations in 1987 an 'oak dug-out' boat was found in River Blackwater. It was examined by Fry (Department of the Environment) and Burke (Ulster Museum) who also drew it. In February 1988 it was buried at the Department of the Environment Depot, Markethill. When found, only the bottom, part of one side and a 'section' of the bow survived. It was radiocarbon dated to  $840 \pm 20$  BP (Gr.N-16867) by Brindley and Lanting (Biologisch-Archaeologisch Instituut, Groningen).

In plan it is parallel-sided with the surviving end rounded. In longitudinal-section it is flat-bottomed with a rounded end, and its cross-section is rounded.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.00   | 0.80  |

'Some possible tool-marks' were noted on the floor.

Fry, M. *Seaby Survey Files*, No 70.

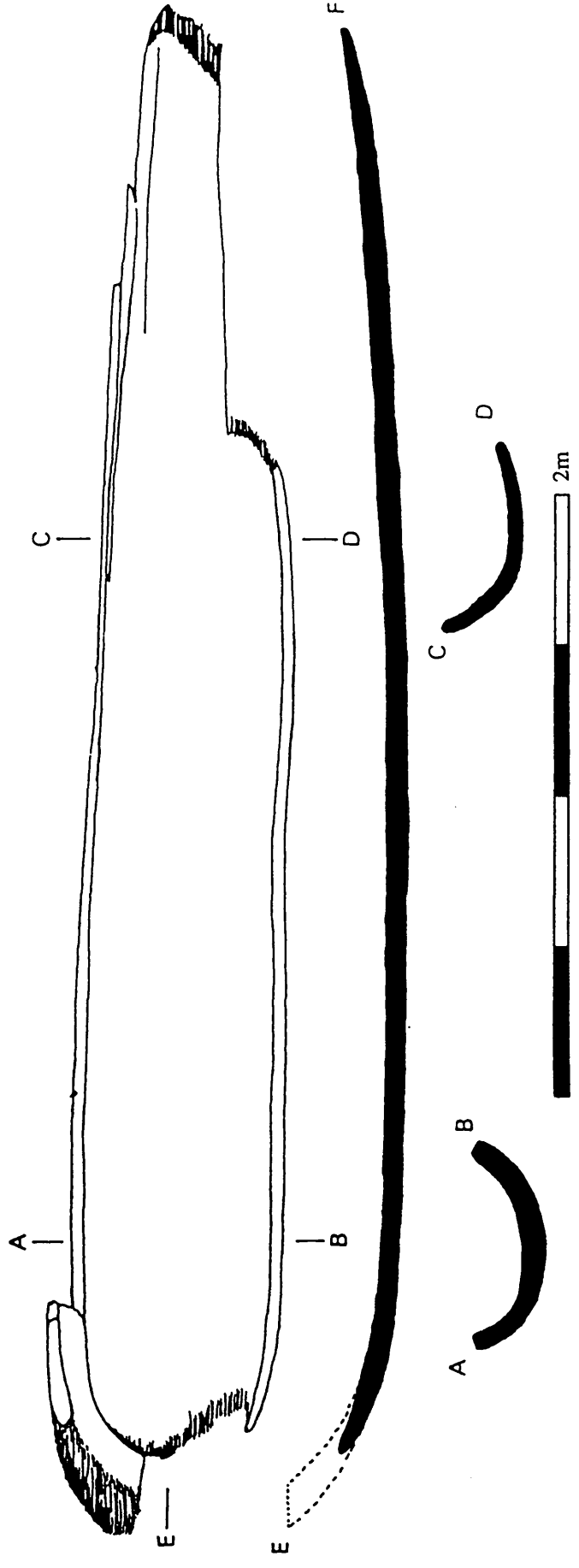


Figure 33: Derrygally 1 (after Bourke)

Boat Number: I153

NGR: H 879 589

Boat Name: Derrygally 2

OD: 15m

Townland: Derrygally

Site: River Blackwater

County: Tyrone

During drainage operations in 1987 on 'oak dug-out' boat was found in River Blackwater. It was examined by Fry (Department of the Environment) and Bourke (Ulster Museum) who also drew it. In February 1988 it was buried at the Department of the Environment Depot, Markethill. When found, only a longitudinal section of part of the bottom, the end and part of one side survived. It was radiocarbon-dated to  $285 \pm 15$  B.P. (GrN-16868) by Brindley and Lanting (Biologisch-Archaeologisch Instituut, Ryksuniversitet, Groningen).

Its Longitudinal-section is flat-bottomed with an inclined end, and its cross-section appears to have been flat-bottomed with a flared side.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.14   | 0.30  |

Two circular holes were noted near the bow 'filled with dowels'. They could have been thickness-gauges.

Fry, M. *Seaby Survey Files*, No.71.



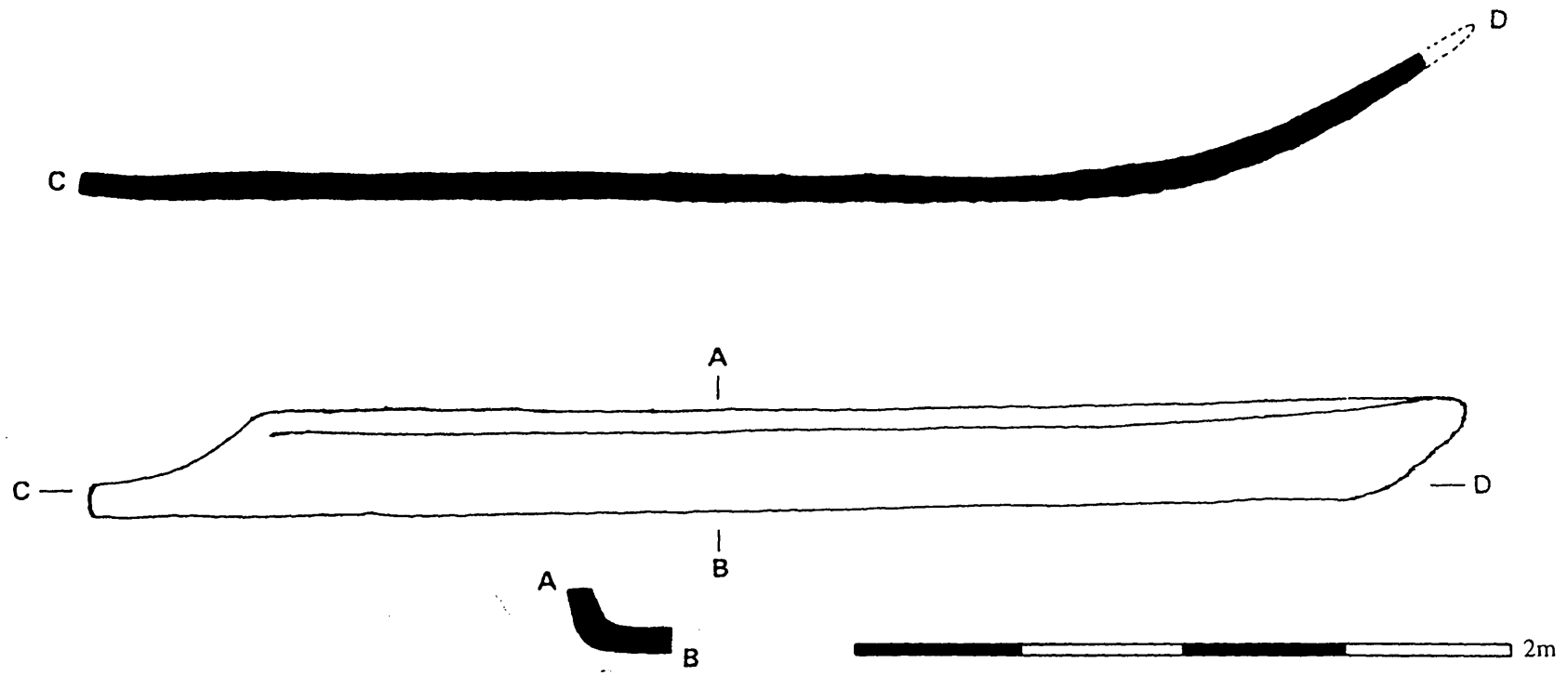


Figure 34: Derrygally 2 (after Bourke)



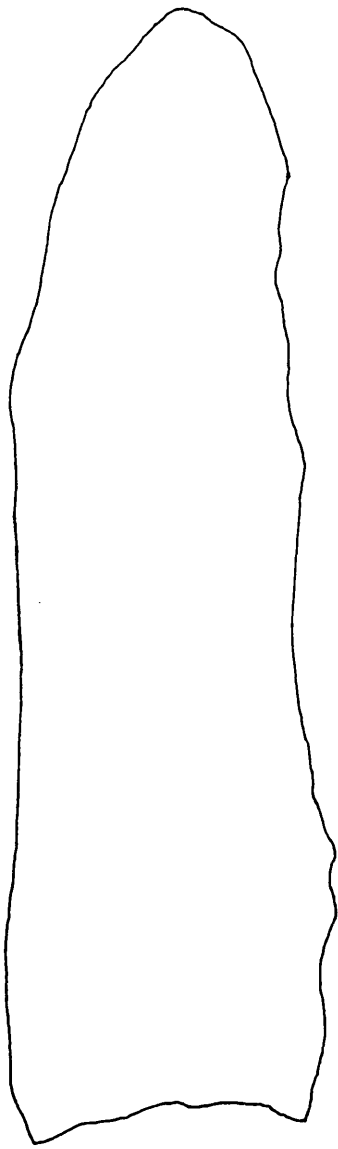


Figure 35: Derrygally 3 (after Bourke)

**Boat Number:** I155 **NGR:** H 85 98  
**Boat Name:** Derrygarve **OD:** 10m  
**Townland:** Derrygarve **Site:** Moyola River  
**County:** Derry

In 1963 a 'dugout' boat was found on the west bank of the Moyola River. It was 'much damaged'. Its fate is not known.

Its cross-section was rectangular.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 2.74   | 0.51  |

MacDowell, U. 1983, *Irish Logboats*, No, 77; Seaby, WA. *Seaby Survey Files*, No. 40.

**Boat Number:** I156 **NGR:** J 058 850  
**Boat Name:** Derryhollagh **Site:** Lough Ravel  
**Townland:** Derryhollagh  
**County:** Antrim

In 1858-9, a 'single-piece' canoe of oak' was found 'partially within the enclosure' of a crannog in Derryhollagh Bog (formerly Lough Ravel). Its fate is not known and probably no longer survives.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 6.32   | 1.40  | 0.51         |

The lake had 'dried up' by 1837. A number of bronze and iron objects such as pins, fibulae, and iron lamp and glass beads were found on the crannog. The location of the boat in relation to the objects was not noted.

|                    |                          |
|--------------------|--------------------------|
| <b>SMR No.</b>     | 049-012                  |
| <b>Townland</b>    | Derryhollagh             |
| <b>Co-ods</b>      | J 0486 8924              |
| <b>Site</b>        | Crannog                  |
| <b>Site Date</b>   | Possible Bronze/Iron Age |
| <b>Boat Assoc.</b> | Found 'on crannog'       |

Benn, E. 1860, 'Observations on Irish Crannogs' *JKAS* 3, 86-90; Gray, W. 1885 'Summary Report on the Glenny Collection' *JRSAI* 12, 194-5; MacDowell, U. 1983 *Irish Logboats*, No 4; Munro, R. 1890 *The Lake Dwellings of Europe*, 371.

**Boat Number:** I157 **OD:** 20m  
**Boat Name:** Derryhubbert **Site:** Derryhubbert Bog  
**Townland:** Derryhubbert  
**County:** Armagh

A 'dug-out canoe' was found in January 1944 in Derryhubbert Bog during peat cutting at a depth of 1.8m. Its bow was 'slightly sunken' and it had 'outrigger oar lock fittings' which were presumably tholepin-holes along the gunwales. It was moved to the Peat Development Works for storage. However subsequent enquiries revealed no knowledge of its present location. It probably no longer survives.

MacDowell, U. 1983 *Irish Logboats*, No.25; Patterson, T G F. 1946 'Recent Finds in Co.s Armagh Tyrone and Down' *UJA* 9, 52.

**Boat Number:** I158 **NGR:** H 961 631  
**Boat Name:** Derryinver **OD:** 10m  
**Townland:** Derryinver **Site:** Lower River Bann  
**County:** Armagh **Form:** Tapered

An oak 'dug-out' boat was found in 1959 near the mouth of the River Bann, Lough Neagh when the water level dropped. It was found in embedded in mud on the foreshore. It was examined and drawn by Seaby and left *in situ*.

In plan it tapered slightly from the rounded stern to rounded bow ends. In longitudinal-section it was flat-bottomed with rounded ends and its cross-section was 'sub-rectangular'.

Dimensions (in metres):

| Length | Stern Width | Bow Width |
|--------|-------------|-----------|
| 7.62   | 1.04        | 0.16      |

Six opposing pairs of thwart supports projected from the sides, and two fitted ribs were nailed 91cm from either end, which were probably used for strengthening. Also at both ends a 'vertical groove' 7.6cm in width, ran along the longest axis. A 1.98m long wooden repair patch was nailed to the floor by the starboard side near the stern.

MacDowell, U. 1983 *Irish Logboats*, No 26, Fig 29; Seaby, WA. *Seaby Survey Files*, No 33.

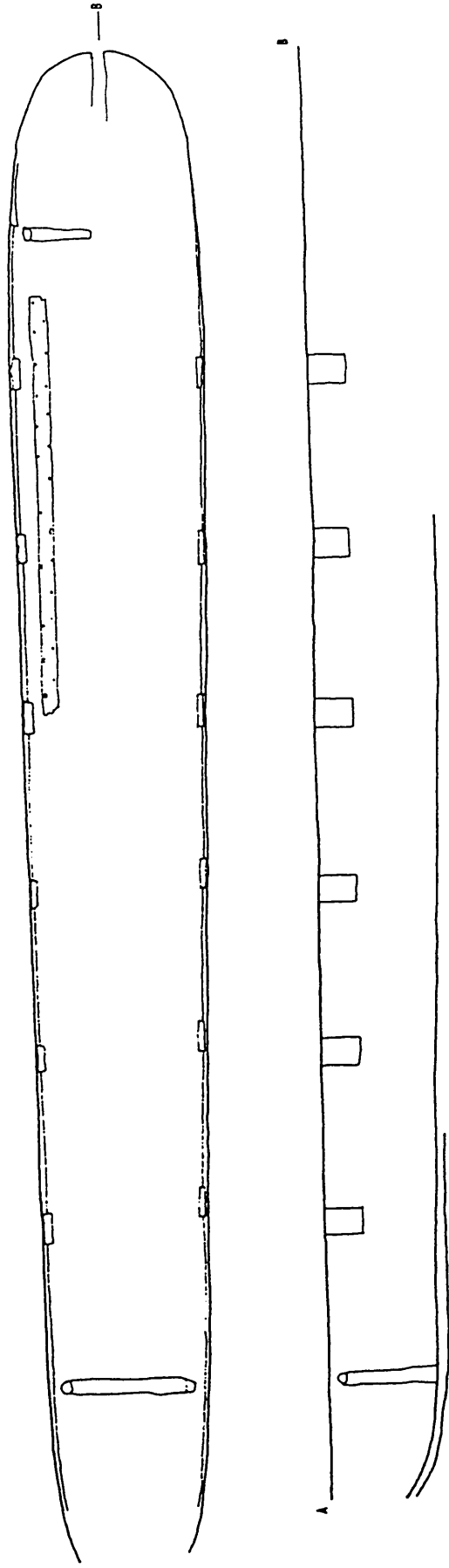


Figure 36: Derryinver (after Seaby)

**Boat Number:** I159 **NGR:** H 28 34  
**Boat Name:** Derrykerrib **OD:** 45m (Water Level)  
**Townland:** Derrykerrib **Site:** Upper Lough Erne  
**County:** Fermanagh

A 'dugout boat' was found between 1890 and 1900 in a bog, which was previously a lake connected to Upper Lough Erne. It was used to bridge a stream, and no longer used. Its length was given as 15 yards, but MacDowell suggests it was more likely to be '15 feet' (4.57m). A paddle was found with it.

MacDowell, U. 1983 *Irish Logboats*, No. 105; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I160 **NGR:** H 977 616  
**Boat Name:** Derryloiste **OD:** 10m  
**Townland:** Derryloiste **Site:** Upper River Bann  
**County:** Armagh **Form:** Tapered

A 'dug-out' boat was found during dredging in the River Bann in 1964. It was placed in adjacent farmland where it was examined by Seaby. When found its sides were worn down. Its fate was not noted. It probably no longer survives.

In plan it tapered from the stern which held a sternboard to the bow which was a rounded-pointed. In longitudinal-section it was flat-bottomed with a rounded bow, while its cross-section was rectangular.

Dimensions (in metres):

| Length | Stern Width | Midships Width | Bow Width | Max Height (int) |
|--------|-------------|----------------|-----------|------------------|
| 2.46   | 0.86        | 0.81           | 0.71      | 0.28             |

The stern had 'been cut away to form a semi circular end through which three holes, 2.5cm in diameter 'had been bored' at 2cm from the end. This was interpreted as a means of securing a sternboard.

MacDowell, U. 1983 *Irish Logboats*, No 27; Seaby, WA. *Seaby Survey Files*.

**Boat Number:** I161 **NGR:** J 07 66  
**Boat Name:** Derrymore **OD:** 10m (Water Level)  
**Townland:** Derrymore **Site:** Lough Neagh  
**County:** Antrim **Form:** Tapered

An oak 'dug-out boat' was found in August 1959 in Bartins Bay, south-east Lough Neagh. It was examined and drawn by Ulster Museum personnel. When found it had a series of splits along the grain and both the bow and the port side of the boat were missing in the bow half. It was left *in situ*. In plan it was tapered from the rounded stern to the bow end. Its longitudinal-section was not noted, and its cross-section was rectangular.

Dimensions (in metres):

| Original Length | Surviving Length | Max Width | Max Height (ext) |
|-----------------|------------------|-----------|------------------|
| 14.60           | 13.71            | 1.42      | 0.76             |

Surviving pairs of footrests on the floor, pairs of 'blisters' with holes in them at the gunwales and pairs of grooved projecting blocks from the sides all indicate positions for eleven rowers. Most of them survived to starboard. A series of thickness-gauge holes which were 1.9cm in diameter were situated by the port and starboard sides and along the long axis. 'An iron staple was hammered into the floor at the bow. It was 6.3cm long and was possibly used to prevent a split from worsening.

MacDowell, U. 1983 *Irish Logboats*, No 1, fig 23; McGrail, S. 1978, *The logboats of England and Wales*, 32, 74-5; Seaby, WAS. *Seaby Survey Files*, No 22; Seaby, WAS. 1960 'Dug-out Boats' *UJA* 23, 58-9.



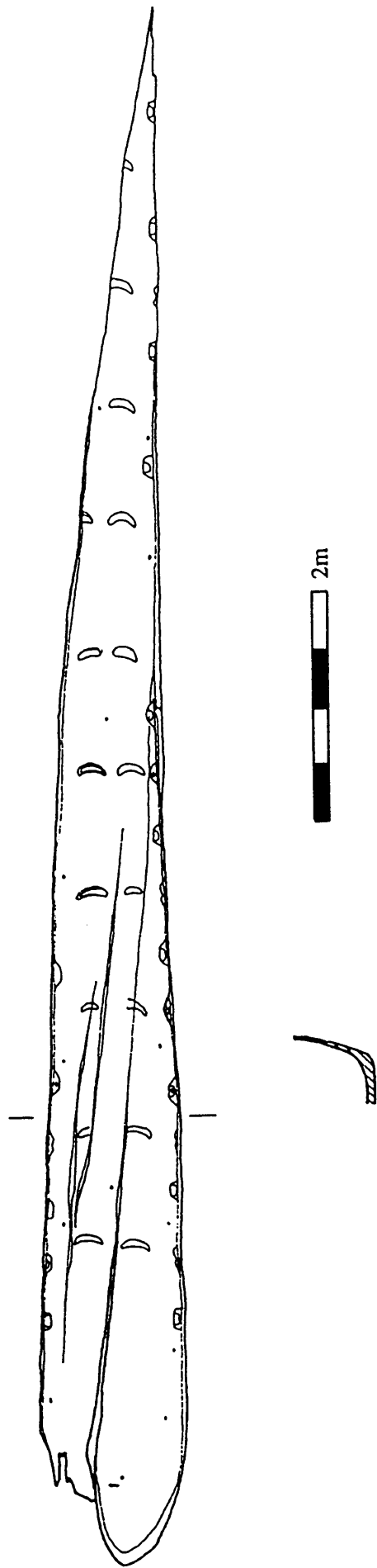


Figure 37: Derrymore (after Seaby)

**Boat Number:** I162 **NGR:** N 07 55  
**Boat Name:** Derrynabuntale **OD:** 40m (Water Level)  
**Townland:** Derrynabuntale **Site:** Lough Ree  
**County:** Longford

In November 1933, due to 'subsidence' in Lough Ree, an 'ancient boat' was found partly embedded in mud. It was raised by the finder who noted it as made of 'solid oak' and 'hollowed out'. It was returned to the lake.

Dimensions

| Length | Max Width |
|--------|-----------|
| 9.14   | 0.97      |

MacDowell, U. 1983 *Irish Logboats*, No.173; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I163 **Site:** River Shannon  
**Boat Name:** Derrynagolliagh  
**Townland:** Derrynagolliagh  
**County:** Clare

A 'dug-out canoe' was found in 1933 in the River Shannon which was made from 'an oak tree' and was 'about the size of an ordinary rowing boat'. Its fate was not noted.

JP. *Irish Press*, 4/11/33, 1; MacDowell, U. 1983 *Irish Logboats*, No 67; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I164  
**Boat Name:** Direen Lower  
**Townland:** Direen Lower  
**County:** Cork

A 'dug-out canoe...made from an oak tree which was hallowed in the centre' was found in 1939, by a farmer digging drains. Its fate was not noted, however 'charcoal' was found at the same location.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 2.44   | 0.61  |

MacDowell, U. 1983 *Irish Logboats*, No. 73; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I165 **NGR:** H786 391  
**Boat Name:** Doogary **OD:** 60m (Water Level)

**Townland:** Doogary

**Site:** Doogary Lough

**County:** Armagh

An oak 'dug-out canoe' was found in July 1977 in Doogary Lough. Brannon (Ulster Museum) examined and drew it. It was left *in situ*. When found, the boat consisted of a longitudinal section of the bottom. It was dendro-dated at Queen's University to 1115±9 AD.

| Dimensions (in metres): | Surviving Length | Surviving Width |
|-------------------------|------------------|-----------------|
|                         | 7.00             | 0.30            |

The lake itself measures approximately 1.2km by 60m in which a possible crannog is situated:

|                       |                  |
|-----------------------|------------------|
| <b>SMR Number</b>     | 015-017          |
| <b>Townland</b>       | Doogary          |
| <b>Nat. Grid Ref.</b> | H 7831 3862      |
| <b>Site</b>           | Possible Crannog |

Brannon, NF. *Seaby Survey Files*, No. 62.

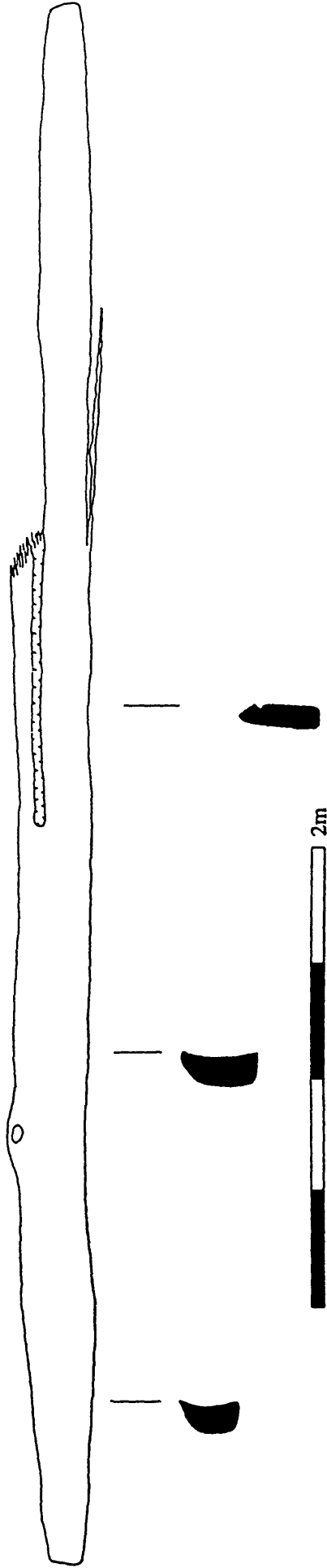


Figure 38: Doogary (after Brannon)

**Boat Number:** I166-69

**NGR:** R 550 755

**Boat Name:** Doon 1-4

**OD:** 25m

**Townland:** Doon

**Site:** Doon Lough

**County:** Clare

Three oak 'dug-out canoes' and a 'possible fourth' were found with a wooden paddle and part of a rotary quern in Doon Lough in 1984. They were found in a 'radial pattern' with several 'pieces of timber' and a quern stone placed in the centre at a depth of c.12m. The file notes they were moved to Craggaunowen Heritage Centre, Quinn. However inquiries reveal no knowledge of them. They had been raised by the finder and were examined by O'Flynn (National Museum of Ireland).

**I166: Form: Canoe.** When found, the boat's sides and stern were damaged and it was split along the 'grain'. In plan it was parallel-sided with rounded bow and a rounded cross section.

Dimensions (in metres):

| Length | Width | Max Height |
|--------|-------|------------|
| 7.20   | 0.78  | 0.35       |

**I167: Form: Tapered** This boat was damaged at both ends. In plan it tapered from the stern to the bow and its cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 2.95   | 0.80  |

A thickness gauge was located on the long axis at 80 cm. from the bow. It was 1.5cm in diameter. What appears to have been a fitted rib placement at 86cm from the bow end which took the form of 'roughly cut grooves' with semi-circular cross-section 'were cut in the base and side walls of the vessel'. They were 18 and 20cm long and 1.5cm wide. They 'were set at an obtuse angle to one another, the apex pointing towards the bow'. No parallel to this has yet been found, except for Crevinish 1 (I123) in which the bow-most rib curves slightly where it meets the sides towards the stern. This rib is carved in the solid. Tool marks were noted near the bow end with the blade's signature length of c.14cm.

**I168: Form: Tapered.** This boat's sides were worn down from their original height. In plan it tapered from one end to the other. In longitudinal section, the flat bottom inclined at the wide end. Neither the bow nor the cross-section was noted.

Dimensions (in metres):

| Surviving L | Width | Max H(ext) | Max Floor T | Min Floor T |
|-------------|-------|------------|-------------|-------------|
| 4.12        | 1.00  | 0.45       | 0.14        | 0.12        |

Six holes are situated in sets of two across the floor. Their diameters vary from 2cm to 4.5cm in diameter. Their purpose was either that of thickness-gauges or a means of securing fitted-ribs to strengthen the hull. They were probably originally the same size, but may have been eroded to the larger sizes.

I169: This object was noted as a 'small piece of a possible fourth canoe'.

'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I170

**NGR:** J 481 457

**Boat Name:** Downpatrick

**OD:** 5m

**Townland:** Downpatrick

**Site:** River Quoile

**County:** Down

**Form:** Tapered

A 'dug-out' boat was found in 1963 in the 'marshy margin' at the east end of the Old Roughal Ford, River Quoile. It was examined and drawn by Seaby (Ulster Museum). When found, most of the sides and the bow were missing. Part of the boat forming the remains of the bow was found nearby and was used to determine the boats length. It was probably left *in situ*.

In plan it tapered from near the stern which was squared to a rounded bow. Its longitudinal-section was flat-bottomed with inclined stern and rounded bow. Its cross-section was rounded.

Dimensions (in metres):

| Original L | Surviving L | Max. H |
|------------|-------------|--------|
| 4.57       | 3.96        | 0.15   |

Two notches in the bow were suggested by Seaby to have been for a steering oar or pole. Situated in the stern were two horizontal holes (3.2cm in diameter) with a probable ash treenail in the port one. The holes and a 'slight' groove located at the same level and 'extending below them', correspond to a thick board found in the boat which has similar holes and could fit into the groove. It had a 15cm high vertical ridge on it above the holes. Seaby suggested that this was to enable a further two boards to be accommodated with the use of trenails, the sum of which would have increased the sterns height.

Two 28x6cm and 2.5cm high ridges located across the floor could have been footrests. One was near the stern and the other was amidships.

MacDowell, U. 1983 *Irish Logboats*, No 91, fig 35; Seaby, WA. *Seaby Survey Files*, No 36.

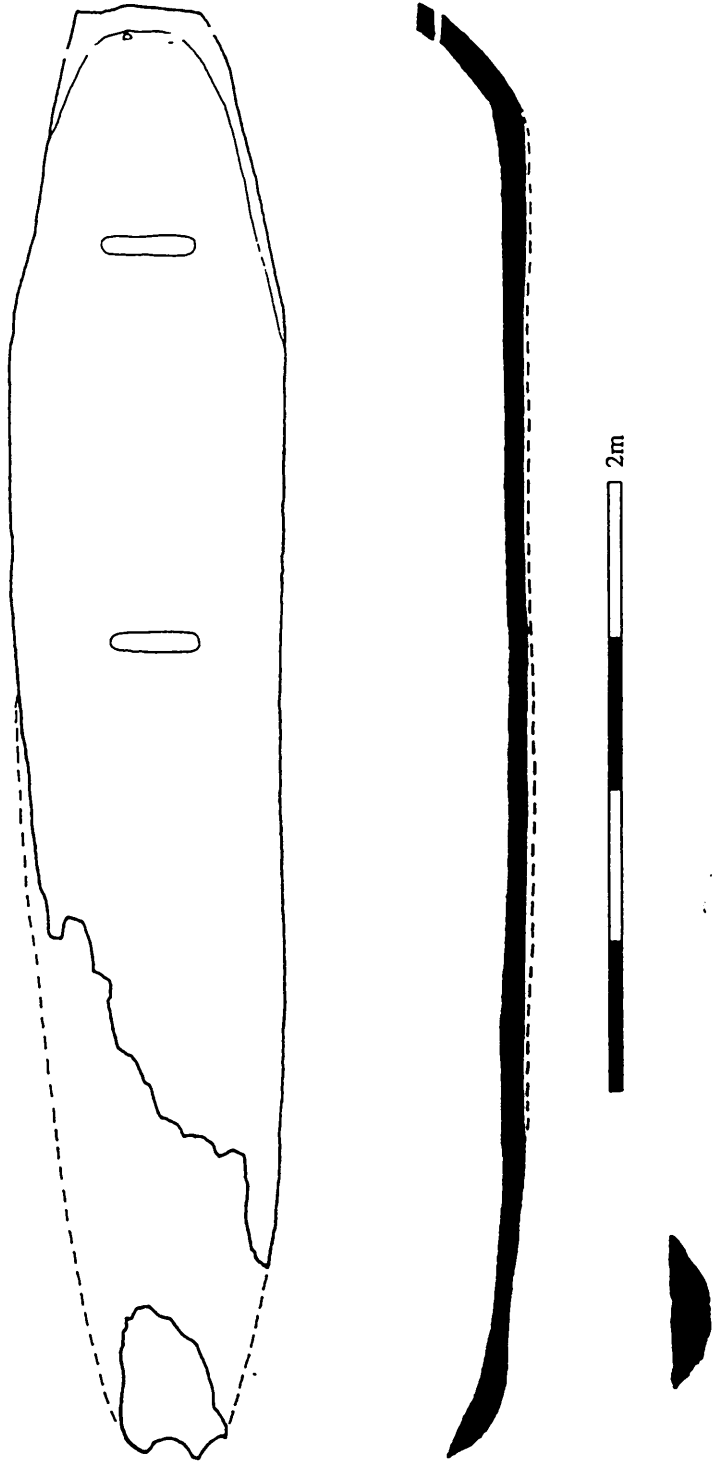


Figure 39: Downpatrick (after Seaby)

**Boat Number:** I171 **NGR:** L 65 50  
**Boat Name:** Drinagh **OD:** 15m  
**Townland:** Drinagh **Site:** Lake  
**County:** Galway **Form:** Canoe

In July 1945 a 'canoe' was found in a bay at a depth of 3.60m during turf cutting. Its fate was not noted.

In plan it was parallel-sided with rounded ends, flat-bottomed with rounded ends in longitudinal-section and its cross-section was rectangular.

Dimensions (in metres)

| Length | Thickness |
|--------|-----------|
| 3.15   | 0.6       |

A 'hole for a mast' was not amidship as were thirty-nine holes near the gunwales and set 10cm apart, which were for 'ribs'. However trenails through the floor would be required to secure fitted-ribs. It is possible that the holes were used to serve extension boards.

'Correspondence Files' *National Museum of Ireland*, 1A/163/54.

**Boat Number:** I172 **NGR:** R80 86  
**Boat Name:** Dromineer **OD:** 30m (Water Level)  
**Townland:** Dromineer **Site:** Lough Derg  
**County:** Tipperary

In 1968, members of Limerick Sub-Aqua Club found a 'sunken dug-out canoe' in 2.3m of water at Youghal Quay, on the east shore of Lough Derg. No further description is given and its fate is not known.

'Correspondence Files' *National Museum of Ireland*, 1A/187/68.

**Boat Number:** I173 **NGR:** M840 985  
**Boat Name:** Drumbo 1 **OD:** 20m  
**Townland:** Drumbo **Site:** Rahans lake  
**County:** Monaghan **Form:** Canoe

An oak 'dug-out canoe' was found in 1954 in Rahans lake. Its discovery was due to drainage operations in the River Glyde. It was examined by National Museum of Ireland personnel where it was sent to and registered as 1954; 102. It was destroyed in 1957. It was damaged during transportation.





**Boat Number:** I176 **NGR:** H 248 461  
**Boat Name:** Drumgay **OD:** 40m (Water Level)  
**Townland:** Drumgay **Site:** Drumgay Lough  
**County:** Fermanagh

A 'single piece canoe of oak' was found c.1830's embedded in Drumgay Lough shore. Nothing else is noted about it. It probably no longer survives.

MacDowell, U. 1983 *Irish Logboats*, No 106; Wakeman, WF. 1873 'Observations on the Principal Crannogs of Fermanagh' *JRSAI* 2, 314; Wood-Martin, WG.1886 *The Lake Dwelling of Ireland*, 50, 186.

**Boat Number:** I177 **NGR:** H 660 005  
**Boat Name:** Drumkeery **OD:** 140m  
**Townland:** Drumkeery **Site:** Drumkeery Lake  
**County:** Cavan

'A single-piece canoe, formed out of an oak trunk' was found in 1863 due to a fall in water levels in Drumkeery Lake. Its fate was not noted. It probably no longer survives.

The lake which now measures approximately 800x130m contained a crannog which Wood-Martin noted as opposite the boat.

MacDowell, U. 1983 *Irish Logboats*, No.50; Munro, R. 1890 *The Lake Dwellings of Europe*, 392; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 50, 201.

**Boat Number:** I178 **OS 6":** 27  
**Boat Name:** Drumleague **OD:** 45m (Water Level)  
**Townland:** Drumleague **Site:** Drumleague Lough  
**County:** Leitrim

'A canoe of a single piece of oak' was found in Drumleague Lough before c.1858. Its fate was not noted and probably no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.48   | 0.56  |

Thole pin holes were noted 'cut in the sides'.

Grace, Rev. J. 1858, 'What we learn from Wilde's Catalogue of Antiquities in the Museum of the Royal Irish Academy' *JRSAI* 2, 132; MacDowell, U. 1983 *Irish Logboats*, No.160; Wilde, WG.

1863 *A Descriptive Catalogue of the Antiquities in the Museum of the Royal Irish Academy* 1, 227; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 48-9. 240

**Boat Number:** I179 **NGR:** G 96 20  
**Boat Name:** Drummans Island **OD:** 50m (Water Level)  
**Townland:** Drummans Island **Site:** Lough Allen  
**County:** Leitrim

A 'dugout boat' was found in 1951 on Lough Allen's northeastern lakeshore. When found, one end of the boat was exposed above the water. It was left *in situ*.

MacDowell, U. 1983 *Irish Logboats*, No.161; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I180 **NGR:** G 947 238  
**Boat Name:** Drummans Lower **OD:** 50m (Water Level)  
**Townland:** Drummans Lower **Site:** Lough Allen  
**County:** Leitrim **Form:** Tapered

A 'dugout canoe' was found in March 1984 in Lough Allen. It was partly covered in Lake Sand. It was examined by O'Floinn (National Museum of Ireland). When found, both the bow and stern were split and the sides did not survive to their full height, Its fate was not noted, but it was probably left *in situ*. It was radiocarbon-dated  $1630 \pm 30$ B.P. (GrN - 18756) by Brindley and Lanting (Biologisch-Archaeologisch Institut, Gronigen).

In plan the rounded bow tapered to the bow which was a rounded-point. Its longitudinal-section was flat-bottomed with rounded ends, while the cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Stern Width | Bow Width | Midship Width | Stern T | Floor T |
|--------|-------------|-----------|---------------|---------|---------|
| 8.60   | 1.05        | 0.80      | 0.95          | 0.10    | 0.08    |

Twelve holes which vary between 2cm in diameter and 10 by 4cm, are located in the floor, four of which are on the long axis, five by one side and three by the other. They were not transversely in line. Their purpose was probably that of thickness-gauge, and the larger oval holes were probably worn to a larger size.

'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I181 **NGR:** N 122 563  
**Boat Name:** Drumnacor 1 **OD:** 45m  
**Townland:** Drumnacor **Site:** River Inny  
**County:** Longford **Form:** Tapered

An oak 'dug-out canoe' was found in the River Inny in 1963 during drainage operations. It was taken to the Office of Public Works Depot, Abbeyshrule, where it was examined and drawn by Danaher (National Museum of Ireland). Its fate was not noted and probably no longer survives. When found, both ends and sides did not survive to the full height.

In plan it tapered from the rectangular stern to rounded bow. Its cross-section was rectangular and in longitudinal-section it was flat-bottomed with inclined ends.

Dimensions (in metres):

| Length | Stern Width | Bow Width | Height (ext) | Sides T |
|--------|-------------|-----------|--------------|---------|
| 6.70   | 0.62        | 0.46      | 0.28         | 0.08    |

MacDowell, U. 1983 *Irish Logboats*, No. 174; 'Topographical Files' *National Museum of Ireland*.

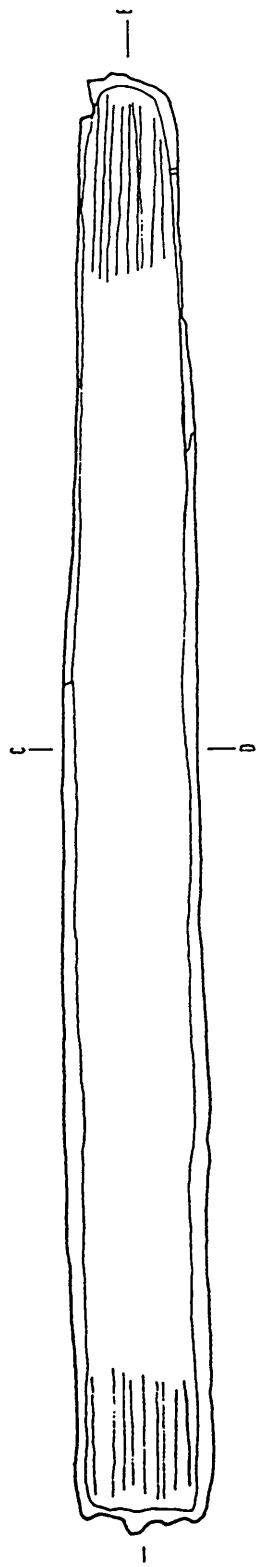


Figure 40: Drumnacor 1 (after Danaher)

**Boat Number:** I182

**NGR:** N 122 563

**Boat Name:** Drumnacor 2

**OD:** 45m

**Townland:** Drumnacor

**Site:** River Inny

**County:** Longford

**Form:** Tapered

An oak 'dug-out canoe' was found in the River Inny in 1963 during drainage operations. It was taken to the Office of Public Works Depot, Abbeyshrule, where it was examined and drawn by Danaher (National Museum of Ireland). Its fate was not noted and probably no longer survives. When found both ends and sides did not survive to full height, and had a knothole in one side.

In plan it tapered from the rectangular stern to the rounded bow. Its cross-section was rectangular and in longitudinal-section it was flat-bottomed with inclined ends.

Dimensions (in metres):

| Length | Stern Width | Bow Width | Sides Width |
|--------|-------------|-----------|-------------|
| 5.50   | 0.62        | 0.40      | 0.04        |

MacDowell, U. 1983 *Irish Logboats*, No. 175; 'Topographical Files' *National Museum of Ireland*.

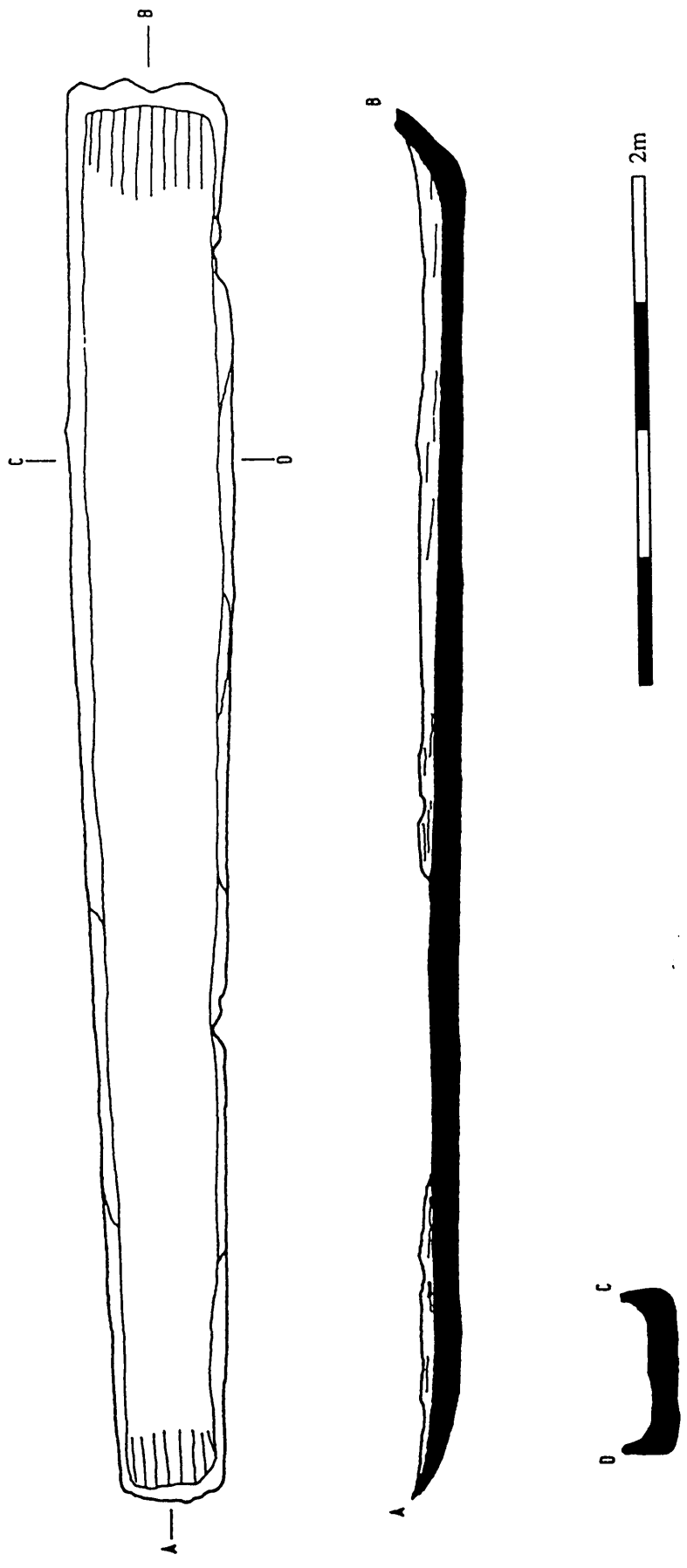


Figure 41: Drumnacor 2 (after Danaher)

**Boat Number:** I183 **NGR:** H 111 576  
**Boat Name:** Drumreask 1 **OD:** 45m (Water Level)  
**Townland:** Drumreask **Site:** Lower Lough Erne  
**County:** Fermanagh

A 'dugout boat' was found in Holme Bay, Lower Lough Erne in 1956. It was examined and drawn by Seaby and Thompson (Ulster Museum) and was probably left *in situ*. When found, it was in two lengths. The only description noted was that of a rounded end and one side several inches thicker near its base than the other.

Dimensions (in metres):

| Length 1 | Length 2 | Width |
|----------|----------|-------|
| 4.57     | 0.99     | 1.83  |

MacDowell, U. 1983 *Irish Logboats*, No. 107; Seaby, WA. *Seaby Survey Files*, No 1.

**Boat Number:** I184 **NGR:** H 111 577  
**Boat Name:** Drumreask 2 **OD:** 45m (Water Level)  
**Townland:** Drumreask **Site:** Lower Lough Erne  
**County:** Fermanagh

A 'dugout boat' was found in Holme Bay, Lower Lough Erne in 1956. It was examined by Seaby (Ulster Museum) and left *in situ*. No further description is given.

MacDowell, U. 1983 *Irish Logboats*, No.108; Seaby, WA. *Seaby Survey Files*, No.2.

**Boat Number:** I185 **NGR:** H 1133 5698  
**Boat Name:** Drumreask 3 **OD:** 45m (Water Level)  
**Townland:** Drumreask- Tully **Site:** Lower Lough Erne  
**County:** Fermanagh **Form:** Tapered

A 'dugout boat' was first found in 1885 and again in 1956 in Holme Bay, Lower Lough Erne. It was discovered embedded in the sand of a river. It was examined by Seaby and Thompson (Ulster Museum) and drawn by Thompson. It was left *in situ*. When found, the boat sides and ends did not survive to their full height.

In plan it tapered slightly from the stern to the bow which were both rounded. In longitudinal-section it was flat-bottomed with rounded ends.



Dimensions (in metres):

| Length | Stern Width | Bow Width |
|--------|-------------|-----------|
| 14.33  | 0.86        | 0.61      |

A solid transverse rib 76cm from the stern was noted by Seaby as a means 'whereby the shape of the hips of the steerer or helmsman was hollowed-out in a little ridge carved in relief across the bottom'. However a more plausible use may have been that of strengthening.

MacDowell, U. 1983 *Irish Logboats*, No. 109; Seaby, W A. *Seaby Survey Files*, No.3.

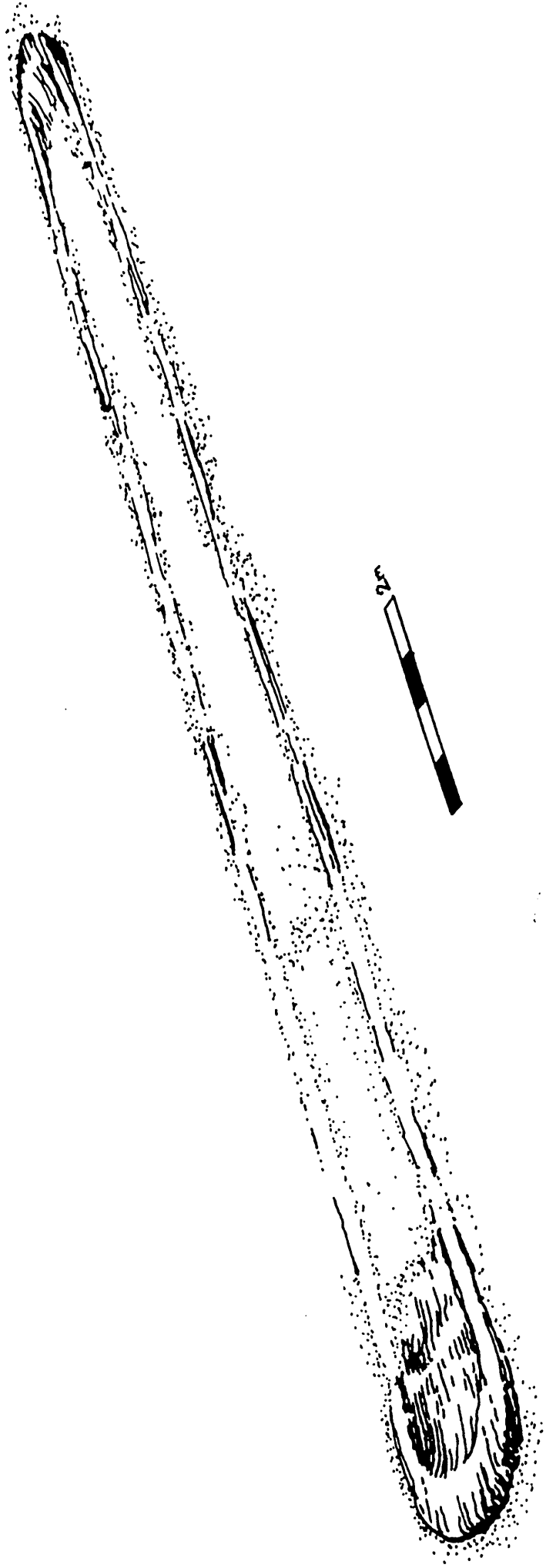


Figure 42: Drumreask 3 (after Seaby and Thompson)

**Boat Number:** I186 **NGR:** H 299 664  
**Boat Name:** Dullaghan **OD:** 120m  
**Townland:** Dullaghan **Site:** Bog  
**County:** Tyrone **Form:** Canoe

An oak dugout 'canoe' was found in 1945 at a depth of 80cm in a small bog. It was examined and drawn by Mogey and then reburied *in situ*. It was found in perfect condition made from a whole log.

In plan it tapers from a rectangular stern to a rectangular bow. Its cross-section was flat-bottomed with rounded upturn of the sides, which terminated in tumblehome. Its longitudinal section is flat-bottomed for most of its length and then inclines up to vertical ends.

Dimensions (in metres):

| Length | Midship width (int) | Midship Gunwale | Max Stern (ext) | Max Bow (ext) | Bow T | Stern T | Side T |
|--------|---------------------|-----------------|-----------------|---------------|-------|---------|--------|
| 3.96   | 0.91                | 0.68            | 0.96            | 0.81          | 0.20  | 0.28    | 0.10   |

At 1.22m from the bow, a solid transverse rib, 10cm wide and 18cm high. A solid stern seat measured 51cm long and 20cm high. An L-shaped horizontal hole situated in each corner near the gunwale, measured 15cm and 23cm in respective bow and stern diameters. The holes were 7.6cm from the bow corners and 12.7cm from the stern corners. Their function is not known. Mogey suggests they were used in conjunction with ropes to pull the boat along. However, such a method would not appear to be a practical arrangement.

The fragments of two paddles were found in the boat. Between the bow and the transverse-rib a quantity of 'small round stones' of 10 to 15cm in diameter were situated. Their purpose may have been to serve as a counter balance to the paddler in the stern.

The bog which measures approximately 400 by 150 metres contained a double line of stakes leading away from the boat in a north west direction to the lowest part of the bog. Stakes also surrounded the boat along with two 'rough planks'.

MacDowell, U. 1983 *Irish Logboats*, No.241; McGrail, S. 1978 *The Logboats of England and Wales*, 89; Mogey, JM. *Seaby Survey Files*, No.21.

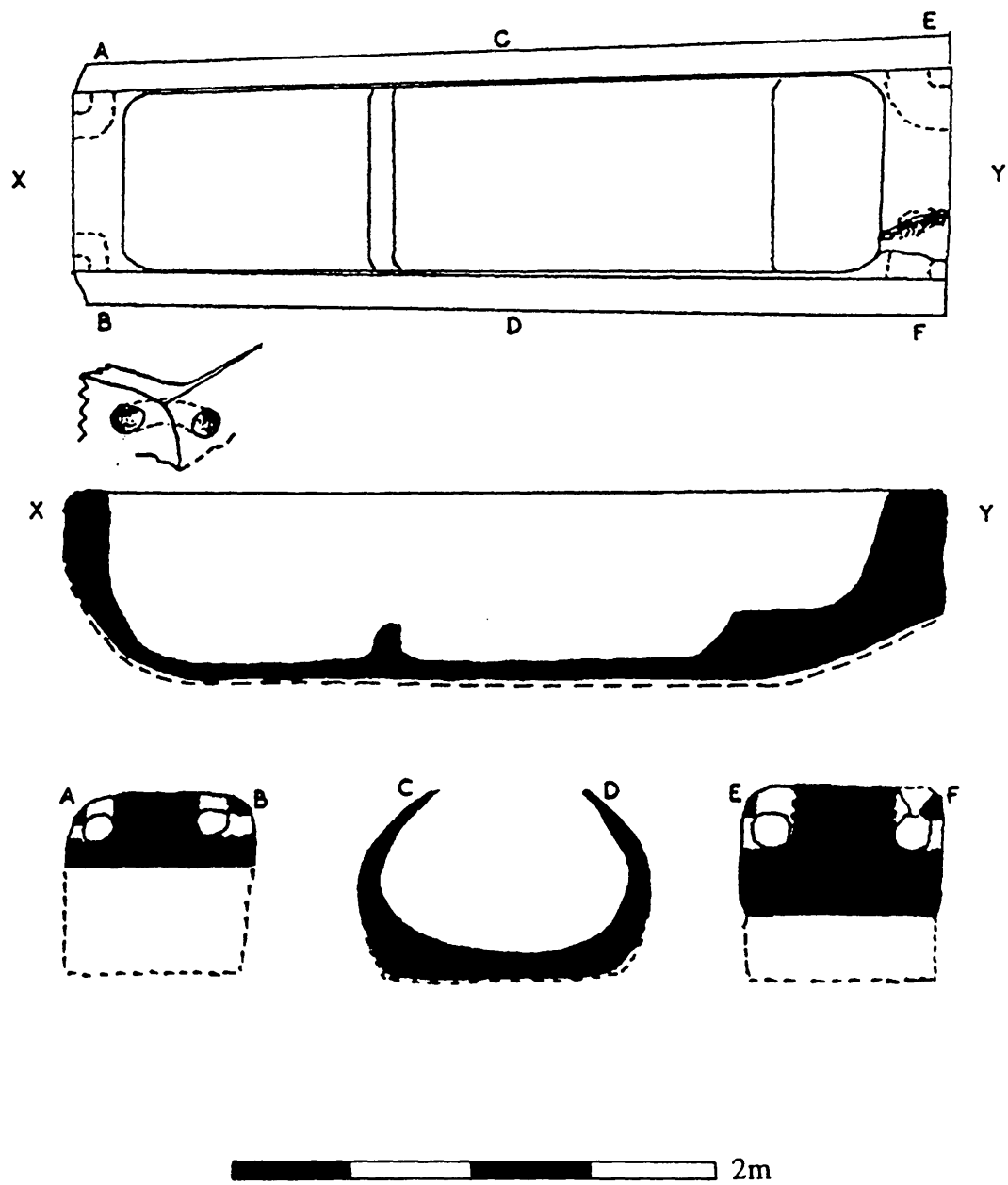


Figure 43: Dullaghan (after Mogey)

**Boat Number:** I187 **NGR:** N 986 528  
**Boat Name:** Dunshaughlin 1 **OD:** 75m  
**Townland:** Dunshaughlin **Site:** Lagore Bog  
**County:** Meath

An 'oak' dugout boat was found in 1934-6 during excavation of Lagore Crannog in a former lake. It was incorporated into the Iron Age foundations on the east side of the crannog and the 'bow-shaped timbers which were driven into the lake mud to consolidate it', and covered with peat. The bow was missing and the stern was damaged. The floor had large splits following the wood grain. It no longer survives.

In plan, the boat was parallel-sided and rounded in cross-section. The longitudinal section was not noted.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 7.00   | 0.95  |

Four pairs of opposing semi-circular thwart-rests were noted as were four pairs of opposing thole pin holes. An oak treenail was situated by the stern gunwale. A length of elder or hazel was treenailed to the starboard side as a repair patch.

Hencken, H. 1951 'Lagore Crannog: An Irish Royal Residence of the 7th to 10th Centuries AD' *PRIA* 53, 10, 39, 151-2, fig 75, pl 7 fig 2; MacDowell, U. 1983 *Irish Logboats*, No.187.

**Boat Number:** I188 **NGR:** N 970 567  
**Boat Name:** Dunshaughlin 2 (Several) **OD:** 75m  
**Townland:** Dunshaughlin **Site:** Lagore Bog  
**County:** Meath

'Several single tree canoes' were found c.1839 around Lagore Crannog. No further description is given and they probably no longer survive.

MacDowell, U. 1983 *Irish Logboats*, No.186; Wood-Martin, WG. 1886, *The Lake Dwellings of Ireland*, 204.

**Boat Number:** I189-91 **NGR:** Q 85 34  
**Boat Name:** Dysert marshes 1-3 **OD:** 5m  
**Townland:** Dysert Marshes **Site:** River Brick  
**County:** Kerry

Three 'dug-out canoes' were found in 1953 during drainage work in the River Brick. The description give is that one consisted a 'central strip of the floor' 4.82m long and 27cm wide. Their fates were not noted.

MacDowell, U. 1983 *Irish Logboats*, No.142-3; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I192 **NGR:** H 743 624  
**Boat Name:** Edencrannon 1 **OD:** 90m (Water Level)  
**Townland:** Edencrannon **Site:** Lough Aughlish  
**County:** Tyrone **Form:** Canoe

A 'dug-out canoe' was found in 1938 in Lough Aughlish. It was acquired by Burges and then the Ulster Museum (368:1959) where it was drawn on two different occasions by Flanagan, Seaby and Thompson. When found, its sides and ends were worn down. It no longer survives.

In plan the boat is parallel sided with rounded ends. In cross-section it was rounded and its longitudinal section was flat-bottomed with rounded ends.

Dimensions (in metres):

| Length | Width | Floor T |
|--------|-------|---------|
| 5.18   | 0.85  | 0.07    |

Two thickness gauges of 2.5cm in diameter are situated near either end on the boat's long axis.

Burges, A. 1938 'Dug-out canoes at Castlecaulfield' *UJA* 1, 80; Flanagan, L. 1960 'Dug-out Boat' *UJA* 23, 53-4, fig 3; MacDowell, U. 1983 *Irish Logboats*, No.249, fig 58; Seaby, WA. *Seaby Survey Files*, No.15.

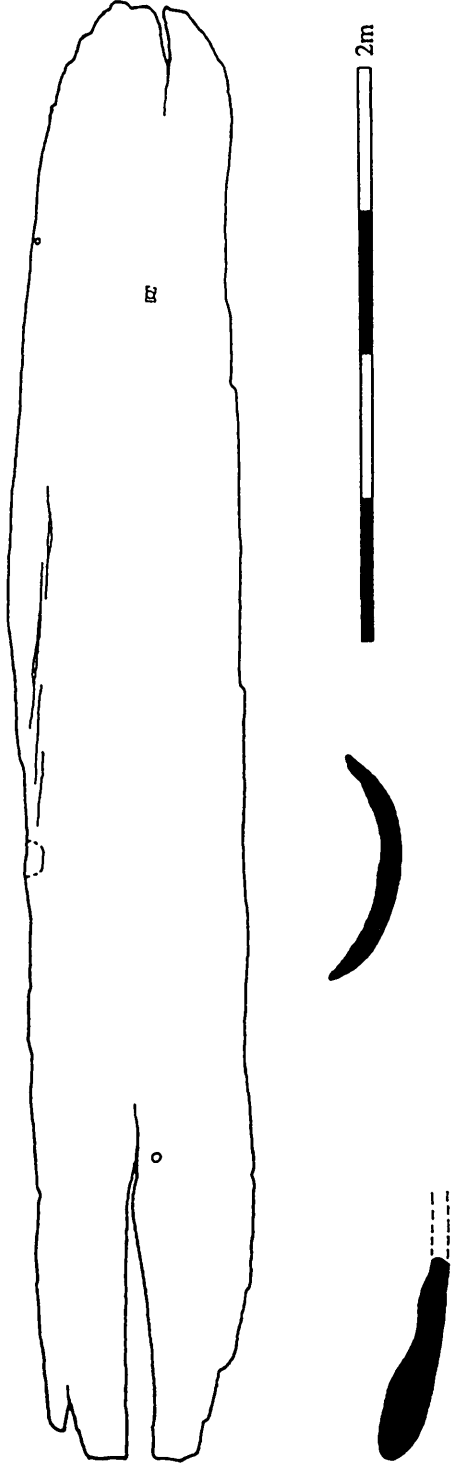


Figure 44: Edencrannon 1 (after Seaby)

**Boat Number:** I193

**NGR:** H 743 624

**Boat Name:** Edencrannon 2

**OD:** 90m (Water Level)

**Townland:** Edencrannon

**Site:** Lough Aughlish

**County:** Tyrone

**Form:** Punt

A 'dug-out canoe' was found c.1938 in Lough Aughlish. It was acquired by Burges and then the Ulster Museum 369:1959, where it was drawn by Flanagan, and Seaby and Thompson on two different occasions. When found, its bow was missing and there was a large split in the floor at this end. Its sides did not survive to their full height. It no longer survives.

In plan, the boat was parallel-sided and the stern was originally rectangular. Its longitudinal-section was flat-bottomed with inclined ends, while its cross-section was sub-rectangular.

Dimensions (in metres):

| Length | Width | Floor T | Sides T |
|--------|-------|---------|---------|
| 3.23   | 0.66  | 0.10    | 0.05    |

A rectangular thole-pin hole mounted in an inward projecting blister of wood was situated on port with the remains of an opposing one on starboard. Further forward, was a pair of opposing thwart rests in the form of inward projecting blisters on the sides. Near the stern a pair of transverse depressions in the floor were interpreted as footrests. The tholepin holes, thwart rests and depressions are located 76cm, 1.17m and 76 cm from the stern respectively. However, the depressions could not have been footrests since they would have been directly under the seat.

Burges, A. 1938 'Dug-out canoes at Castlecaulfield' *UJA* 1, 80; Flanagan, C. 1960 'Dug-out Boat' *UJA* 23, 53-4, fig3; MacDowell, U. 1983 *Irish Logboats*, No250, fig 57; Seaby, WA. 1973 *Seaby Survey Files*, No 14.



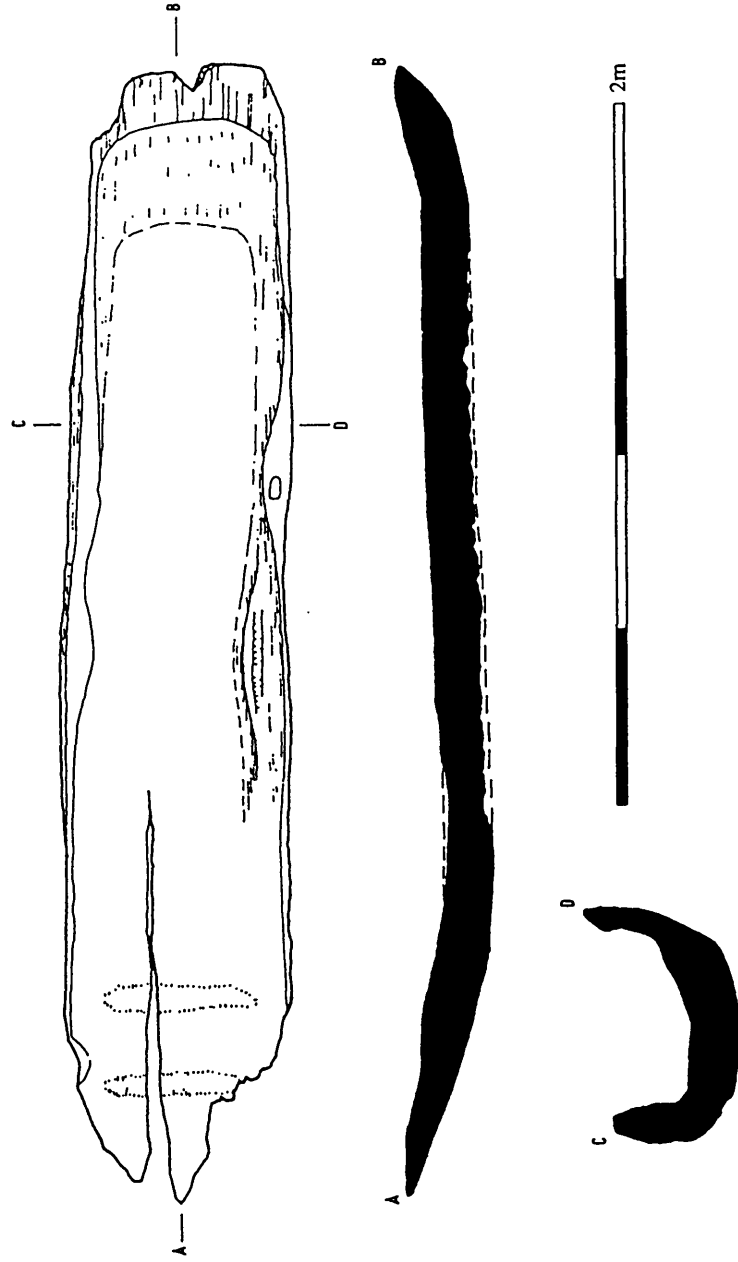


Figure 45: Edencrannon 2 (after Seaby)

**Boat Number:** I194

**NGR:** N 05 97

**Boat Name:** Erril Lough

**OD:** 45m (Water Level)

**Townland:** Erril

**Site:** Erril Lough

**County:** Leitrim

A 'logboat' was found in Erril Lough in 1895, at a depth of 4.6m. It was sent to the National Maritime Museum, Greenwich. It was noted as 'flat-bottomed with straight sides and square ends'.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 7.54   | 0.83  |

MacDowell, U. 1983 *Irish Logboats*, No 162.

**Boat Number:** I195-6

**NGR:** H 773 618

**Boat Name:** Eskragh 1-2

**OD:** 90m (Water Level)

**Townland:** Eskragh

**Site:** Lough Eskragh

**County:** Tyrone

Two oak 'dug-out canoes' were found in August-September 1953 in Lough Eskragh, when the water level dropped due to increased water demand in the vicinity. They were examined and drawn by Collins and Seaby (Ulster Museum). The first one no longer survives and the stern of the second was brought to the Ulster Museum. One of the boats was radiocarbon-dated to  $2165 \pm 25$  B.P. (GrN-14740) by Brindley and Louting (Biologisch-Archaeologisch Institut)

**I195: Form: Canoe.** Both sides in the bow-half and the bow were worn down. In plan, it was parallel-sided with a squared stern and rounded bow. In longitudinal-section it was flat-bottomed with a rounded bow and the stern rounded up to a vertical end. Internally the stern was steeply inclined up to a level surface. The cross-section was rectangular along its main body, rounded at the bow and sub-rectangular at the stern.

Dimensions (in metres):

| Length | Width | Stern T |
|--------|-------|---------|
| 7.39   | 0.79  | 0.46    |

Three thickness gauges were vertically set through the floor on the long axis.

**I196: Dissimilar-ended** This boat was found at a lower level in the lake mud. It was cracked in 'several places across the hull and large portions of sides had broken away'. In plan, it was parallel-sided with a sub-rectangular stern which had 2 sternboard grooves and rounded bow. Its longitudinal section was not noted and its cross-section was rectangular.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 6.40   | 0.79  |

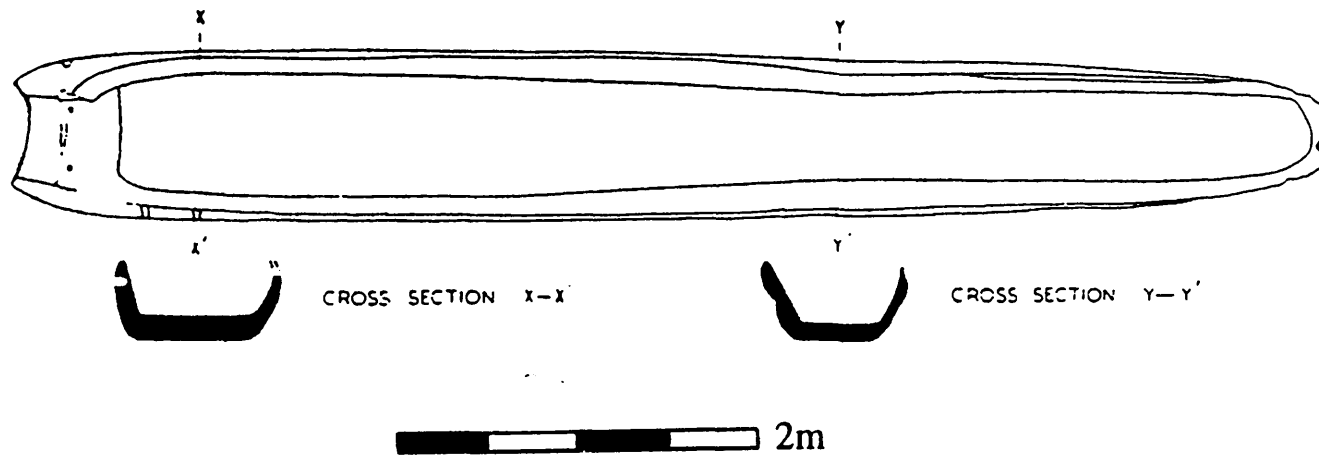
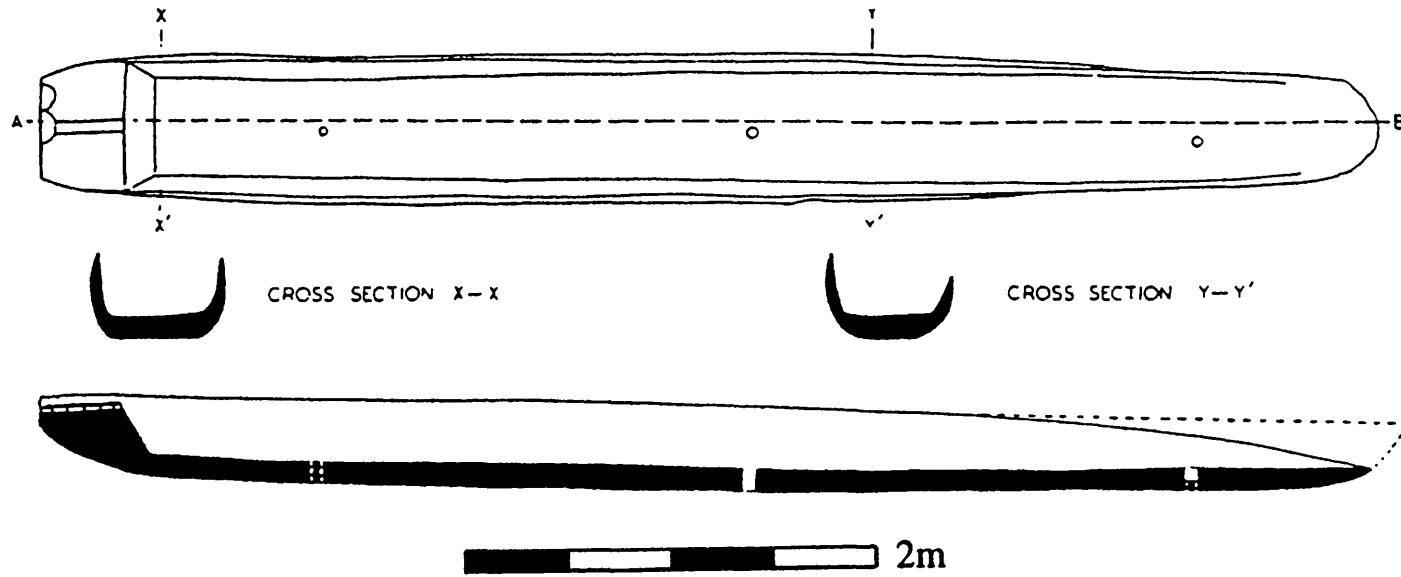
One of the two sternboards was held by transverse groove and the second consisted of a board which was treenailed into place. Both were secured by a 'cross-piece' and the second board was further 'secured by two vertical posts'. Both boards were made of oak and were caulked with moss.

The lake which measured approximately 700 by 400 metres contained three 'sites of timber construction. The boats were found beside and in association to Site A. The first boat (I195) had an alder two piece container. The boat either predates or is contemporary to it.

|                          |                                  |
|--------------------------|----------------------------------|
| <b>SMR Number</b>        | 054-031                          |
| <b>Townland</b>          | Eskragh                          |
| <b>Nation Grid Ref.</b>  | H 773 618                        |
| <b>Site</b>              | Crannog                          |
| <b>Site Date</b>         | Late Bronze Age, Built 650-400BC |
| <b>Date Methods</b>      | C14 and artefact assemblage      |
| <b>Boats Association</b> | Contemporary to crannog          |

Along with the boats, all the artefacts were retrieved from 'the muddy surface of the crannog'.

Collins, A. and Seaby, W. 1960 'Structures and small Finds' discovered at Lough Eskragh' *UJA* 23, 25-30, 35-6, figs.2, 3, 4, 5; MacDowell, U. 1983 *Irish Logboats*, No. 244-5; McGrail, S. 1978 *The Logboats of England and Wales*, 64,66; O'Riordan, S. 1979 *Antiquities of the Irish Countryside*, 94; Seaby, WA. *Seaby Survey Files*, No.16-7; William, B.1978 'Excavations at Lough Eskragh' *UJA* 41, 37-9, 41-3, 46-7, figs. 2, 3, 7.



Figures 46-7: Eskragh 1 (top) and Eskragh 2 (bottom) (after Collins and Seaby)

**Boat Number:** I197

**NGR:** G 975 227

**Boat Name:** Fahy

**OD:** 50m

**Townland:** Fahy

**Site:** River Yellow

**County:** Leitrim

**Form:** Tapered

An oak 'dug-out canoe' was found in October 1964 beneath 1.25m of river gravel in the River Yellow where it enters Lough Allen. Flooding changed the river course and revealed the boat. It was examined and drawn by Danaher (National Museum of Ireland). When found, most of the sides and ends were missing, It's fate was not noted and probably no longer survives. However five iron nails from the boat were acquired (National Museum of Ireland 'Topographical Files' 1964:115-9).

In plan, the boat tapered very slightly from the bow which appeared to have originally been rectangular to a squared stern with a stern board. Its longitudinal-section was flat-bottomed with an inclined bow and it was rectangular in cross-section.

Dimensions (in metres):

| Length | Max Width | Height (int) | Average T |
|--------|-----------|--------------|-----------|
| 6.00   | 0.90      | 0.38         | 0.04      |

The stern board levelled on the outer edge was dovetailed on to the end was secured by treenails of which the holes were 2cm in diameter. Above this and resting on the gunwales was aboard secured by trenails.

Two thwart rests were located on the starboard side, one amidships and the other near the bow. Three iron nails were set into the floor near the bow of which their purpose is not known. Twelve 2cm holes were set into the floor, four of which form a transverse line which could have held a fitted rib. The remaining eight were set in to groups of four into the floor. They were set as subsets of two across the floor, the ones closer to either end were closer to the sides. They may have held fitted foot rests as they were c 60cm closer to the stern than the corresponding thwart rests.

The five iron nails are rectangular in cross-section, two of which have 'mushroom-shaped' heads and three which are rectangular. Their lengths are 5.6cm, width of 6mm and 4mm in thickness.

'Acquisitions for 1964', 1967 *JRSAI* 97, 15; *Irish Independent* 29-10-64; *Irish Press* 29-10-64; *Longford Leader* 31-10-64; MacDowell, U. 1983 *Irish Logboats*, No.163, fig 48.



Figure 48: Fahy (after Danaher)



**Boat Number:** I200 **NGR:** R 788 865  
**Boat Name:** Garraunfadda **OD:** 35m (Water Level)  
**Townland:** Garraunfadda **Site:** Lough Derg  
**County:** Tipperary

An oak 'dug out canoe' was found in Lough Derg in July 1930. It was sent to the National Museum of Ireland (1930:200) where it was examined by Mahr. It no longer survives. When found both its ends were missing.

In plan, the boat was parallel sided with a rounded bottom and vertical sides in cross section. It was flat-bottomed in longitudinal section.

Dimensions (in metres)

| Length | Width |
|--------|-------|
| 6.12   | 0.64  |

The sides were extended by willow or poplar boards and lashed in 20 places by willow branches through holes in the hull and boards which were set c.25cm apart. They were caulked with moss. 'A curious loop with a half penetrated hole in it' was found beneath the boat. Its function or association is not known.

*Irish Independent* 27-8-1930; *Irish Independent* 15-9-1930; MacDowell, U. 1983 *Irish Logboats*, No. 239; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I201 **NGR:** N 182 247  
**Boat Name:** Garrynphort **OD:** 70m (Water Level)  
**Townland:** Garrynphort **Site:** Lough Croan  
**County:** Roscommon

A 'dug out canoe' was found c.1930 Lough Croan. It was rediscovered in October 1966 covered by silt 'to a depth of 30 cm'. It was examined by O'Riordain and left *in situ*. When found both ends and one side were missing. The only description given is that it was parallel sided.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 7.90   | 0.19  | 0.35         |

The lake measures approximately 600 by 600 metres, in which a crannog is located within 200m from the boat. It was probably associated with it due to the lake size and their proximity to each other.







**Boat Number:** I207 **NGR:** O 00 35  
**Boat Name:** Glananeeran Upper 1 **OD:** 60m  
**Townland:** Glananeeran Upper **Site:** Lough Lynch Bog  
**County:** Antrim

'Some years' before 1945, 'a short dug out boat' was found at Lough Lynch Bog. It was 'square ended' and 'decayed' before it could be removed.

Evans, E. 1945 'Field Archaeology in the Ballycastle District' *UJA* 8, 29; MacDowell, U. 1983 *Irish Logboats*, No.20.

**Boat Number:** I208 **NGR:** C 999 367  
**Boat Name:** Glassaneeran Upper 2 **OD:** 60m  
**Townland:** Glassaneeran Upper **Site:** Lough Lynch Bog  
**County:** Antrim **Form:** Canoe

A 'dug out' boat was found in Lough Lynch Bog in 1952. It was examined and drawn by Gibbons and Jones, then sent to the Ulster Museum (34:1954) where it was examined and drawn by Seaby and Thompson (Ulster Museum). It no longer survives. Both ends were split and there was a crack in the floor.

In plan, it was parallel-sided with a rounded stern and tapered slightly from near the bow to this rectangular end. In longitudinal-section it was flat-bottomed with a rounded stern and inclined bow. Its cross-section was rounded. The bow had a duck-bill projection from the rounded cross-section.

Dimensions (in metres):

| Length | Width | Height (ext) |
|--------|-------|--------------|
| 5.05   | 0.84  | 0.38         |

The boat had two pairs of thwart rests in the sides, two pairs of foot rests on the floor and two pairs of tholepin holes on gunwale, all of which took the form of solid projections. The holes were oval with a width of 7.6cm.

Three 2.5cm diameter thickness-gauges were located on the long axis at 0.84, 1.83 and 3.73m from the stern.

The bow was repaired with a board which was originally rectangular which had been treenailed across the duckbill projection by at least eight trenails. The purpose of it was to prevent further splitting along the grain.

MacDowell, U. 1983 *Irish Logboats*, No.21, fig 26; Seaby, WA. *Seaby Survey Files*, No.27

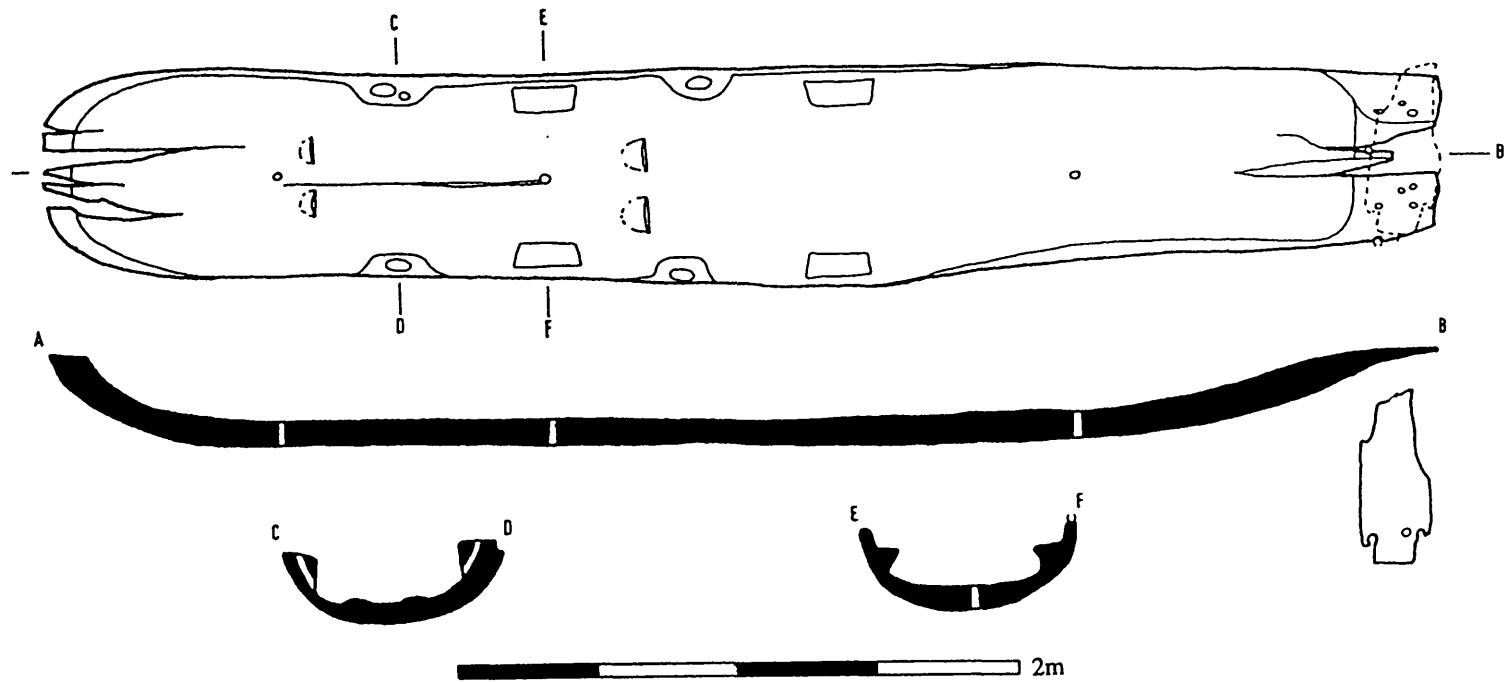


Figure 49: Glassaneeran Upper 2 (after Seaby)

**Boat Number:** I209 **NGR:** Q 965 335  
**Boat Name:** Gortnaminsha **OD:** 5m  
**Townland:** Gortnaminsha **Site:** River Feale  
**County:** Kerry

A 'dugout canoe' was found c.1918 in the River Feale. It was used as a 'hay prop'. In 1938 it was reported to the National Museum of Ireland and then sent to Tralee Technical School. It no longer survives. When found the boat was split into two longitudinal parts, the smaller part was subsequently sawn in two and had nails driven into it.

Dimensions (in metres):

| Length | Width | Max Height (int) |
|--------|-------|------------------|
| 3.35   | 0.56  | 0.25             |

Two oval holes were located in the floor. They were probably original circular thickness-gauges which were warped out of shape.

MacDowell, U. 1983 *Irish Logboats*, No.144; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I210 **NGR:** H 150 613  
**Boat Name:** Gubbaroe 1 **OD:** 45m (Water Level)  
**Townland:** Gubbaroe **Site:** Lower Lough Erne  
**County:** Fermanagh

An oak 'dug-out' boat was found in c.90cm of water on the North shore of Gubbaroe Point, Lower Lough Erne in 1956. It was examined and drawn by Seaby (Ulster Museum) and left *in situ*. It was found broken in two halves and little of the sides and neither end survived.

In plan, it was parallel-sided, rectangular in cross-section and appears to have been flat-bottomed in longitudinal section.

Dimensions (in metres)

| L(Part 1) | W(Part1) | L(Part2) | Original L |
|-----------|----------|----------|------------|
| 4.70      | 0.84     | 8.53     | 13.41      |

MacDowell, U. 1983 *Irish Logboats*, No.111, fig 40; Seaby, W A. *Seaby Survey Files*, No.4.

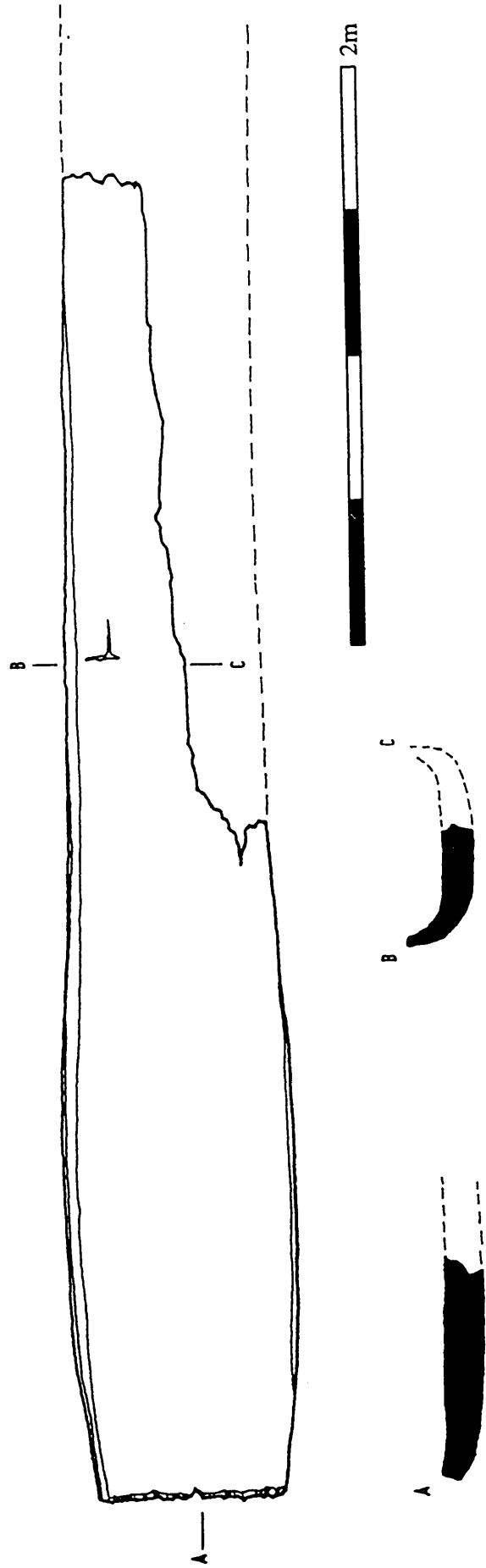


Figure 50: Gubbaroe 1 (after Seaby)

**Boat Number:** I211 **NGR:** H 15 61  
**Boat Name:** Gubbaroe 2 **OD:** 45m (Water Level)  
**Townland:** Gubbaroe **Site:** Lower Lough Erne  
**County:** Fermanagh

A possible unfinished dugout boat was found in 1957 partly buried in sand on the north shore of Gubbaroe Point, Lower Lough Erne. It was examined by Seaby and was left *in situ*.

It was described as a 6.10m length of log disappearing into the sand. 'It was hollowed down its length forming a narrow cavity' 46cm wide. Unfortunately no indication is given of its external width. Seaby suggests that if it was a boat it would only have been suitable for carrying light objects.

MacDowell suggest that it could have been a chute. The cavity width of 46cm is too narrow for a finished boat to be useable.

MacDowell, U. 1983 *Irish Logboats*, No 112; Seaby, W A. *Seaby Survey Files*.

**Boat Number:** I212 **NGR:** J 039 512  
**Boat Name:** Hacknahay **OD:** 15m  
**Townland:** Hacknahay **Site:** Gilford Drain  
**County:** Armagh **Form:** Punt

In the late 1960s an oak dugout boat was found in 'Gilford Drain'. It was examined by Fry (Department of the Environment) and was 'retained' by the finder, F. Irwin, at Brackagh. It was examined by the writer in March 1993, but it was not drawn as it is currently being used as a flower bed. When it was found, one side did not survive to its full height. One end is now radically split and one side has warped outwards. It was made from a knot free half of log.

In plan it was originally parallel-sided with rectangular ends. Both the longitudinal and cross-sections are flat-bottomed with flared sides or inclined ends.

Dimensions (in metres):

| Overall L | Ends L | Bow W | Stern L | Body W | H(ext) | Ends T | Sides T |
|-----------|--------|-------|---------|--------|--------|--------|---------|
| 3.03      | 0.50   | 0.49  | 0.55    | 0.52   | 0.30   | 0.16   | 0.03    |

Three 2cm. diameter holes are set across the bow which were probably used to secure a board to prevent radial splitting.

Fry, M. *Seaby Survey Files*, No.86.

**Boat Number:** I213

**NGR:** M 1 5

**Boat Name:** Headford

**OD:** 15m (Water Level)

**Townland:** Headford

**Site:** Lough Corrib

**County:** Galway

A 'dug out canoe made from a solid tree' was found in 1932 in Lough Corrib by scuba divers, at a depth of c.5.50m. It was sent to University College, Galway. Its fate was not noted.

Dimensions (in metres):

| Length | Width | Thickness |
|--------|-------|-----------|
| 10.36  | 0.71  | 0.10      |

'Cross ribs or seat marks along the whole length' were noted. These were probably ribs in the solid. At both ends were three circular holes in a 'tripod pattern' whose function are not known. There were tool marks throughout the hole, and on the bow the figures 'IVII' were noted.

*Irish Times* 21-6-32; *Kerryman* 25-6-32; MacDowell, U. 1983 *Irish Logboats*, No. 128; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I214-5

**OD:** 30m

**Boat name:** Heathlodge 1-2

**Site:** Lake

**Townland:** Heathlodge

**County:** Cavan

Two oak 'canoes' were found c.1885 on a lakeshore near Heathlodge. They were 'made from a single trunk'.

I214: Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.49   | 0.61  |

I215: Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Sides T |
|--------|-------|--------------|---------|---------|
| 6.40   | 0.84  | 0.38         | 0.10    | 0.06    |

The lake which has since being drained contained a crannog, with which the boats have no obvious association.

MacDowell, U. 1983 *Irish Logboats*, No 51-2; Milligan, S. 1885 'Proceedings' *JRSAI* 17, 148-9.



**Boat Number: I216**

**Boat Name: Hillsborough**

**Townland: Hillsborough**

**County: Down**

An oak 'canoe' was found in the vicinity of Hillsborough, c.1938. It was in good condition when found, but by the time it was reported, the sides and one end no longer survived. Its fate is not known and probably no longer survives.

The only description given is that it had a rectangular cross-section.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.88   | 0.61  |

The missing end had the number '1190' carved into it.

MacDowell, U. 1983 *Irish Logboats*, No.88; Tarry, *Seaby Survey Files*.

**Boat Number: I217**

**OS 6": 18**

**Boat Name: Huntington**

**OD: 15m**

**Townland: Huntington**

**Site: Derry River**

**County: Carlow**

A 'dug-out canoe' was found somewhere in the tail-race of the Derry River, c.1929. A paddle or oar was found in the same area and was registered with the National Museum of Ireland, (1929:1372). No other description is given and the boat's fate was not noted.

MacDowell, U. 1983 *Irish Logboats*, No.66; 'Topographical Files' *National Museum of Ireland*.

**Boat Number: I218-21**

**NGR: G 234 037**

**Boat Name: Illanee 1-4**

**OD: 80m (Water Level)**

**Townland: Illanee-Garrison Ireland**

**Site: Lough Ennell**

**County: Mayo**

Two oak 'dug-out canoes' were found 4m apart on the south west shore of the island in 1989. They were examined by O'Floinn and Cherry (National Museum of Ireland). Two other boats (IR220-1) were noted nearby, but they were not accessible for examination. All four boats were left *in situ*.

**I218: Form: Dissimilar-ended.** When found, the boat's sides were 'completely eroded'. In plan it had a rounded bow and rectangular stern. Its cross-section was flat-bottomed with an inclined bow and vertical stern.

Dimensions (in metres):

| Length | Max Width | Stern T | Floor T |
|--------|-----------|---------|---------|
| 1.20   | 0.65      | 0.10    | 0.06    |

Seven holes were noted, three of which were set 75cm apart along the long axis and the remaining four 'at various points' along one side. Their purpose would have been either as the thickness-gauges or for securing fitted ribs.

I219: Both the sides and most of the bow were missing on this boat. It was 'broad and flat-bottomed' and the bow was 'represented by a semi-circle'.

Dimensions (in metres):

| Length | Width | Min T | Max T | Bow T |
|--------|-------|-------|-------|-------|
| 6.20   | 0.60  | 0.02  | 0.04  | 0.09  |

'Adze' marks were noted with a signature blade length of 7cm.

|            |                 |
|------------|-----------------|
| SMR Number | 060-010         |
| Townland   | Illanee         |
| Site       | 'Island Cashel' |

'Correspondence Files' *National Museum of Ireland*, IA/198/89.

**Boat Number:** I222

**NGR:** J 46 44

**Boat Name:** Inch 1

**OD:** 5m

**Townland:** Inch

**Site:** River Quoile

**County:** Down

A possible 'dug-out' boat was found in 1958 during dredging in the River Quoile. It was sent to the Ulster Museum (1959:370) where it was examined and drawn by Flanagan Seaby and Thompson. It now no longer survives. When found, most of its sides and one end were missing. In plan it tapered to sub-rectangular end. Its cross-section was rounded and in longitudinal-section, it was flat-bottomed with a vertical end.

Dimensions (in metres):

| L (Ext) | L (int) | Min Floor T | Max Floor T | Width |
|---------|---------|-------------|-------------|-------|
| 2.44    | 2.08    | 0.18        | 0.25        | 0.70  |

This object is unlikely to be a boat. As MacDowell suggests it was very cumbersome with a very and extremely thick bottom or floor. It was more likely to have been a trough. However as a possible boat, it cannot be discounted.

A site is located in the vicinity:

|            |         |
|------------|---------|
| SMR Number | 037-050 |
| Townland   | Inch    |

|                         |   |
|-------------------------|---|
| <b>Site</b>             | Cistercian Abbey on pre Norman Monastery site |
| <b>Site Date</b>        | c.10th to 15th century                        |
| <b>Boat Association</b> | Possibly used as a ferry boat to the Abbey    |

A medieval quay or bridge was excavated in 1992 by Foley. It was located on the Quoile River bed in the vicinity of the boat. C14: 1364±AD and 1529±9 AD, Q8778 and Q8779 respectively.

Foley, C. 1993, *Pers. comm.*; Flanagan, L. 1960, 'Acquisitions' *UJA* 23, 53-4, fig 3; MacDowell, U. 1983 *Irish Logboats*, No.89; Seaby, WA. *Seaby Survey Files*, No.27; Seaby, WA. 1965 'Dug-out Boats' *UJA* 23, 58.

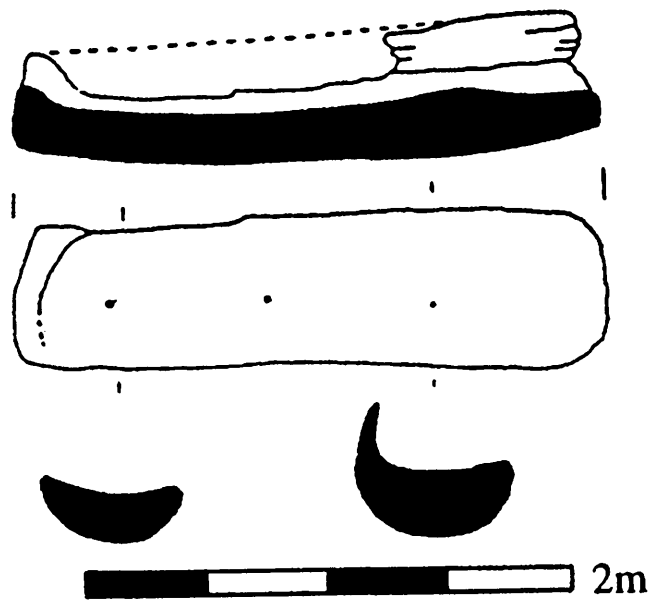


Figure 51: Inch 1 (after Seaby)

**Boat Number:** I223

**NGR:** J 480 455

**Boat Name:** Inch 2

**OD:** 5m

**Townland:** Inch

**Site:** River Quoile

**County:** Down

**Form:** Tapered

An unfinished oak dugout boat was found in October 1991 in the River Quoile close to IR222. It was sent to the Department of the Environment depot, Moira where it is currently under going conservation treatment. It was examined and drawn by the writer on 19th March 1993. The boat was radiocarbon dated to 2739±9 BC (UB-8520) at Queens University. Part of the port side was missing when it was found. A half log was used which has a few knots indicating that the stern was the root end of the trunk.

In plan the starboard is straight sided while the port curves gently to the rounded stern. The bow was not shaped. Its longitudinal section is flat-bottomed for most of its length with a gentle curve up either end, while it is rounded in cross section externally and generally level with the gunwales, except for a long the port side where it was in the process of being hollowed. The gunwale along this side is perfectly rounded. The starboard in its finished state would have been similarly formed. If it had been completed the bow would have been between 2.2 and 2.3 metres from the stern, leaving an excess length of at least 70cm. On the bow end, which would probably have been rounded on all three plans, but narrower than the stern, The port side is broken away at 1.95m from the stern. This probably occurred during the boats construction and caused the boat to be abandoned.

Dimensions (in metres):

| Overall L | Stern L | Max W | Max Hollowed W | Intended W(int) | H (ext) | Side T |
|-----------|---------|-------|----------------|-----------------|---------|--------|
| 3.06      | 0.40    | 0.45  | 0.20           | 0.35            | 0.20    | 0.05   |

When completed, the boat would have been very unstable for any propulsion method other than a sitting position and using a paddle.

Foley, C. 1993 *pers. comm.*; Fry, M. *Seaby Survey Files*, No.88.

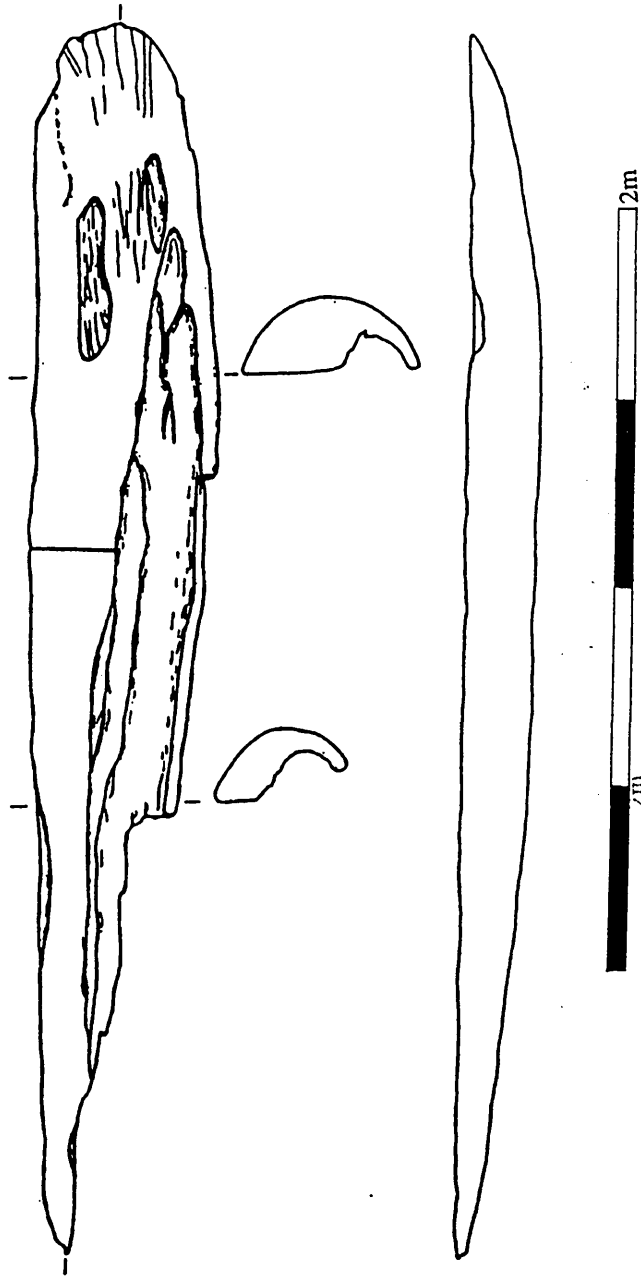


Figure 52: Inch 2

A COMPARATIVE STUDY OF  
IRISH AND SCOTTISH LOGBOATS

VOLUME THREE

N. T. N. GREGORY, B.A.

THESIS SUBMITTED FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

UNIVERSITY OF EDINBURGH

1997



## CONTENTS OF VOLUME THREE

|   |     |
|---|-----|
| <b>APPENDIX 1 (CONTINUED): CATALOGUE OF IRISH LOGBOATS</b>  | 441 |
| <b>APPENDIX 2: ARTEFACTS PREVIOUSLY MISTAKEN AS LOGBOAT</b> | 559 |
| <b>APPENDIX 3: CATALOGUE OF SCOTTISH LOGBOATS EXAMINED</b>  | 566 |
| <b>APPENDIX 4: LIST OF LOGBOAT FEATURES</b>                 | 590 |
| <b>APPENDIX 5: LIST OF LOGBOAT FORMS</b>                    | 595 |
| <b>APPENDIX 6: LIST OF LOGBOAT LENGTH RANGES</b>            | 597 |
| <b>APPENDIX 7: LIST OF LOGBOAT WIDTH RANGES</b>             | 600 |
| <b>APPENDIX 8: LIST OF LOGBOAT HEIGHT RANGES</b>            | 603 |
| <b>APPENDIX 9: LIST OF LOGBOAT SLENDERNESS RATIOS</b>       | 605 |
| <b>APPENDIX 10: LIST OF LOGBOAT BROADNESS RATIOS</b>        | 608 |
| <b>APPENDIX 11: LIST OF LOGBOAT THICKNESS RATIOS</b>        | 609 |
| <b>APPENDIX 12: LIST OF LOGBOATS AND THEIR REGIONS</b>      | 610 |
| <b>APPENDIX 13: LIST OF SYMBOLS USED IN CHAPTER 13</b>      | 613 |
| <b>APPENDIX 14: GLOSSARY OF BOAT AND NAUTICAL TERMS</b>     | 615 |



**Boat Number:** I224 **NGR:** J 478 455  
**Boat Name:** Inch 3 **OD:** 5m  
**Townland:** Inch **Site:** River Quoile  
**County:** Down

A dugout boat was found 'retrieved' from the River Quoile during 'exploratory work before dredging', by the Irish Underwater Archaeological Research Team, which was conducted by Foley (Department of the Environment). It was sent to the Department of the Environment Depot, Moira, for possible conservation treatment, but has since fallen into at least five parts. It is now due to be buried at Markethill. When it was found it consisted of the floor and chines. It was examined by Foley and drawn by Warner (Department of the Environment). In March 1993 it was examined by the writer. It was dendro-dated to 1188±22 A.D. (Foley *pers. comm.*).

There are the remains of two ribs in the solid and two opposing pairs of L shaped footrests. The ribs would have been used to strengthen the boat's hull.

At the same time as the boat was recovered, the remains of a bridge or quay were also found, which were radiocarbon dated to 1529±A.D. (Q8779, Q8778) by Queens University. The boat may be associated with this structure or the abbey in the immediate vicinity.

|                    |   |
|--------------------|---|
| <b>SMR Number</b>  | 037-050                                       |
| <b>Townland</b>    | Inch  |
| <b>Site</b>        | Cistercian Abbey on pre Norman Monastery Site |
| <b>Site Date</b>   | C.10th to 15th century                        |
| <b>Boat Assoc.</b> | Possibly used as a ferry boat to the Abbey    |

Foley, C. *pers comm.*; Fry, M. *Seaby Survey Files*, No.95.

**Boat Number:** I225 **NGR:** N 61 16  
**Boat Name:** Inchacooley **OD:** 60m  
**Townland:** Inchacooley **Site:** River Figile  
**County:** Laois

A 'dugout canoe' was found in February 1984 in the River Figile (tributary to the River Barrow). It was 'hailed up in a drag line by the Office of Public Works Drainage workers. It was placed in a nearby farm where it was examined and drawn by Cahill (National Museum of Ireland). When found, its bow, part of the starboard and all of the port side was missing. Its fate was not noted.

In plan it was parallel-sided with a rectangular stern. Its longitudinal-section was flat-bottomed with an inclined stern and it was rectangular in cross-section.

Dimensions (in metres):

| Length | Stern T | Height (int) | Floor T |
|--------|---------|--------------|---------|
| 4.68   | 0.45    | 0.15         | 0.04    |

Two thickness gauges were located along the long axis in the floor at 25cm. from the bow and 1.10cm from the stern. They still retained their trenails when the boat was found.

'Correspondence Files' *National Museum of Ireland*, 1A/3/84.

**Boat Number:** I226

**NGR:** R 27 97

**Boat Name:** Inchiquin

**OD:** 25m (Water Level)

**Townland:** Inchiquin

**Site:** Inchiquin Lake

**County:** Clare

A 'prehistoric canoe' was found in 1939 in Inchiquin Lake. It was sent to 'Clifden House'. Its fate was not noted and probably no longer survives. It was noted as 3.05m long. The lake itself is quite small at approximately 1.8 by 1.1km.

In the centre of the lake there is a crannog with no obvious associations to the boat. The crannog also has a medieval tower house.

|                          |                         |
|--------------------------|-------------------------|
| <b>SMR Number</b>        | 017 - 059               |
| <b>Townland</b>          | Inchiquin               |
| <b>National Grid Ref</b> | 12718 18964             |
| <b>Site</b>              | Crannog and Tower House |

MacDowell, U. 1983 *Irish Logboats*, No 68; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I227

**NGR:** N 99 70

**Boat Name:** Irishtown

**OD:** 10m

**Townland:** Irishtown

**Site:** River Glyde

**County:** Louth

In June 1950 during drainage operations on the River Glyde, an 'oak dug-out canoe' was found in 'the peat on the bottom'. It was examined and drawn by Raftery (National Museum of Ireland). However enquiries determined they never received the boat. It probably no longer survives. When found, both its sides and ends were worn down and it was broken in two during recovery.

In plan, the boat was parallel-sided and its longitudinal-section was flat bottomed and rectangular in cross-section.

Dimensions (in metres):

| Length | Max Width | Floor T | Sides T |
|--------|-----------|---------|---------|
| 3.66   | 0.69      | 0.10    | 0.06    |

On the floor a double footrest was located near one end.

MacDowell, U. 1983 *Irish Logboats*, No.178; Raftery, JR. 'A New Dug-out Canoe', *JLAS* 12, 126-7.

**Boat Number: I228**

**NGR: H 165 628**

**Boat Name: Kesh**

**OD: 45m (Water Level)**

**Townland: Kesh**

**Site: Lower Lough Erne**

**County: Fermanagh**

**Form: Canoe**

A 'dug-out boat' was found at Goblusk Point, Lower Lough Erne in 1887. Its sides and ends were worn down. Its fate was not noted and probably no longer survives. It was noted as having 'spoon shaped' ends.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 16.76  | 0.61  |

Day, R. 1888 'Proceedings' *PSA* 12, 67; MacDowell, U. 1983 *Irish Logboats*, No.110.

**Boat Number: I229**

**NGR: H 03 08**

**Boat Name: Keshcarrigan**

**OD: 65m (Water Level)**

**Townland: Keshcarrigan**

**Site: Lough Scur**

**County: Leitrim**

A 'dug-out' boat was found during drainage work in Lough Scur in 1953. It was examined by National Museum of Ireland. Its fate was not noted.

Dimensions: (in metres):

| Length | Width |
|--------|-------|
| 6.10   | 0.76  |

The lake which now measures approximately 2 by 1.2km contains four crannogs. There is no obvious association with the boat. None of the crannogs have been dated:

| SMR Number   | 024-045     | 024-046     | 024-047     | 024-049     |
|--------------|-------------|-------------|-------------|-------------|
| Townland     | Roscarbon   | Dring       | Gowley      | Gowley      |
| Nat.Grid Ref | 20270 30826 | 20325 30886 | 20338 30859 | 20334 30840 |

MacDowell, U. 1983 *Irish Logboats*, No.164; 'Topographical Files' *National Museum of*



**Boat Number: I234-5**

**NGR: H 3 1**

**Boat Name: Killygowan 1-2**

**OD: 50m (Water Level)**

**Townland: Killygowan**

**Site: Lough Oughter**

**County: Cavan**

'Two dugout canoes' were found in August 1955 by the shore of Lough Oughter. Both were examined by Lucas (National Museum of Ireland) and left *in situ*.

**I234: Form: Dissimilar-ended.** When found only the bottom and chines survived. In plan it tapered along its length. It was flat-bottomed along its length.

Dimensions (in metres):

| Length | Stern Width | Bow Width | Floor T |
|--------|-------------|-----------|---------|
| 6.58   | 0.58        | 0.56      | 0.08    |

The boat had two circular holes set through the floor, both of which were 2.5cm in diameter. They were probably thickness gauges.

**I235:** Found in a drain under 90cm of water, only 1-5m of it was visible before it 'disappeared into a bank'. The visible portion consisted of a stern. Nothing further is noted.

MacDowell, U. 1983 *Irish Logboats*, No.53; 'Topographical Files' *National Museum of Ireland*.

**Boat Number: I236-8**

**NGR: H 347 059**

**Boat Name: Killykeen 1-3**

**OD: 50m (Water Level)**

**Townland: Killykeen**

**Site: Lough Oughter**

**County: Cavan**

Three 'dugout canoes' were found together in July 1941 embedded in mud near the shore of Lough Oughter. They were examined by National Museum of Ireland personnel.

**I236:** This boat was broken in an attempt to raise it. One end and a 'tiller-piece' were retrieved. The remainder of the boat was left *in situ*. Both ends were damaged. In plan the boat was parallel-sided with a pointed bow. Its longitudinal section was flat-bottomed with an inclined bow. In cross-section, the main body was rectangular and the bow was V-shaped.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 14.63  | 0.91  |

The 'tiller piece' is described as a 'slightly horned pyramid, curving out to three points' and it measured 46x41x41cm. From the vague description it is very doubtful that it was used to steer the boat. Its function could not be determined.

**I237:** Found beside the bow of Killykeen 1 (I236) its remains consisted of the end of a boat and was raised. Its fate was not noted. In plan its longitudinal section was rounded and its cross-



On plan it tapered from the missing end to the original squared end. Its cross-section was rectangular and in longitudinal section it was flat bottomed with an inclined end.

Dimensions (in metres):

| Length | Max Width | Min T | Max T |
|--------|-----------|-------|-------|
| 4.46   | 0.66      | 0.03  | 0.05  |

Two sets of three holes, 2.5cm. in diameter, were set through the floor near either end. One from each set was on the long axis and the remaining two were in a transverse line closer to either end. Two oval holes which measured 1.5x1cm. are located in the floor on either side of the split. A rectangular hole 3.5cm. from the surviving end was 'set vertically through the floor and is in the middle of a deep tool mark'. The two sets of three holes may have been to secure a fitting. A more plausible explanation is those on the long axis were thickness-gauges and the remaining ones were used to secure a fitted rib. The two oval holes were probably originally circular and were used as a means of preventing the split growing as could the above holes retaining fitted ribs. The rectangular hole could have been the result of a careless adze or axe swing.

The bottom was also repaired by an internal and external patch, of which the external was still *in situ*. They covered an irregular shaped hole. They were secured by twenty-two iron nails. The external patch measured 47x27.5x2cm. The internal patch which was recovered, measured 18.8x4.5x2cm. and had ten iron nails. Both patches had bevelled edges. The nails were rectangular in cross section and their heads no longer survive. Form: Possible Punt Variant.

MacDowell, U. 1983 *Irish Logboats*, No.168, fig 7.

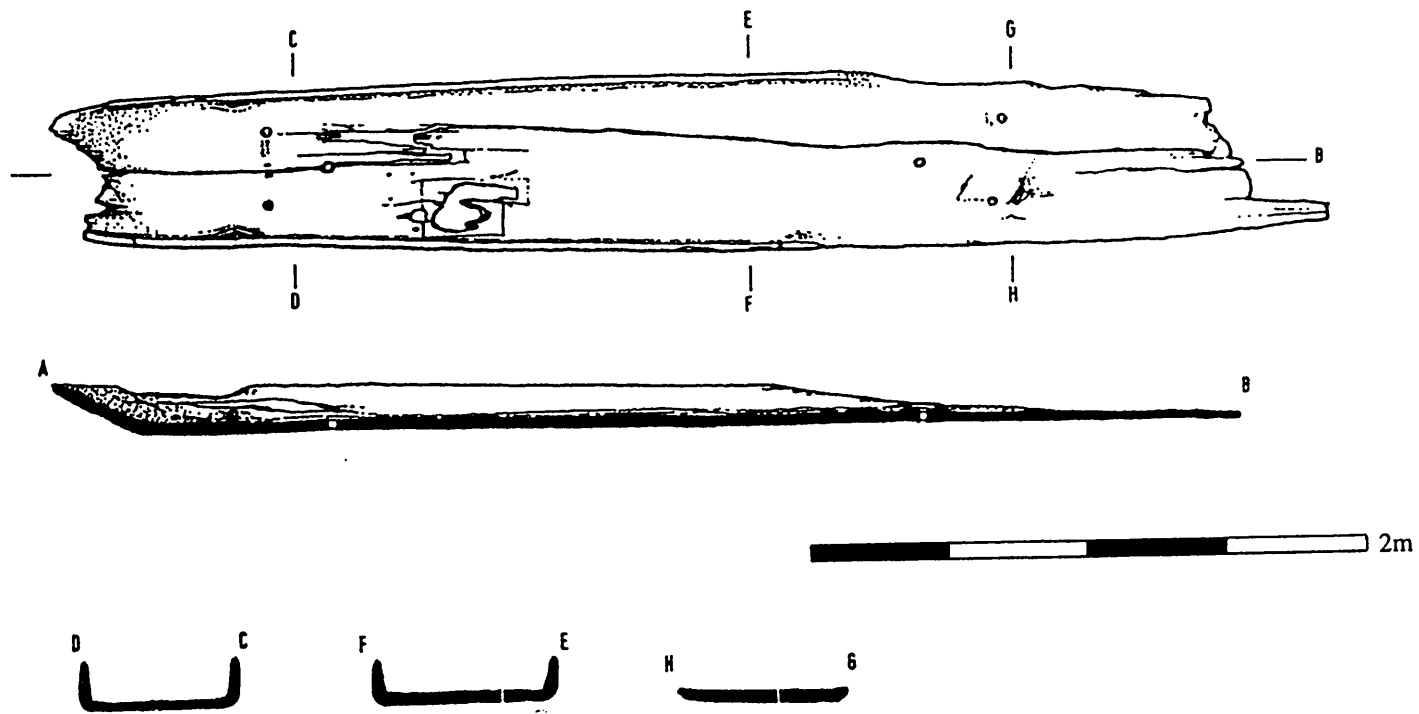


Figure 53: Kilturbid (after MacDowell)





bottomed with an inclined bow and vertical stern and its cross section is rectangular.

Dimensions (in metres):

| Length      | Stern<br>L     | Bow<br>L         | Bottom<br>L | Width<br>(ext) | Width<br>(int) |
|-------------|----------------|------------------|-------------|----------------|----------------|
| 3.43        | 0.27           | 0.40             | 3.06        | 0.57           | 0.51           |
| Bottom<br>T | Min<br>Sides T | Max<br>Side<br>T | Bow<br>T    | Stern<br>T     |                |
| 0.17        | 0.03           | 0.08             | 0.09        | 0.22           |                |

At 1.73m. from the stern is an opposing pair of thole pin holes, set in gunwale blisters which are sub-rectangular in plan and taper downwards into the sides. The holes are 4cm. in diameter and depth. Warner noted 'a series of tool marks' on the hull which 'interpreted as axe marks'. An opposing pair of thwart rests are located half way up the sides amidships, cut in the form of ledges.

The boat's construction was not finished when it was abandoned. Its floor was not full hollowed out. It is quite uneven and is very thick. Internally the stern near its base is quite uneven with the hacking out of the wood with an adze not finished, and externally the stern is very uneven. The sides also vary greatly in thickness from 3 to 8 cm, and would have required further removal of excess wood.

Fry, M. *Seaby Survey Files*, No. 55; Fry, M. 1988 *Paddle your own!: The logboat in the North of Ireland*, 6; MacDowell, U. 1983 *Irish Logboats*, No. 28, fig 30.

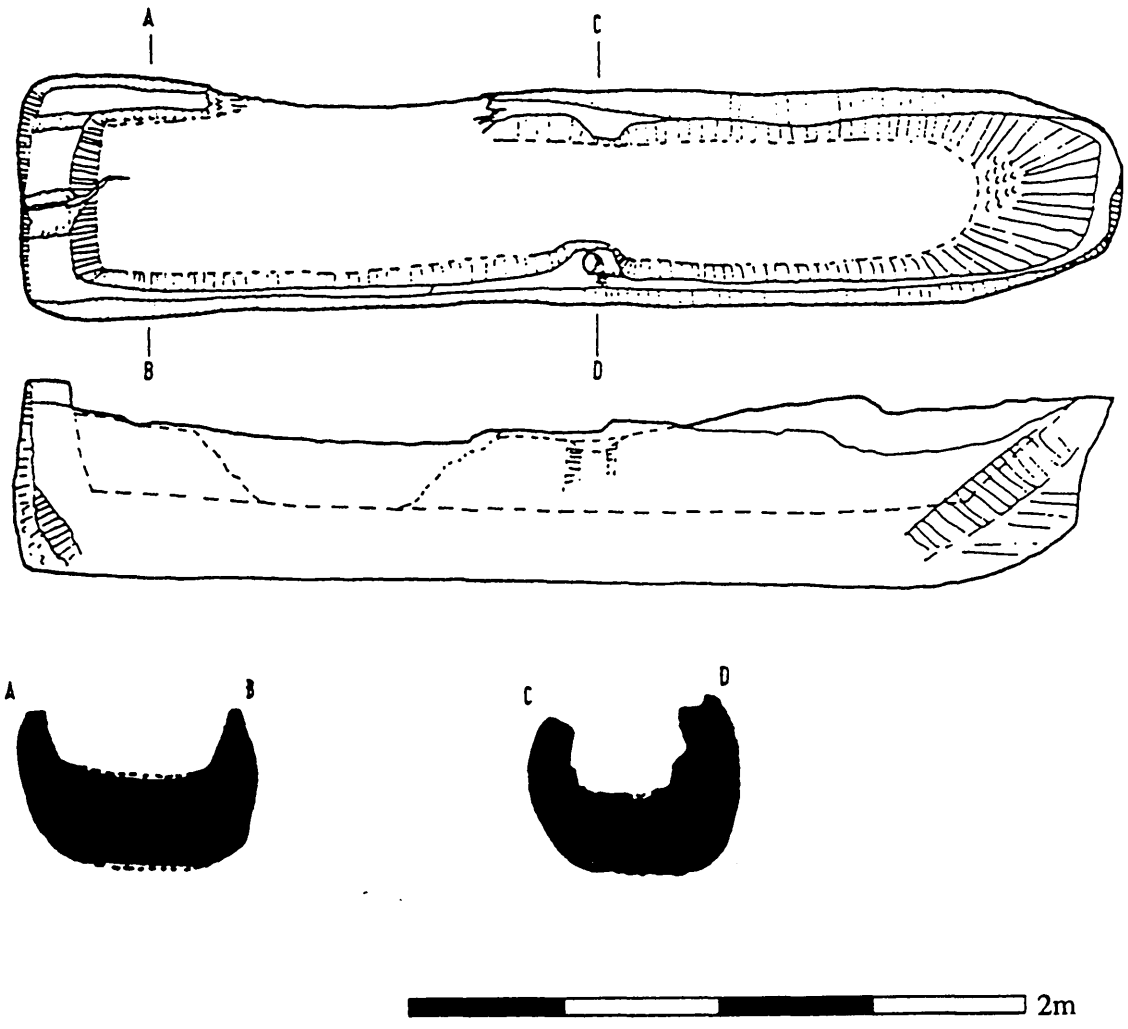


Figure 54: Kinnegoe (after Warner)

**Boat Number:** I253 **OS 6'':** 27  
**Boat Name:** Knockaville **OD:** 100m (Water Level)  
**Townland:** Knockaville **Site:** Lough-a-Trim  
**County:** Westmeath

A 'canoe' was found in 1876 in Lough-a-Trim during drainage operations. It was described as having 'carved ends'. Its length was noted 6.71m. The boat 'fell to pieces' shortly after discovery.

A crannog was noted in the lake (SMR No.027-030) from which 'horn combs, bone and bronze pins and an amber ring' were obtained. The boat may be contemporary to this crannog.

Barden, P. 1898, 'Lough-a-trim Crannog, Co. Westmeath'. *JRSAI* 28, 276; MacDowell, U. 1983 *Irish Logboats*, No. 267 .

**Boat Number:** I254 **OS 6'':** 36  
**Boat Name:** Knockbrack **OD:** 75m  
**Townland:** Knockbrack **Site:** Land/Miscellaneous  
**County:** Sligo **Form:** Punt

A logboat was found c.1925 on a farmer's land at 45cm. 'below the surface, resting on clay and packed either side with boards and stones'. It was sent to the National Museum of Ireland (1928:401). It was examined and drawn by Mahr, Raftery and MacDowell and examined by McGrail, all on different occasions. Their measurements all differ. MacDowell's account is taken into account here, since her measurements are the most comparable to the others and most detailed. It is now stored at the National Museum of Ireland's Depot, Daingean. In May 1993 the boat was inaccessible for examination.

In plan, it was roughly parallel-sided with a slight taper to the bow. Both ends were squared. In longitudinal section it was flat-bottomed with rounded ends, while the cross-section is flat-bottomed with flared sides. The boat split along the grain at both ends and along the floor.

Dimensions (in metres):

| Length | Stern Width | Bow Width | Ends T |
|--------|-------------|-----------|--------|
| 2.49   | 0.94        | 0.83      | 0.25   |

MacDowell, U. 1983 *Irish Logboats*, No.237, fig 9; 'Topographical Files' *National Museum of Ireland*; Raftery, JR. *Seaby Survey Files*, No.12.

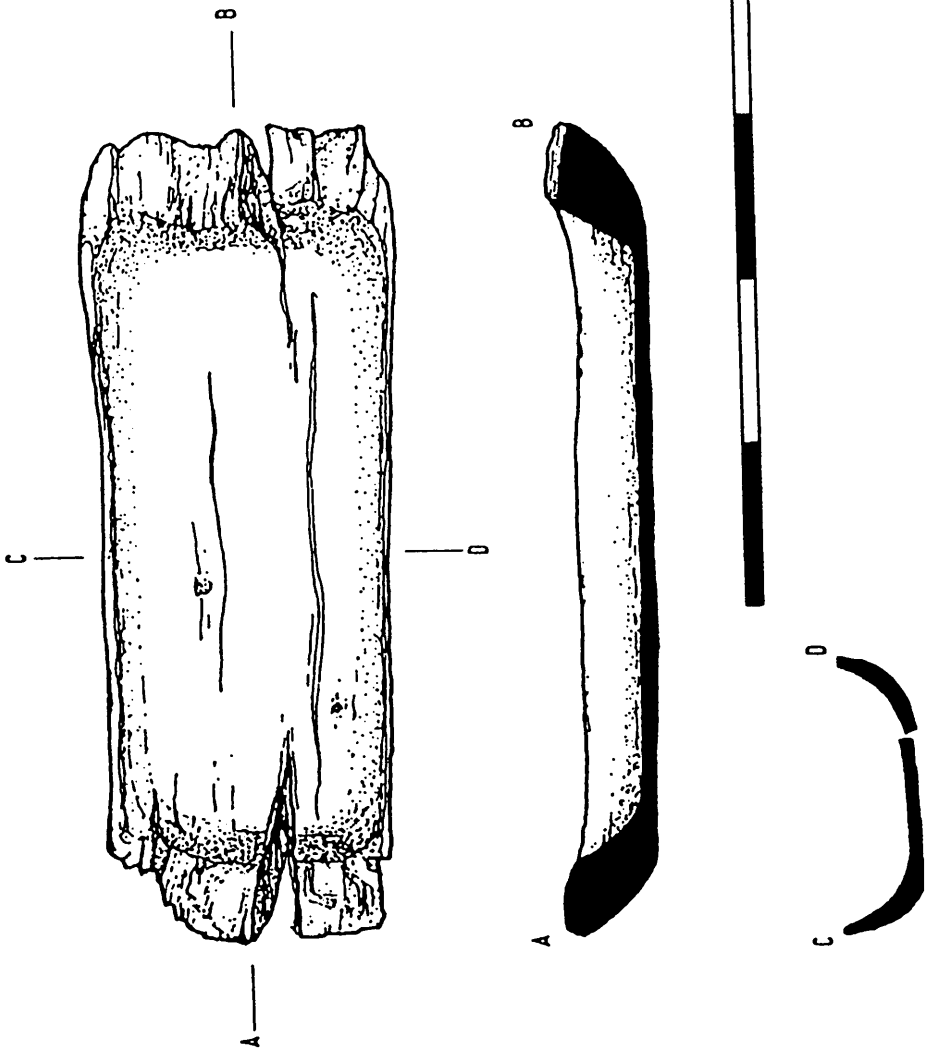


Figure 55: Knockbrack (after Mahr)

**Boat Number:** I255 **OS 6'':** 82  
**Boat Name:** Knocklofty **OD:** 20m  
**Townland:** Knocklofty Demesne **Site:** River Suir  
**County:** Tipperary

'An oak like canoe' was found in 1939 in the River Suir, embedded and upturned in the riverbank. The boat was 'not acquired' by the National Museum of Ireland. It was probably left *in situ*. Its length was noted as c.3.05m.

MacDowell, U. 1983 *Irish Logboats*, No.238; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I256 **NGR:** O 79 09  
**Boat Name:** Lagavooren **OD:** 15m  
**Townland:** Lagavooren **Site:** River Boyne  
**County:** Louth **Form:** Canoe

An 'oak' dugout boat was found in June 1956 in the River Boyne. It was removed from the river and examined and drawn by Raftery (National Museum of Ireland). When found one end of the boat was missing and one side was worn down. It was supposed to be housed in the Louth Archaeological and Historical Society's collection. However, enquiries determined they never received a boat. It probably no longer survives.

In plan, the boat was parallel-sided with a rounded-end. Its longitudinal-section was flat-bottomed with an inclined end. Its cross-section is rectangular except at the end where it is rounded.

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Sides T |
|--------|-------|--------------|---------|---------|
| 4.55   | 0.55  | 0.20         | 0.05    | 0.04    |

At 77cm from the end a rib in the solid crossed the floor. There were two holes, (one oval 6x3 cm.) which pierced the end horizontally by one side and the other which was circular (2cm.in diameter) set through the floor. The oval one was noted by Raftery as possibly having contained a mooring rope. The circular hole was probably at thickness-gauge.

'Topographical Files' *National Museum of Ireland*; Ross, N. Co. *Louth Archaeological and Historical Society, pers. comm.*

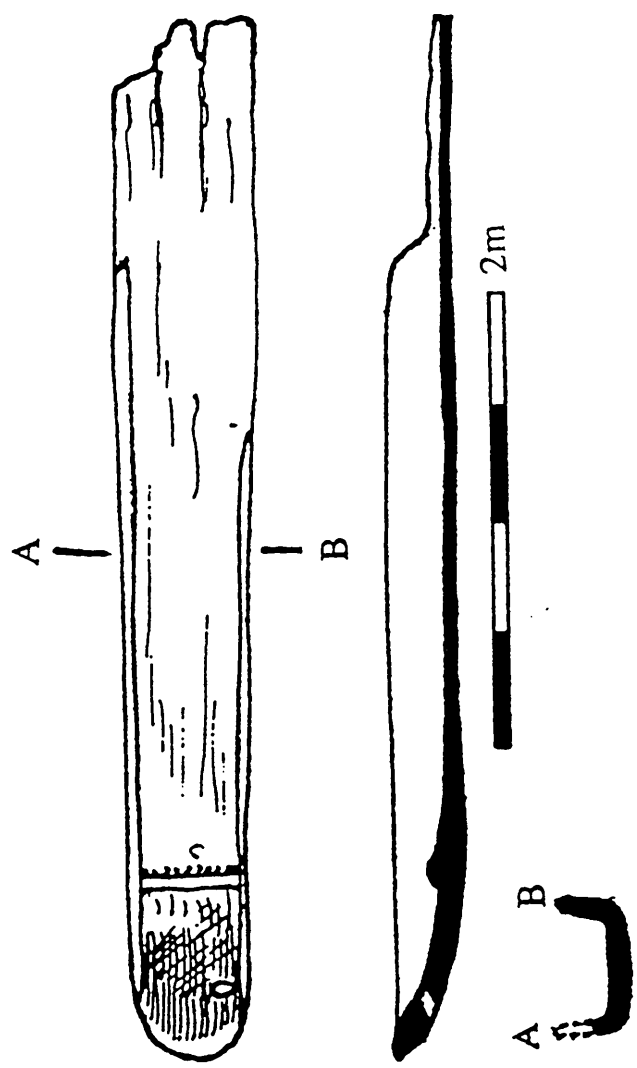


Figure 56: Lagavoooren (after Raftery)

**Boat Number:** I257 **NGR:** N 03 68  
**Boat Name:** Lanesborough 1 **OD:** 40m  
**Townland:** Lanesborough **Site:** Lough Barrow  
**County:** Longford

A 'dugout canoe' was found in Lough Barrow between 1890 and 1900. It was 'said to be in' the National Museum of Ireland. Raftery attempted to find it in 1940 but he doubted whether it was 'ever acquired'.

MacDowell, U. 1983 *Irish Logboats*, No.176; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I258 **NGR:** N 0 6  
**Boat Name:** Lanesborough 2 **OD:** 40m (Water Level)  
**Townland:** Lanesborough **Site:** Lough Ree  
**County:** Longford

An 'oak dugout canoe' was found on the shore of Lough Ree in 75cm of water. It was brought ashore. Its fate was not noted and probably no longer survives. When found the boat's ends were badly damaged, neither the side nor part of the floor survived.

MacDowell, U. 1983 *Irish Logboats*, No.177; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I259 **NGR:** M 244 764  
**Boat Name:** Leamore **OD:** 45m  
**Townland:** Leamore **Site:** River Suck  
**County:** Roscommon

A 'dugout canoe' was found in early 1972 during dredging in the River Suck. It was examined and drawn by Gannon (National Museum of Ireland) and left on the riverbank. It no longer survives. When found the bottom did not survive for its full width and little of the ends remained.

The boat's plan and cross-section was not determined. Its longitudinal-section was flat bottomed with inclined ends.

Dimensions (in metres):

|               |
|---------------|
| <b>Length</b> |
| 5.00          |

*Irish Independent* 6-10-1971; MacDowell, U. 1983 *Irish Logboats*, No.215, fig.53; 'Topographical Files' *National Museum of Ireland*.



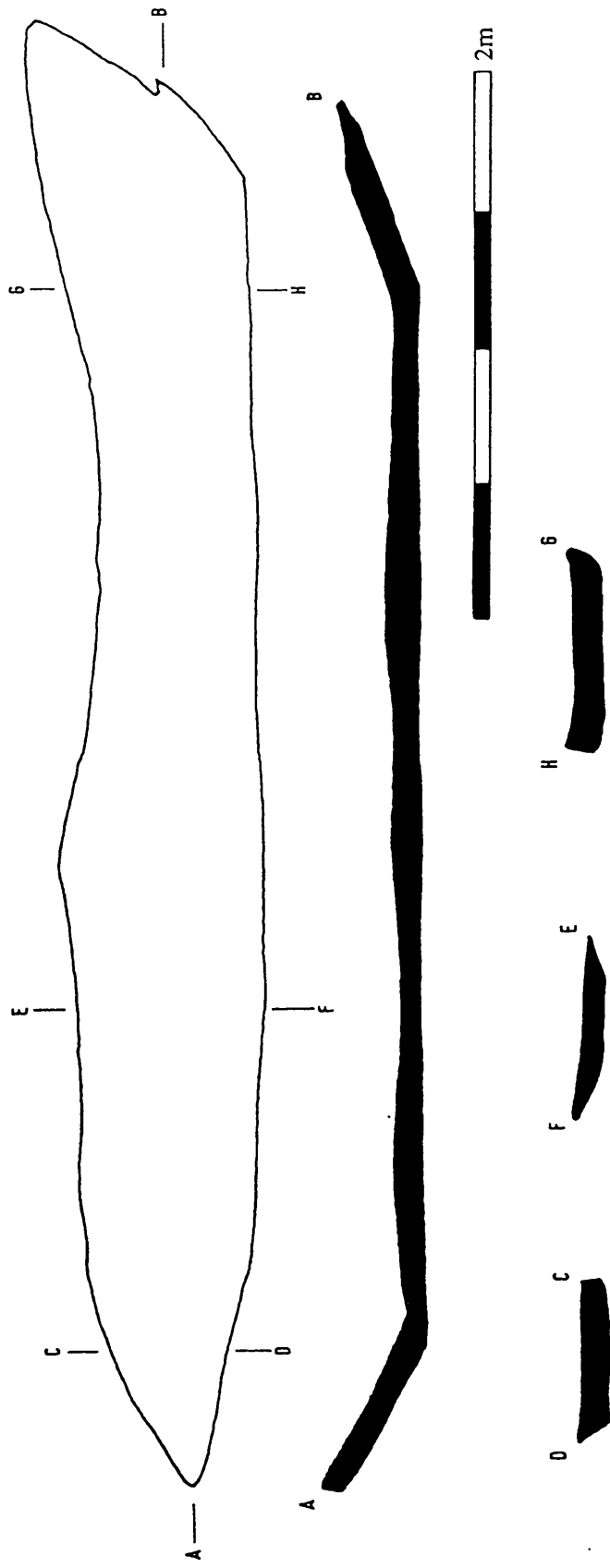


Figure 57: Leamore (after Cannon)

**Boat Number:** I260-1

**NGR:** See below

**Boat Name:** Legg 1-2

**OD:** 45m (Water Level)

**Townland:** Legg

**Site:** Lower Lough Erne

**County:** Fermanagh

Two 'dug-out' boats were found in 1972 in Lower Lough Erne by the lakeshore. They were examined and drawn by Hickey (Department of the Environment) and were left *in situ*.

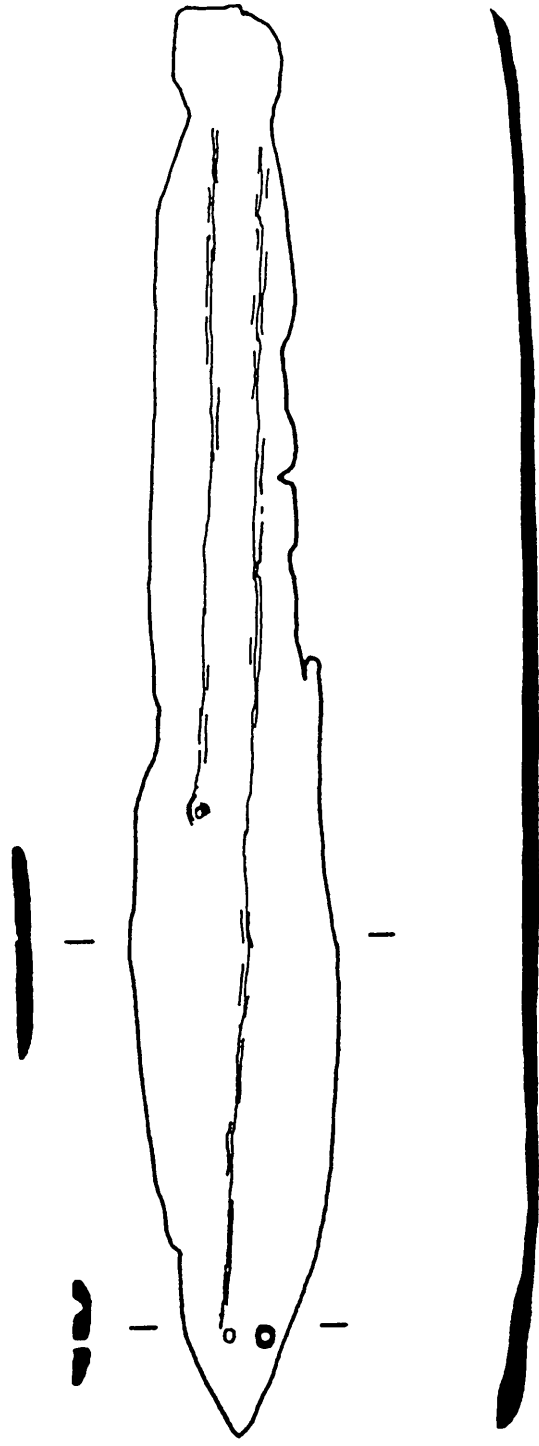
**I260: NGR: H 059 582: Form: Dissimilar-ended** The remains consisted of the bottom of a boat. In its original plan it appears to have had a pointed bow and squared end. In longitudinal-section it was flat-bottomed with possibly inclined ends. Its cross-section could not be determined. It measured 5.03m in length. At the bow there were two circular holes, one of which pierced the floor, and the other of which was v-shaped. Their functions could have been as thickness-gauges or to secure a fitted rib to strengthen the hull.

**I261: NGR: H 058 583:** The boat's remains consisted of the bottom. Its plan and cross-section could not be determined. In longitudinal-section it was flat-bottomed with a slight upward curve to one end.

Dimensions (in metres):

| Length | Max Width |
|--------|-----------|
| 3.80m  | 0.64      |

MacDowell, U. 1983 *Irish Logboats*, No.113-4; Seaby, W A. *Seaby Survey Files* No.12-3.



2m 2m

Figure 58: Legg 1 (after Hickey)

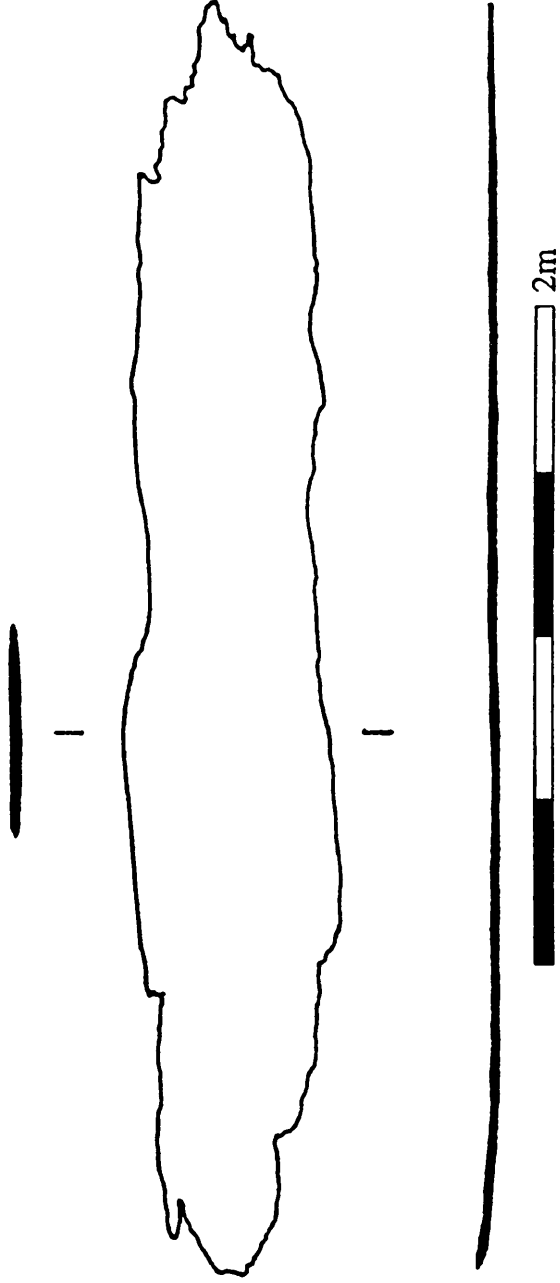


Figure 59: Legg 2 (after Hickey)

**Boat Number:** I262

**OS 6":** 54

**Boat Name:** Lemonfield

**OD:** 10m

**Townland:** Lemonfield

**Site:** Bog

**County:** Galway

**Form:** Canoe

An 'oak dug out canoe' was found at a depth of 90cm in a bog in 1945. It was brought to a nearby farm where it was examined and drawn by Raftery (National Museum of Ireland). Its subsequent history is not recorded. It probably does not survive. When found parts of its sides were missing and both ends were damaged.

In plan, the boat tapered from amidships to both ends which were rounded. In longitudinal-section it was flat-bottomed with inclined ends and the cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | End Width | Midships Width |
|--------|-----------|----------------|
| 3.05   | 0.48      | 0.90           |

A thickness-gauge (2.5cm in diameter) was located in the floor near one end. An opposing pair of incomplete thole-pin holes were located at the gunwales amidships. The holes did not survive, but part of the projections did. Closer to one end a pair of opposing projections were situated at the turn of the bilge. Their function is not known. At the other end a pair of opposing projections were set halfway up the sides. Raftery noted that they were too narrow to be thwart rests, but could have been used to divide the internal space of the boat.

MacDowell, U. 1983 *Irish Logboats*, No,130; 'Topographical Files' *National Museum of Ireland*.

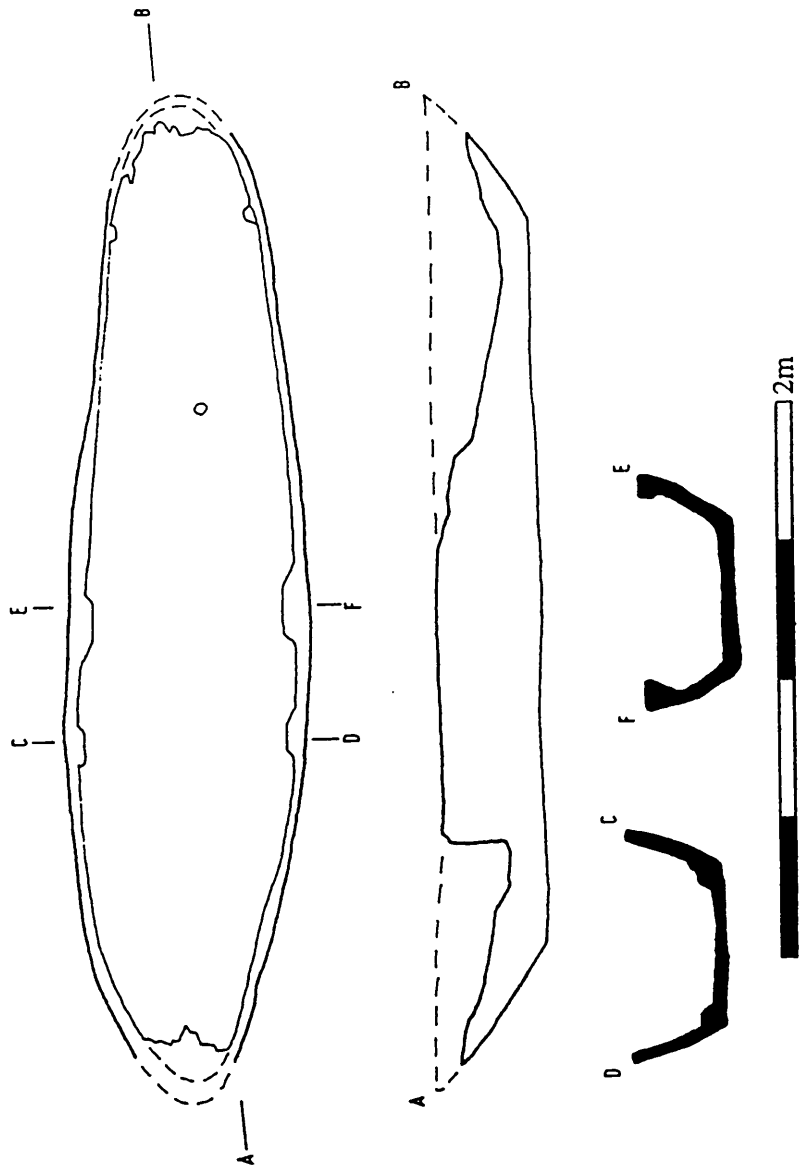


Figure 60: Lemonfield (after Raftery)

**Boat Number:** I263

**NGR:** H 533 019

**Boat name:** Levaghery

**OD:** 10m

**Townland:** Levaghery

**Site:** Upper River Bann

**County:** Armagh

**Form:** Canoe

An 'oak' dugout boat was found in September 1991 in the River Bann. It was examined and drawn by Fry (Department of the Environment) and Bourke (Ulster Museum). It is now buried at the Department of the Environment Depot, Markethill. When found, the boat was very 'fragmentary'. It consisted of approximately twelve pieces of the bottom with little of the sides and ends surviving. It was radiocarbon dated to  $833 \pm 52$ AD (UB-3549) at Queens University.

In plan it appears to have been parallel-sided with squared ends. In longitudinal-section, it was flat-bottomed with rounded ends and appears to have been rounded in cross section. No dimensions were noted.

The remains of two circular holes survived in a transverse line across the floor amidships. They could have retained a fitted rib to strengthen the hull, or have been thickness gauges. An opposing pair of L shaped footrests were located on the floor near the stern. On the portside closer to the bow were the remains of a tholepin hole and a projecting block of wood.

Fry, M. *Seaby Survey Files*, No 87.

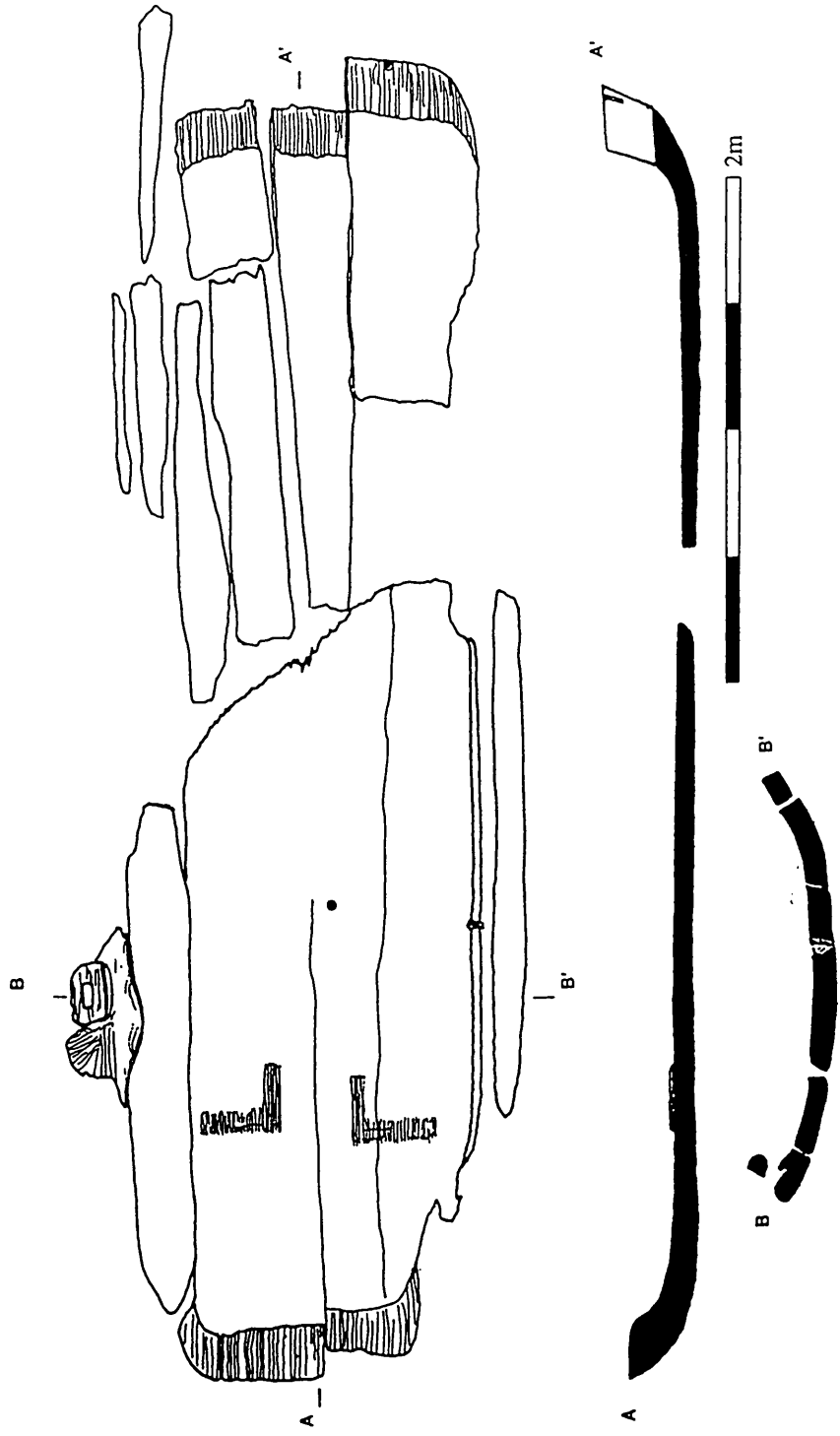


Figure 61: Levaghery (after Bourke)









**Boat Number:** I275 **NGR:** M 2 5  
**Boat Name:** Lough Corrib **OD:** 10m (Water Level)  
**County:** Galway **Site:** Lough Corrib

An 'oak boat', in a single piece, was found in Lough Corrib in 1867. It was sent to the Royal Irish Academy where it was registered No.2563. It no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 7.47   | 0.97  |

'Register' 1859-1886' *Royal Irish Academy*, No. 233; Wakeman, WF. 1894 *Catalogue of the Antiquities of the RIA*, .106, No.733.

**Boat Number:** I276 **NGR:** M 946 895  
**Boat Name:** Lough Elia **OD:** 40m  
**County:** Roscommon **Site:** Lough Elia

A 'canoe' was found in Lough Elia, c.1897. It was embedded in the mud below the lake, not far from the remains of a crannog. Its fate was not noted. It probably no longer survives.

Dimensions (in metres):

| Length | Stern Width | Bow Width |
|--------|-------------|-----------|
| 10.21  | 0.86        | 0.53      |

Repair patches were noted on the boat as 'the appearance of having been repaired by slabs of oak attached to the sides, where defective, by broad-headed iron nails.

The lake, which now measures approximately 600 x 500m, has a crannog.

|                     |   |
|---------------------|---|
| <b>SMR Number</b>   | 017-144                                     |
| <b>Townland</b>     | Cloonglasny Bog                             |
| <b>Nat.Grid Ref</b> | 19718 28885                                 |
| <b>Site</b>         | Crannog                                     |
| <b>Site Date</b>    | Undated, a bone comb and whetstone from it. |

MacDowell, U. 1983 *Irish Logboats*, No.214; 'Miscellanea' 1897 *JRSAI* 27, 431.

**Boat Number:** I277-8 **NGR:** N 4 5  
**Boat Name:** Lough Ennell 1-2 **OD:** 80m (Water Level)  
**County:** Westmeath **Site:** Lough Ennell

Two oak dugout boats were found in Lough Ennell in 1986. They were brought to Mullingar Military Barracks where they were examined by Raftery and examined and drawn by

MacDowell, in 1982.

**I277: Form: Canoe.** The boat consisted of the bottom, both chines and a little of the ends. It was split along its long axis from one end almost to the other. By March 1993 it had broken into two halves along this split. A knothole indicated the stern was the root end of the tree.

In plan it was parallel sided with what appeared to be rounded ends. Its longitudinal section was flat bottomed with gently inclined ends. In cross section it was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Depth | Width | Stern T | Bow T | Floor T | Sides T | Height (int) |
|--------|-------|-------|---------|-------|---------|---------|--------------|
| 6.55   | 0.39  | 0.45  | 0.13    | 0.12  | 0.06    | 0.03    | 0.25         |

Three pairs of opposing thwart rests survive as slight inward bulges of the sides which taper into the turn of the bilge. They measure 17 x 5cm on their flat top. They are located 2.93, 3.53 and 4.65m from the stern.

The boat was repaired along the split in three places to prevent it spreading. The repairs consisted of sunken rectangular areas with a 2cm hole drilled through the floor at either end. They measured 31 x 7cm and 3cm in maximum depth. They were located at the bow and 4.0m and 5.52m from that end.

**I278: Form: Tapered.** The boat consists of the bottom with little of the stern and chines surviving. In plan it tapers from the squared stern, which held a stern board to the bow. Its longitudinal-section and cross-section are flat bottomed.

Dimensions (in metres):

| Length | Stern Width | Floor T |
|--------|-------------|---------|
| 6.65   | 0.71        | 0.11    |

Two holes measuring 3cm and 5cm in diameter are set through the floor's long axis. They were used as thickness gauges. A stern board groove, 23cm from the stern, is rectangular in cross-section measuring 8cm in maximum width and 5.5cm in maximum depth.

The holes contained an ash and an oak treenail. Form: Possible Dissimilar ended.

MacDowell, U. 1983 *Irish Logboats*, No.269-70, fig.13-4.

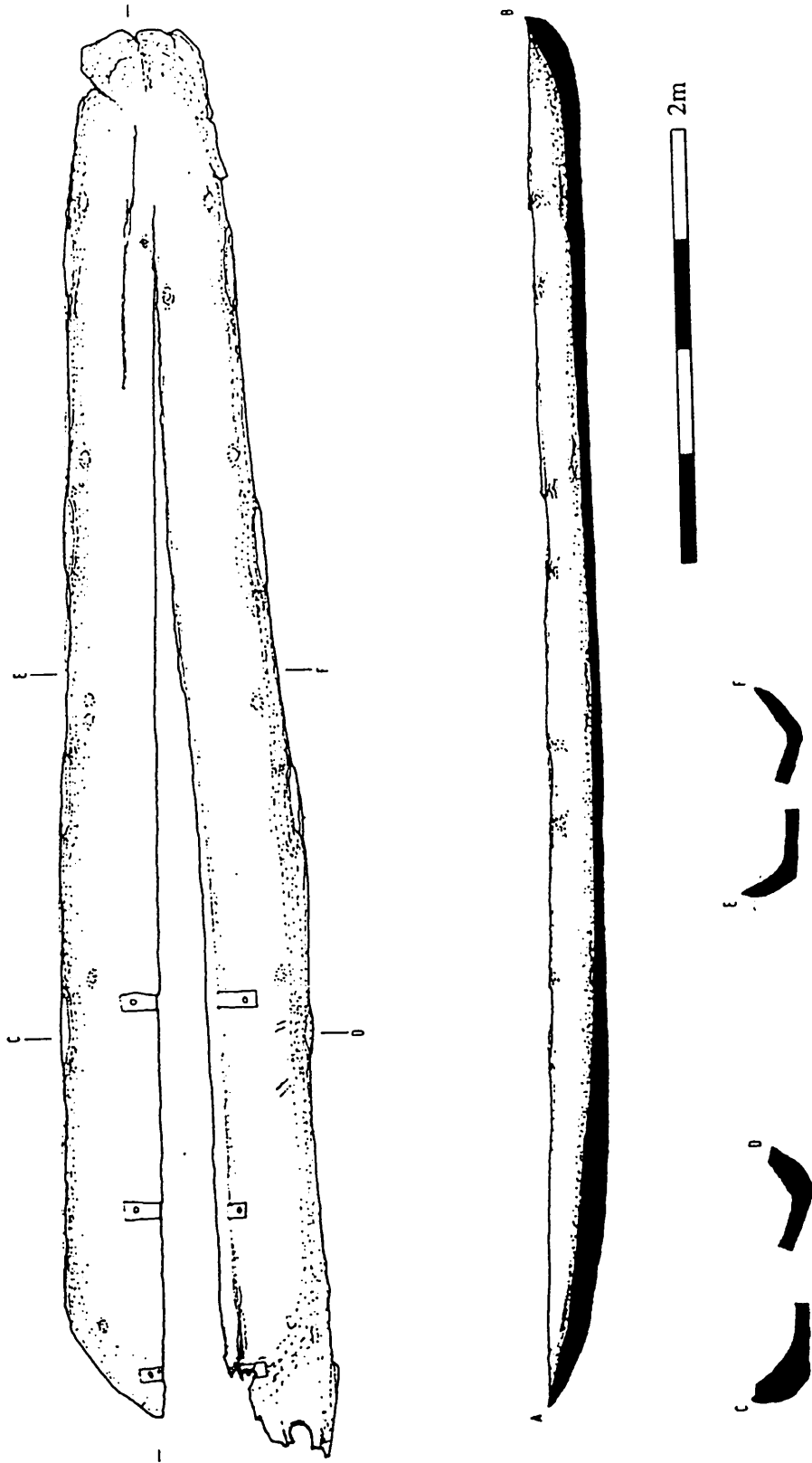


Figure 62: Lough Ennell 1 (after MacDowell)

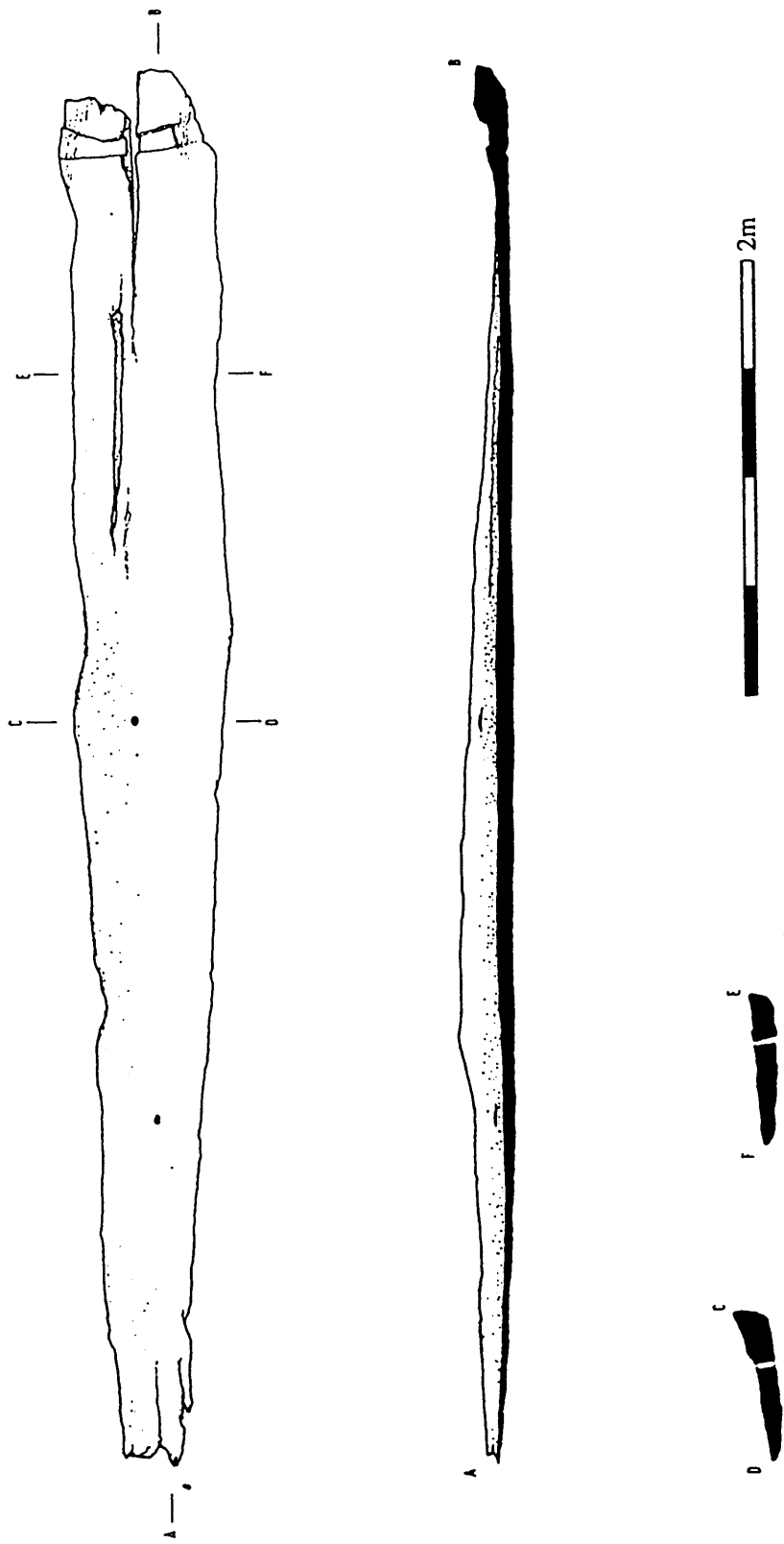


Figure 63: Lough Ennell 2 (after MacDowell)







examined and drew it.

In plan the boat tapers from a rounded stern to the bow which is rounded point. In longitudinal-section, it is flat-bottomed with rounded ends and its cross-section is flat-bottomed with flared sides.

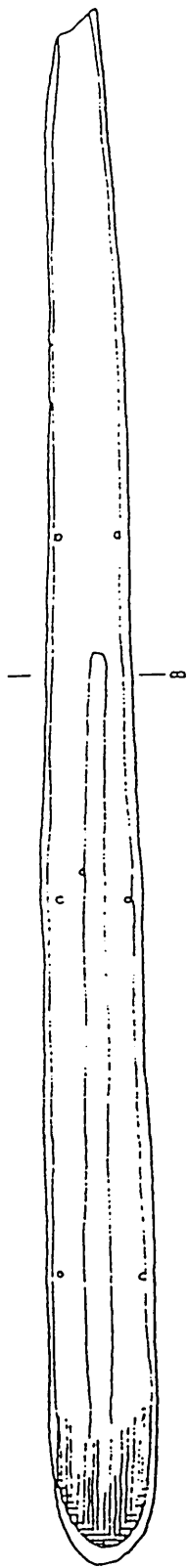
Dimensions (in metres):

| Length | Stern Width | Bow Width | Height (int) |
|--------|-------------|-----------|--------------|
| 15.24  | 1.12        | 0.41      | 0.76         |

Three pairs of opposing 3.8cm diameter holes were located at the turn of the bilge. They were probably used as thickness gauges as was a seventh hole of the same diameter, set beside an internal 'keelson'. This keelson was a sub rectangular ridge in cross-section along the boat's axis from near the stern for a length of c.6m.

Costello refers to the 'keelson' as having 'cross branches running up to the gunwale in 4 or 5 places, probably where the rowers sat'. However, these were not recorded in Raftery's drawing or any other account. The internal 'keelson's' function is not known. However, the 'cross branches' which may have been there could have been solid ribs to strengthen the hull. It is unlikely that they would have been seats.

Costello, T B. 1902 'The Lurgan Canoe' *JGMAS* 2, 57-8; MacDowell, U. 1983 *Irish Logboats*, No.135, fig.43; McGrail, S. 1976 'The Problems of Irish Nautical Archaeology, *IARF* 3, 23; McGrail, S. 1978 *The Logboats of England and Wales*, 67; 'Topographical Files' *National Museum of Ireland*; Raftery, R *Seaby Survey Files*, No.17; 'Register 1886-1928' *National Museum of Ireland*, 358, No.51.



2m



0.5m

Figure 64: Lurgan (after Raftery)

**Boat Number:** I305

**NGR:** N 40 46

**Boat Name:** Lynn

**OD:** 80m (Water Level)

**Townland:** Lynn

**Site:** Lough Ennell

**County:** Westmeath

A 'dugout canoe' was found in Lough Ennell in 1953. It was examined by National Museum of Ireland personnel and brought to the Museum (1953:63). It no longer exists. When found, one side and end were damaged.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 1.98   | 0.48  | 0.36         |

The account noted that 'the upper part of the bow seemed to be a separate piece held in place by two wooden pins', also 'the plank which closed the end of the boat had never been recovered'. The account appears to refer to a composite arrangement forming the bow and an unrecovered stern board.

Also, an iron rivet was noted 'which must be an integral part of the boat' and a small lead piece lodged in the hull which was suggested to be a bullet.

Two crannogs are located near the above townland, School Boy Island (SMR No.026-102) and Rushy Island (SMR NO.026-103). Neither of them has been dated. The boat may have been contemporary with the crannogs and associated with them.

'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I306

**NGR:** H 93 64

**Boat Name:** Maghery 1

**OD:** 10m (Water Level)

**Townland:** Maghery

**Site:** Lough Neagh

**County:** Armagh

An 'Ancient Irish Cott made of oak' was found in August 1894 in the south east corner of Lough Neagh. It was uncovered during excavations for a pier in peaty soil on the shore. It was left at a nearby farm and probably no longer survives. Little of one end survived, and both sides were worn down at this end.

In plan, it was parallel-sided with a round ended surviving end from which there was a rectangular duck-billed projection. In longitudinal-section it was flat-bottomed with an inclined end. Its cross-section was not noted.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 6.93   | 1.19  | 0.64         |

Seven 2cm diameter holes were noted. Three of these were in a transverse line across the duck-billed projection; probably to retain a board or rib to prevent splitting along the grain. The remaining four were Thickness-gauges in the floor, along the boat's long axis.

Four thwart supports were left proud of the sides and five pairs of footrest blocks were proud of the floor. Three tholepin hole mountings were situated along the gunwales, and two others 'which had been broken away were also found'.

Dugan, CW. 1895 'Notice of an Ancient Irish Cott, found at Maghery' *JRSAI* 25, 224-6;  
MacDowell, U. 1983 *Irish Logboats*, No.29; Paterson, TGF. 1944 'Two Recent Finds in Co. Armagh' *UJA* 7, 47; Miscellanea, 'Ancient Irish Cott found at Maghery' *JRSAI* 25, 382; Seaby, WA. *Seaby Survey Files*.

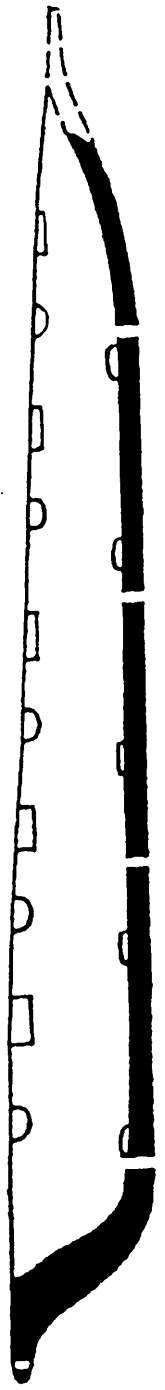
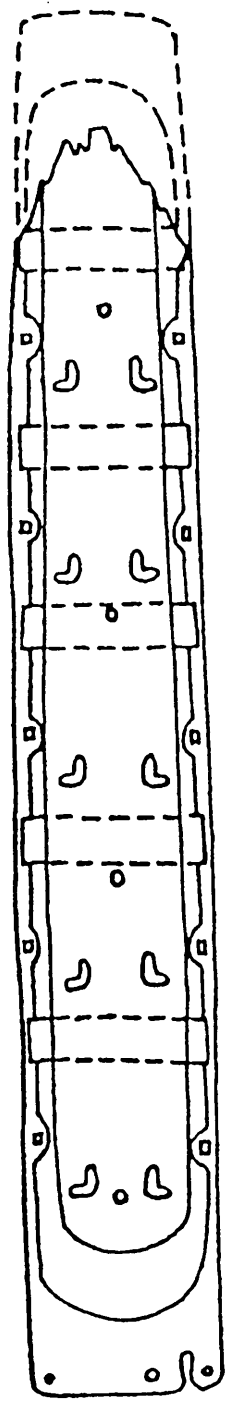


Figure 65: Maghery 1 (after Seaby and Thompson)

**Boat Number:** I307

**NGR:** H 927 634

**Boat Name:** Maghery 2

**OD:** 10m (Water Level)

**Townland:** Maghery

**Site:** Lough Neagh

**County:** Armagh

An 'oak dugout' boat was found 'during service trenching' in November 1991, approximately 120m from the shore of south-east Lough Neagh. No description was noted except that it was 3.8m long and 0.43m wide. It was reburied at the Department of the Environment Depot, Markethill. The boat was radiocarbon dated to  $590 \pm 20$  B.P. (GrN-14742) by Brindley and Lanting (Biologisch-Archaeologisch Instituut, Groningen).  
Fry, M. *Seaby Survey Files*, No.89.

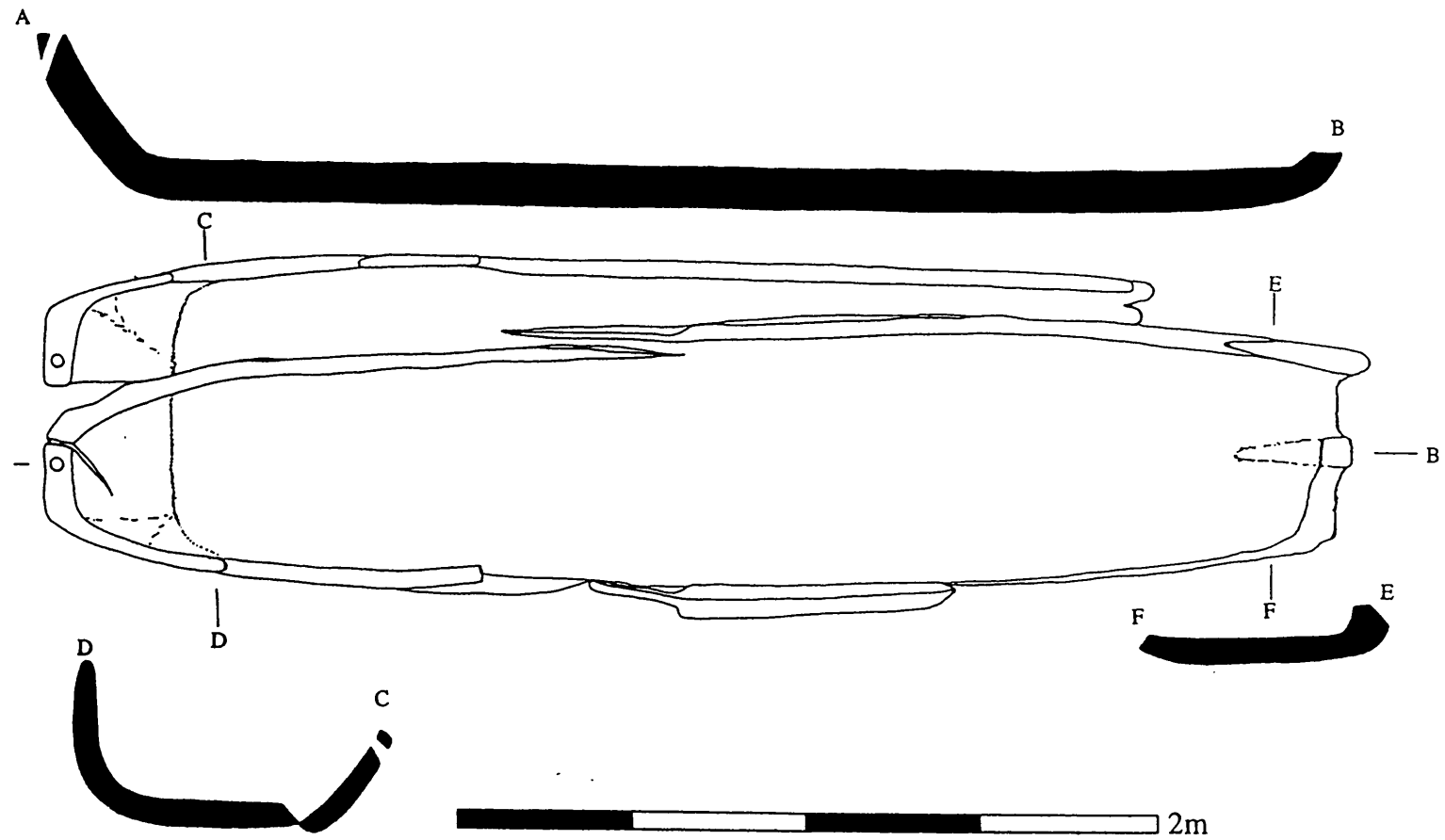


Figure 66: Maghera 2 (after Bourke)



**Boat Number:** I308 **NGR:** R 775 890  
**Boat Name:** Meelick **OD:** 30m  
**Townland:** Meelick **Site:** River  
**County:** Clare

An 'oaken dugout' boat was found 1.5m under 'river bed silt' in 1969. It was 3m long. Its fate was not noted.

'Correspondence Files' *National Museum of Ireland*, 1A/28/69.

**Boat Number:** I309 **NGR:** J 07 43  
**Boat Name:** Meenan **OD:** 60m  
**Townland:** Meenan **Site:** Meenan Bog  
**County:** Down

'A canoe formed out of a solid piece of oak' was found in Meenan Bog in 1826. Nothing else was noted. It probably no longer survives.

Lett, Rev. HW. 1895 'Ancient Canoe found near Loughbrickland, County Down' *UJA* 1, 154;  
 MacDowell, U. 1983 *Irish Logboats*, No.92.

**Boat Number:** I310 **NGR:** N 10 94  
**Boat Name:** Mohill **OD:** 40m  
**Townland:** Mohill **Site:** Lough Rinn  
**County:** Leitrim

An 'oak single piece canoe' was found in Lough Rinn in 1847. It was sent to the Royal Irish Academy in 1858. It no longer survives.

In plan it was parallel-sided with squared ends. In longitudinal section it was 'flat-bottomed'; its cross-section was not noted.

Dimensions (in metres):

| Length | Width | Surviving<br>(int) | Height |
|--------|-------|--------------------|--------|
| 3.96   | 0.61  | 0.10               |        |

Wilde noted the presence of three undated crannogs, of unknown date, in the former lake. The boat may have been associated with the crannogs.

MacDowell, U. 1983 *Irish Logboats*, No.170; Wilde, WR. 1859 'Account of three Crannogs' *PRIA* 7, 147-153; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 50, 242; Wood-Martin, WG. 1895 *Pagan Ireland*, 242.

**Boat Number:** I311

**NGR:** G 863 028

**Boat Name:** Monaltyduff

**OD:** 30m (Water Level)

**Townland:** Monaltyduff

**Site:** Monalty Lake

**County:** Monaghan

A 'canoe...formed out of a single piece oak' was found before 1845 in 'a small artificial island' close to the south shore of Monalty Lake. Its fate was not noted, and it probably no longer survives.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 7.32   | 0.91  | 0.33         |

It is not clear whether the boat was found on the crannog or in its structure. Stone and bronze axes, spears, bronze needles and pins were found at the same and are possible contemporary to the boat.

|                     |                     |
|---------------------|---------------------|
| <b>SMR Number</b>   | 031-132             |
| <b>Townland</b>     | Monaltyduff         |
| <b>Nat.Grid Ref</b> | H 8639 0282         |
| <b>Site</b>         | Crannog             |
| <b>Site Date</b>    | Possible Bronze Age |

Graces, Rev. J. 1858 'What we learn from Wilde's Catalogue of Antiquities in the Museum of the Royal Irish Academy' *JRSAI* 2, 110-39; MacDowell, U. 1983 *Irish Logboats*, No.198; Shirley, EP. 1846 'On Crannoges, and Remains Discovered in Them' *AJ* 3, 49; Troyan, MF. 1859 'Details of Discoveries made at Ancient Lake Habitations of Switzerland and Ireland' *UJA* 7, 190-1; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 48, 195.

**Boat Number:** I312

**OS 6":** 191

**Boat Name:** Monea (several)

**OD:** 120m (Water Level)

**Townland:** Monea

**Site:** Lake

**County:** Fermanagh

A number of 'single piece canoes' had from time to time been found in the lake. They were found before 1873. Their fate was not noted, and they probably no longer survive.

A crannog, in which oak paddles had been found, was noted in the lake by Wood-Martin. The boats may be associated with the crannog, but there is no evidence of this.

MacDowell, U. 1983 *Irish Logboats*, No.118; Munro, R. 1890 *The Lake Dwellings of Europe*, 376; Wakeman, W F. 1873 'Observations of the Principal Crannogs of Fermanagh' *JRSAI* 2, 320; Wakeman, W.F., 1880, 'On Certain Recoveries of Ancient Crannog Structures' *JRSAI* 5,

**Boat Number:** I313 **NGR:** H 22 46  
**Boat Name:** Moneynoe **OD:** 120m  
**Townland:** Moneynoe  
**County:** Fermanagh

'A single tree canoe' was found in the bed of an ancient lough before 1886. Its fate was not noted, and it probably no longer survives.

MacDowell, U. 1983 *Irish Logboats*, No.119; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 50, 186.

**Boat Number:** I314 **NGR:** H 881 506  
**Boat Name:** Moy **OD:** 15m  
**Townland:** Moy **Site:** River Blackwater  
**County:** Tyrone **Form:** Punt

An 'oak' dugout boat was found in 1924 in the River Blackwater, near Moy. It was registered in the Ulster Museum (504:1924) where it is currently stored. It was examined and drawn by Seaby and Thompson (Ulster Museum) and examined by MacDowell. When drawn, both ends were damaged, part of the sides were missing and the bow was cracked. In March 1993, the boat was warped so that the stern had twisted to starboard and the bow to port. It is held together by iron straps and metal wire. Part of the stern is missing from radial splitting. A whole log was used and a knot in the starboard side indicates that the stern was the root end of the tree. The boat has been radiocarbon dated to 245±15 B.P. (Gr N-14741) by Brindley and Lanting (Biologisch Archaeologisch Instituut, Groningen).

In plan it tapers from stern to bow. Both ends were originally rectangular. In longitudinal section it is flat-bottomed with inclined ends and its cross-section was originally rectangular.

Dimensions (in metres):

|                  | Overall            | Stern                    | Bow                      | Midship                  | Floor | Max. sides | Min. sides |
|------------------|--------------------|--------------------------|--------------------------|--------------------------|-------|------------|------------|
| <b>Length</b>    | 5.41               | 0.70                     | 0.43                     |                          |       |            |            |
| <b>Width</b>     |                    | 0.58 (ext)<br>0.54 (int) | 0.50 (ext)<br>0.44 (int) | 0.56 (ext)<br>0.52 (int) |       |            |            |
| <b>Height</b>    | 0.45 (max,<br>int) |                          |                          |                          |       |            |            |
| <b>Thickness</b> |                    | 0.07                     |                          |                          | 0.05  | 0.05       | 0.01       |

A pair of opposing thwart rests, measuring 16x1.2cm, are 1.91m from the stern. They are proud of the sides, 19cm above the floor. There are 10cm long recessed areas into which the thwart

fitted. Tool marks are visible at the bow, but are too worn to determine the tool used.

Three 2cm diameter thickness gauges are set through the floor on its long axis. They are plugged and located at 97cm, 2.48m and 4.43m from the stern. Two oval holes in a transverse line are situated 60cm from the stern. They measure 2.5x2cm and were originally circular. They may have been thickness gauges or used to retain a fitting to prevent the wood splitting along the grain.

MacDowell, U. 1983 *Irish Logboats*, No.246, fig 56; Seaby, W A. *Seaby Survey Files*, No.19.

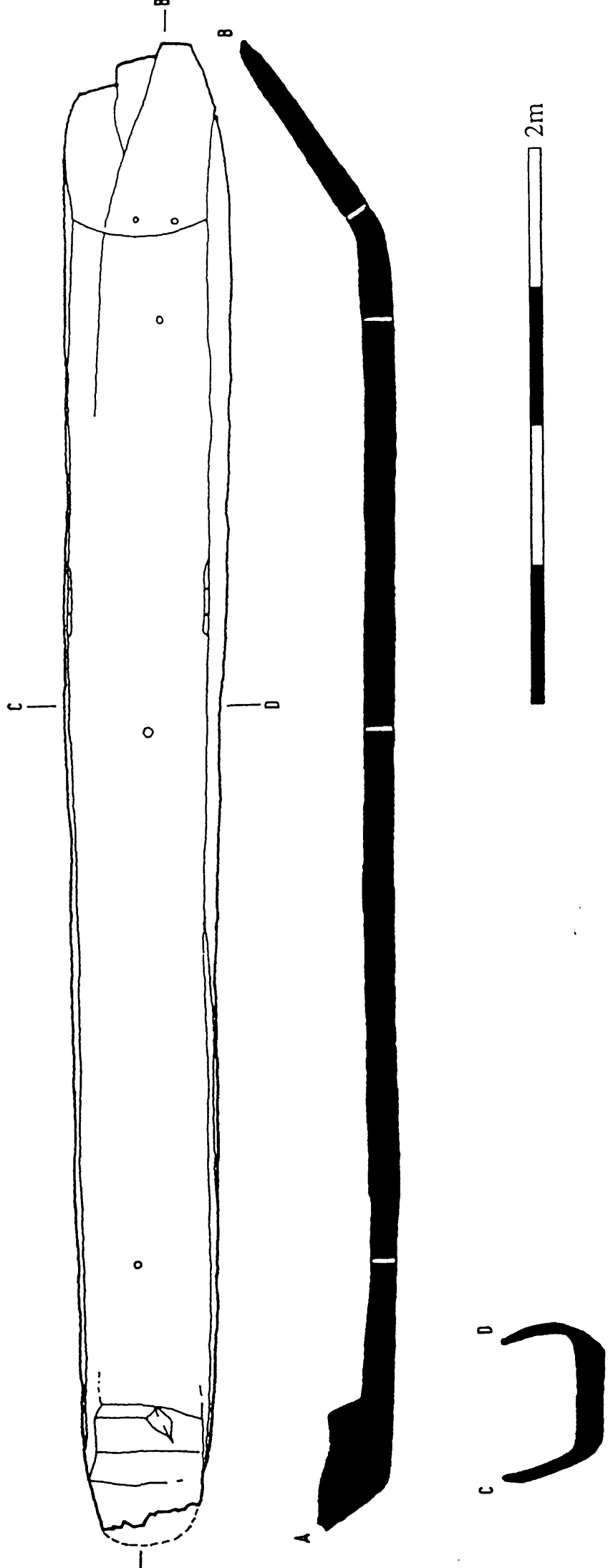


Figure 67: Moy (after Seaby and Thompson)





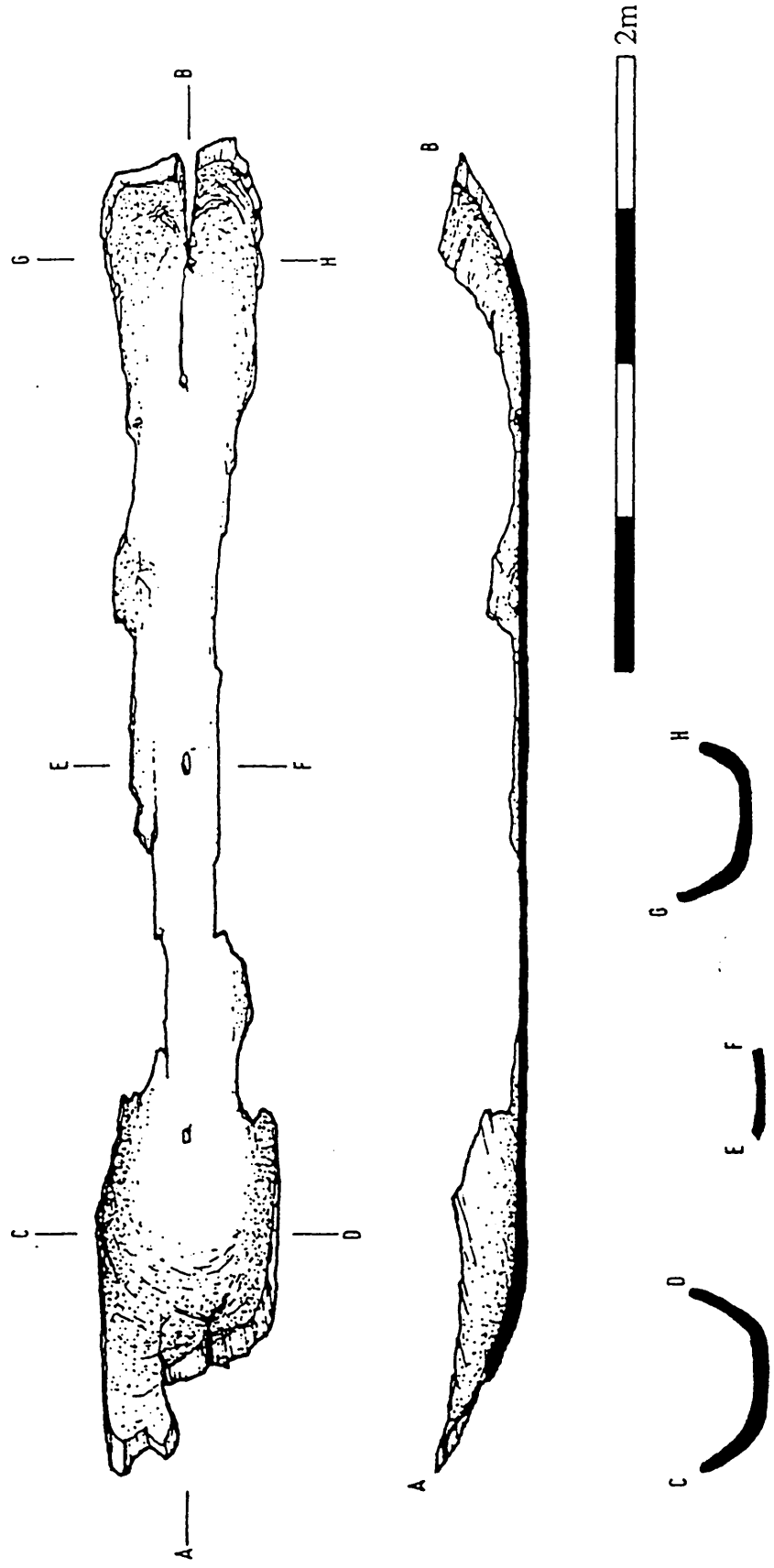


Figure 68: Mullán Lower 1 (after Seaby and Thompson)



Boat Number: I319

NGR: H 335 357

Boat Name: Mullynascarty

OD: 50m

Townland: Mullynascarty

Site: Colebrook River

County: Fermanagh

Form: Tapered

In January 1992, an oak dugout boat was found in the Colebrook River. It was discovered when it became 'dislodged from the river bank during a flood' and 'formed an obstruction'. It was sent to the Department of the Environment Depot, Moira, where it is currently undergoing conservation treatment. It was examined by Fry (Department of the Environment). The boat is dendrochronologically dated to 1520 AD (Q8777) at Queen's University. A whole log was used in which several knots indicate the bow was the root end of the tree. When examined in March 1993 part of the bow had radially split off. Gaps in the sides occurred where sapwood had worn away. Part of the stern is missing.

In plan, the boat tapers from stern to bow, both of which are rectangular. In longitudinal-section it is flat-bottomed with inclined ends. Its cross-section is sub-rectangular.

Dimensions (in metres):

| Length  | Stern Length | Bow Length | Stern Width | Bow Width | Height (int) |
|---------|--------------|------------|-------------|-----------|--------------|
| 7.23    | 1.20         | 1.30       | 0.92        | 0.54      | 0.46         |
| Floor T | Max Side T   | Min Side T |             |           |              |
| 0.10    | 0.07         | 0.01       |             |           |              |

Twelve holes in five groups are located along the boat's bottom and ends. Their details are as follows:

| Group | Hole No. | M from Stern | P/S/C | Dia. | Plugged? | Purpose  |
|-------|----------|--------------|-------|------|----------|--|
| 1     | 1        | 0.03         | P     | 3cm  | No       | To hold repair in place and prevent splitting by rib                             |
| 1     | 2        | 0.03         | S     | 2.5  | No       | as above   |
| 2     | 3        | 0.87         | S     | 2.5  | No       | Thickness gauges   |
| 2     | 4        | 0.87         | P     | 3.0  | No       | Thickness gauges   |
| 3     | 5        | 1.09         | S     | 2.5  | Yes      | Thickness gauges   |
| 3     | 6        | 1.09         | C     | 2.5  | Yes      | Thickness gauges   |
| 3     | 7        | 1.09         | P     | 2.5  | No       | Thickness gauges   |
| 4     | 8        | 3.67         | P     | 2.5  | No       | Thickness gauges   |
| 4     | 9        | 3.67         | S     | 2.5  | Yes      | Thickness gauges   |
| 5     | 10       | 5.99         | P     | 3.0  | No       | Probably retained fitted rib to hole to prevent splitting and as thickness gauge |

|   |    |      |   |     |     |  |
|---|----|------|---|-----|-----|--|
| 5 | 11 | 5.99 | C | 2.5 | Yes |  |
| 5 | 12 | 5.99 | S | 3.0 | Yes |  |

The stern had been repaired by the port side where the boat had previously split. An oak board measuring 98cm long and 12.5cm in maximum width tapering to 7cm at either end was placed in the split, and overlapped the wood of the boat at its bow end. It is 5.5cm high and was made so that it fitted the gap tightly. A 2cm diameter hole horizontally the port side 10cm from the stern. It pierces the repair board and the rest of the boat for 38cm in overall length. The treenail of equal length is still *in situ*.

Adze marks are situated in the boat's floor where the wood had been hollowed out deeper than intended. The average blades' signature length is c4cm.

Fry, M. *Seaby Survey Files*, No.94.



2m



Figure 69: Mullynascarty

**Boat Number:** I320 **NGR:** S 735 272  
**Boat Name:** New Ross **OD:** 10m  
**Townland:** New Ross **Site:** River Barrow  
**County:** Wexford

An 'oak canoe' was found c.1801 in the River Barrow, 'on the site of a previous bridge'. Its fate was not noted. It probably no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.18   | 1.22  |

New Ross (SMR Number: 029-013) has its origin as a Medieval town. The boat may have been used as a ferryboat.

Martin, H. 1858 'Proceedings' *JKAS* 2, 205.

**Boat Number:** I321 **NGR:** M 343 977  
**Boat Name:** North Ward **OD:** 5m  
**Townland:** North Ward **Site:** River Foyle  
**County:** Tyrone **Form:** Dissimilar-ended

An 'oak log boat' was found in September 1984, close to the east bank of the River Foyle, 100m north of Lifford-Strabane bridge. It was examined and drawn by O'Flionn (National Museum of Ireland). When found, its bow was 'badly damaged' and there was 'a series of cracks' along the floor. It was buried at the Department of the Environment Depot, Markethill. It was radiocarbon dated to 415±90 BP (UB-2733) at Queen's University.

In plan, the boat was parallel-sided with a squared stern which had held a sternboard. Its longitudinal-section was flat bottomed with an inclined bow. In cross-section it was rounded.

Dimensions (in metres):

| Length | Width | Height (ext) | Floor T |
|--------|-------|--------------|---------|
| 4.70   | 0.45  | 0.35         | 0.08    |

A 3 x 2.5cm hole was noted on one of the sides near the bow. It was probably originally circular, holding a fitting. A 'series of holes' was also noted on the 'sloping base' of the stern, set in pairs 14 to 16cm apart, which O'Flionn noted as possibly having 'served to secure a sternboard'. A pair of opposing thwart rests were situated 1.40m from the bow.

Fry, M. *Seaby Survey Files*, No.58; 'Correspondence Files' *National Museum of Ireland*.

Boat Number: I322

NGR: O 04 76

Boat Name: Oldbridge

OD: 5m

Townland: Oldbridge

Site: River Boyne

County: Meath

Form: Punt

A 'perfect single-piece oaken boat' was found in 1837 during dredging in the River Boyne. When found, both of its ends were damaged. It was displayed in Liverpool for a few years and is currently stored in the National Museum of Ireland Depot, Daingean, where it is inaccessible for examination. It was examined and drawn by Wilde, Wood-Martin and Raftery on separate occasions. It was made from a whole log.

In plan, the boat was parallel-sided with rectangular ends. In longitudinal-section it was flat-bottomed with inclined ends. Its cross-section appears to have been rectangular or sub-rectangular.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 5.72   | 0.86  | 0.51         |

A transverse rib (in the solid) was situated near one end, and three thickness gauges on the long axis were 0.56, 1.59 and 1.63m respectively from this rib.

Hughes, W I. 1843 'On an Ancient Boat found near Drogheda' *PRIA* 2, 247; MacDowell, U. 1983 *Irish Logboats*, No.184, fig 51; Raftery, JR. *Seaby Survey Files*; Wilde, WR. 1863 'A descriptive Catalogue of the Antiquities in the Collection of the RIA' *PRIA* 8, 293; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 48, Pl.4, fig 2.

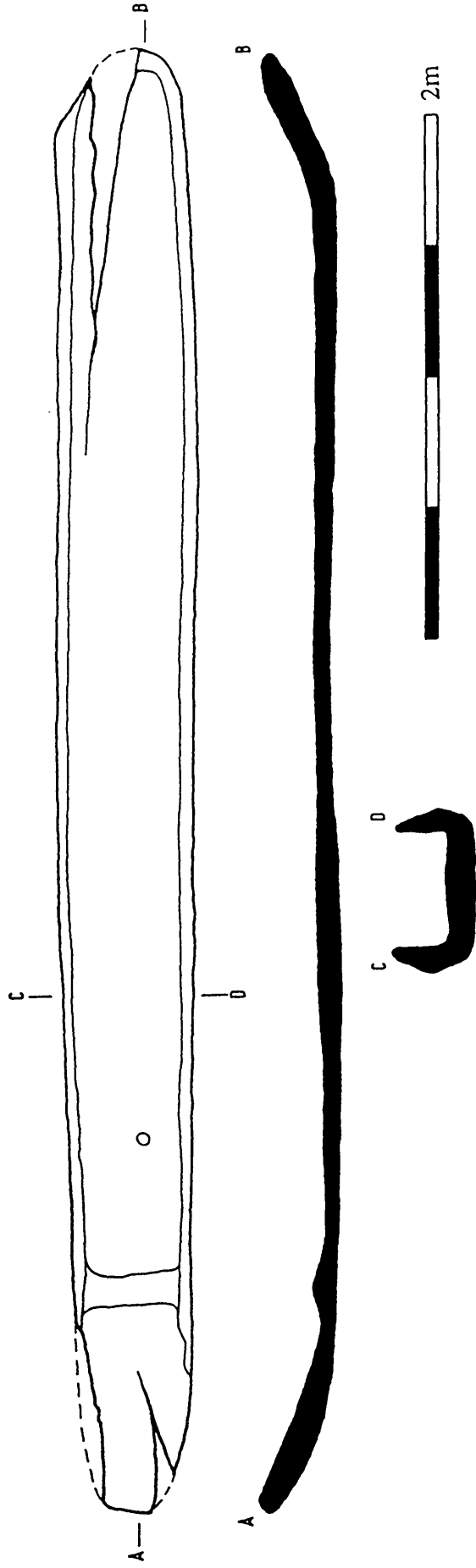


Figure 70: Oldbridge (after Raftery)

**Boat Number:** I323

**OS 6":** 29

**Boat Name:** Pollacorrugane

**OD:** 30m

**Townland:** Pollacorrugane

**Site:** River Clare

**County:** Galway

An 'oak dugout canoe' was found in June 1978 in River Clare. It was examined and drawn by Ryan (National Museum of Ireland) and was 'not acquired' by them. Its subsequent fate was not noted. The remains, when found, consisted of the boat's bottom.

It was oval in outline with a flat-bottomed longitudinal-section and a rounded cross-section.

Dimensions (in metres):

| <b>Length</b> | <b>Width</b> | <b>Floor T</b> |
|---------------|--------------|----------------|
| 3.12          | 0.70         | 0.14           |

Two 'slight' ridges were set at a slight angle across the grain along the floor.

MacDowell, U. 1983 *Irish Logboats*, No.136, fig 44; 'Topographical Files' *National Museum of Ireland*.

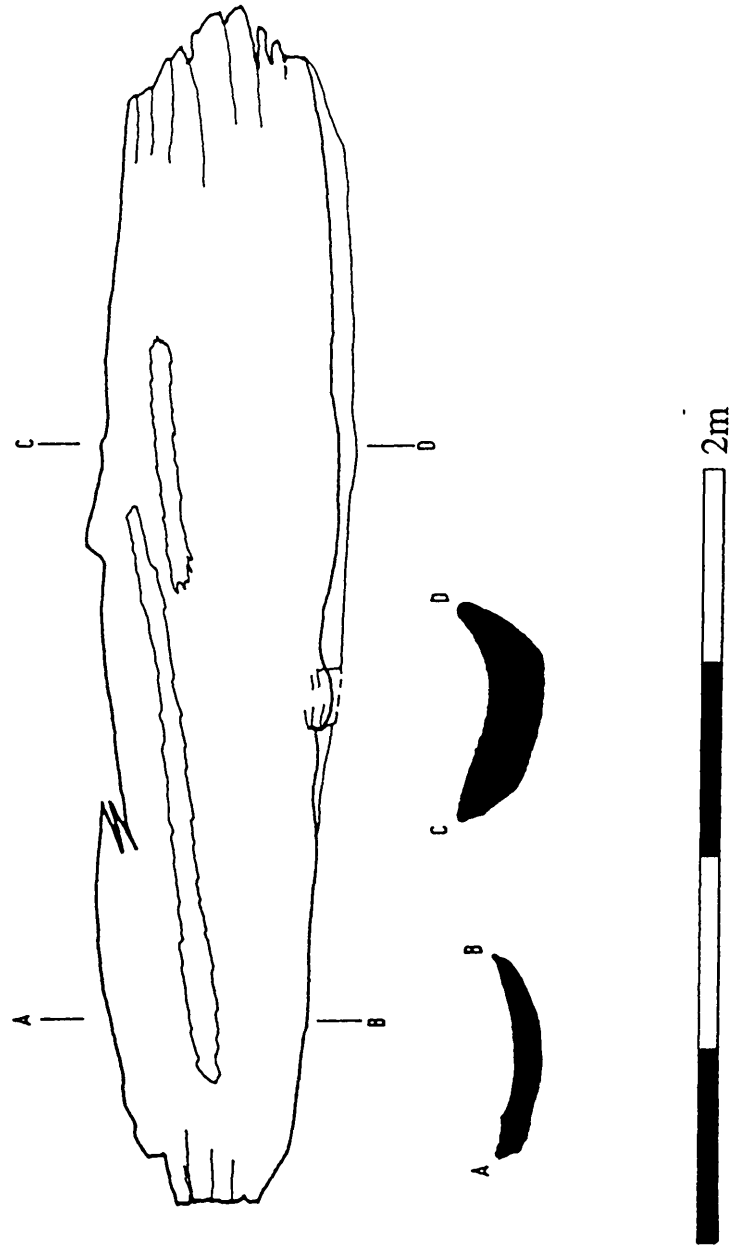


Figure 71 Pollacorragune (after Ryan)



**Boat Number:** I324

**NGR:** J 02 54

**Boat Name:** Portadown 1

**OD:** 10m

**Townland:** Portadown

**Site:** River Cochrin

**County:** Armagh

**Form:** Punt

An 'oak canoe' was found in 1898 in peat close to the bank of the River Cochrin, at a depth of 1.8m. It was registered with the Ulster Museum (1898:973). When found, the turn of the bilge was cracked and one end damaged. It was examined and drawn by Thompson, Seaby and MacDowell on separate occasions. It now no longer survives. It was repaired in the Museum, but by 1983 the repairs were 'beginning to fall apart'.

In plan, it was parallel sided with sub-rectangular ends. In longitudinal-section it was flat-bottomed with inclined ends, and its cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 3.57   | 0.52  |

MacDowell records that previous repairs noted by Wakeman were 'obscured by the subsequent repairs by the Museum staff'.

MacDowell, U. 1983 *Irish Logboats*, No 30, fig 2; Paterson, T G F. 1944 'Two recent Fins in Co. Armagh' *UJA* 7, 48; Seaby, WA. *Seaby Survey Files*; Wakeman, 1899 'Canoe found at Portmore' *UJA* 5, 52.

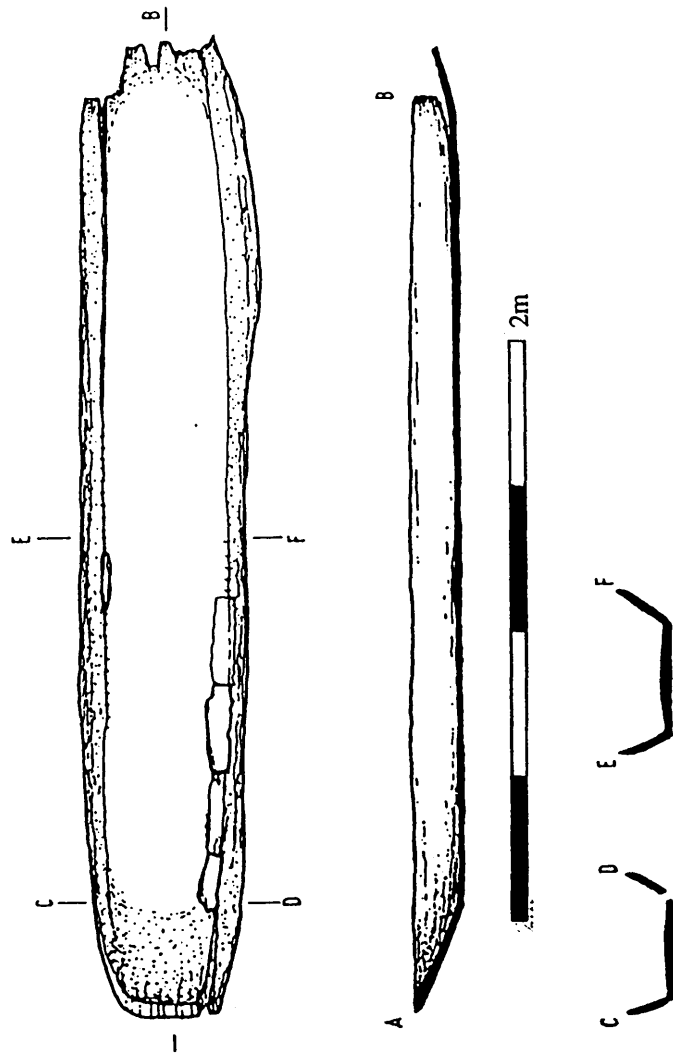


Figure 72: Portadown 1 (after Seaby and Thompson)



| <b>Bow L</b> | <b>Height (int)</b> | <b>Floor T</b> | <b>Base Sides T</b> | <b>Top Sides T</b> |
|--------------|---------------------|----------------|---------------------|--------------------|
| 0.29         | 0.25                | 0.04           | 0.03                | 0.01               |

Axe marks are located internally on the stem. The blade's average signature length is 6.5cm.

Fry, M. *Seaby Survey Files*, No.85.

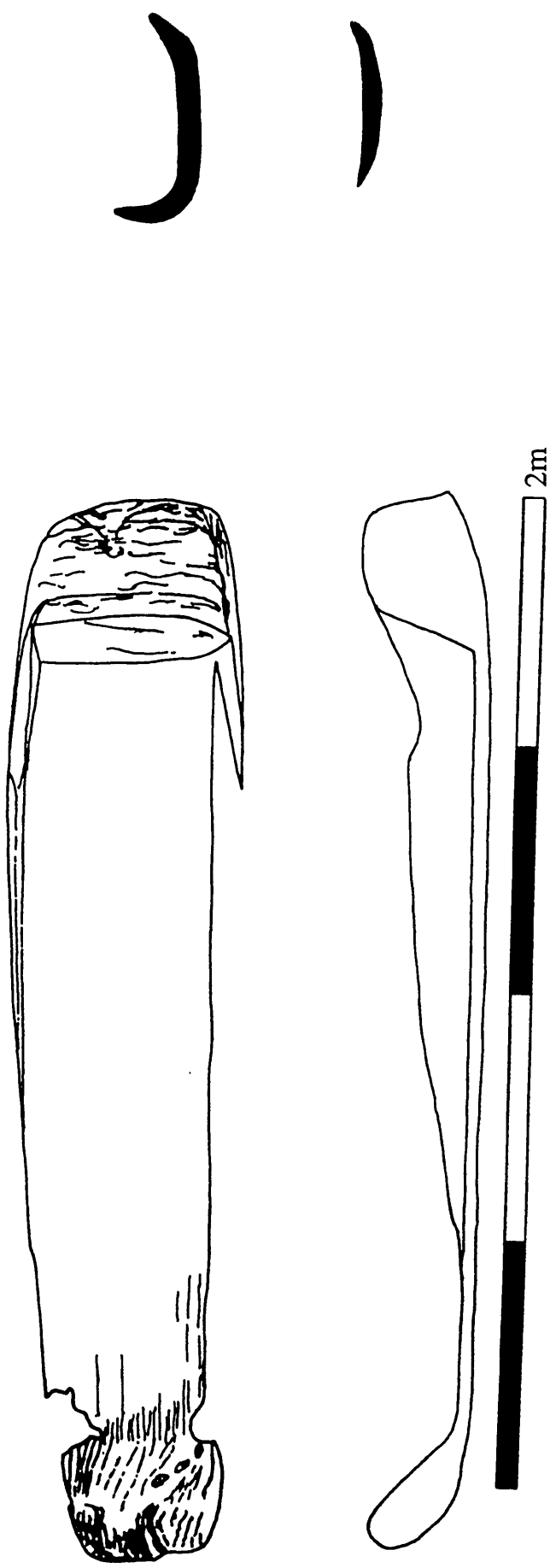


Figure 73: Portadown 3 (after Butler)

**Boat Number:** I327 **NGR:** N 300 078  
**Boat Name:** Portaliff **OD:** 50m (Water Level)  
**Townland:** Portaliff **Site:** Town Lough  
**County:** Cavan

An 'oak dugout boat' was found embedded in mud, in Town Lough, in 1938. Both ends were damaged. Its fate was not noted.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 4.57   | 0.61  | 0.46         |

Five pieces of wood in which holes were bored were found in the boat.

MacDowell, U. 1983 *Irish Logboats*, No.59; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I328 **NGR:** N 037 917  
**Boat Name:** Portanure **OD:** 65m (Water Level)  
**Townland:** Portanure **Site:** Lough Gowna  
**County:** Cavan

A dugout boat was found c.1933 in Lough Gowna. It was examined by Davis (National Museum of Ireland). It was then 'lost in floods'.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 6.40   | 0.91  |

The sides had thwart rests.

MacDowell, U. 1983 *Irish Logboats*, No.60; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I329 **NGR:** J 12 68  
**Boat Name:** Portmore **OD:** 10m  
**Townland:** Portmore **Site:** Portmore Lough  
**County:** Antrim

An 'oak canoe' was found in 1863 in Portmore Lough. It was examined and drawn by Lett. It no longer survives. When found, the stern was damaged. In plan, it tapered from a rounded-point stern to the bow. No other sections were noted.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 9.14   | 0.91  | 0.46         |

Lett noted six opposing pairs of thwart rests and foot rests. Near the stern 'three holes pierce the

bottom' and another near the bow. They were probably thickness gauges. A rectangular 'socket' (12.5x7.5 cm) is located in the stern 'into which two pin holes from the outside'. These were interpreted by Lett as being to secure some form of fitting. Thirty-six holes are set horizontally into the gunwales. They were probably used to extend the boat.

Lett, Rev. H W. 1897 'Canoe found at Portmore' *UJA* 1, 251-2; MacDowell, U. 1983 *Irish Logboats*, No.13; McGrail, S. 1978 *The Logboats of England and Wales*, 43,73, fig.122; Seaby, WA. *Seaby Survey Files*.

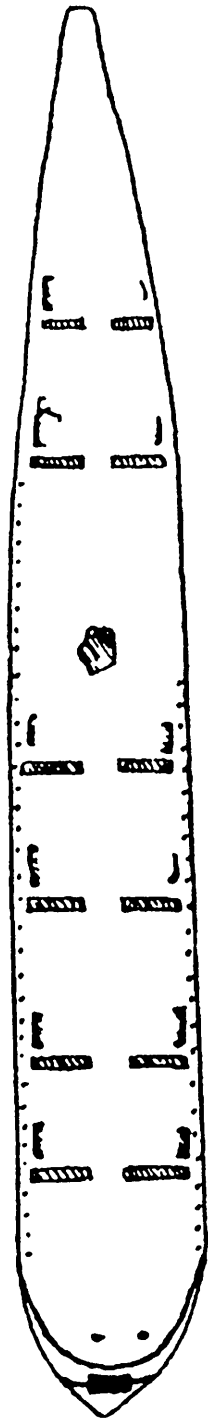


Figure 74: Portmore (after Lett)



**Boat Number:** I330

**NGR:** H 1105 5735

**Boat Name:** Portnacloyaduff

**OD:** 45m (Water Level)

**Townland:** Portnacloyaduff

**Site:** Lower Lough Erne

**County:** Fermanagh

**Form:** Punt

A 'dugout' boat was found on the foreshore, in Holme Bay, Lower Lough Erne, in 1956. It was examined and drawn by Seaby. It was sent to Carrickfergus Castle, where it no longer survives. When found, both ends were worn down.

In plan it was parallel-sided and its longitudinal-section was flat-bottomed with inclined ends.

The cross-section was rectangular.

Dimensions (in metres):

| Length | Width | Floor T | Sides T | Height (int) |
|--------|-------|---------|---------|--------------|
| 8.10   | 0.89  | 0.05    | 0.03    | 0.38         |

Tool marks were noted along the turn of the bilge..

MacDowell, U. 1983 *Irish Logboats*, No.120, fig.41; Seaby, W A. *Seaby Survey Files*, No.5.

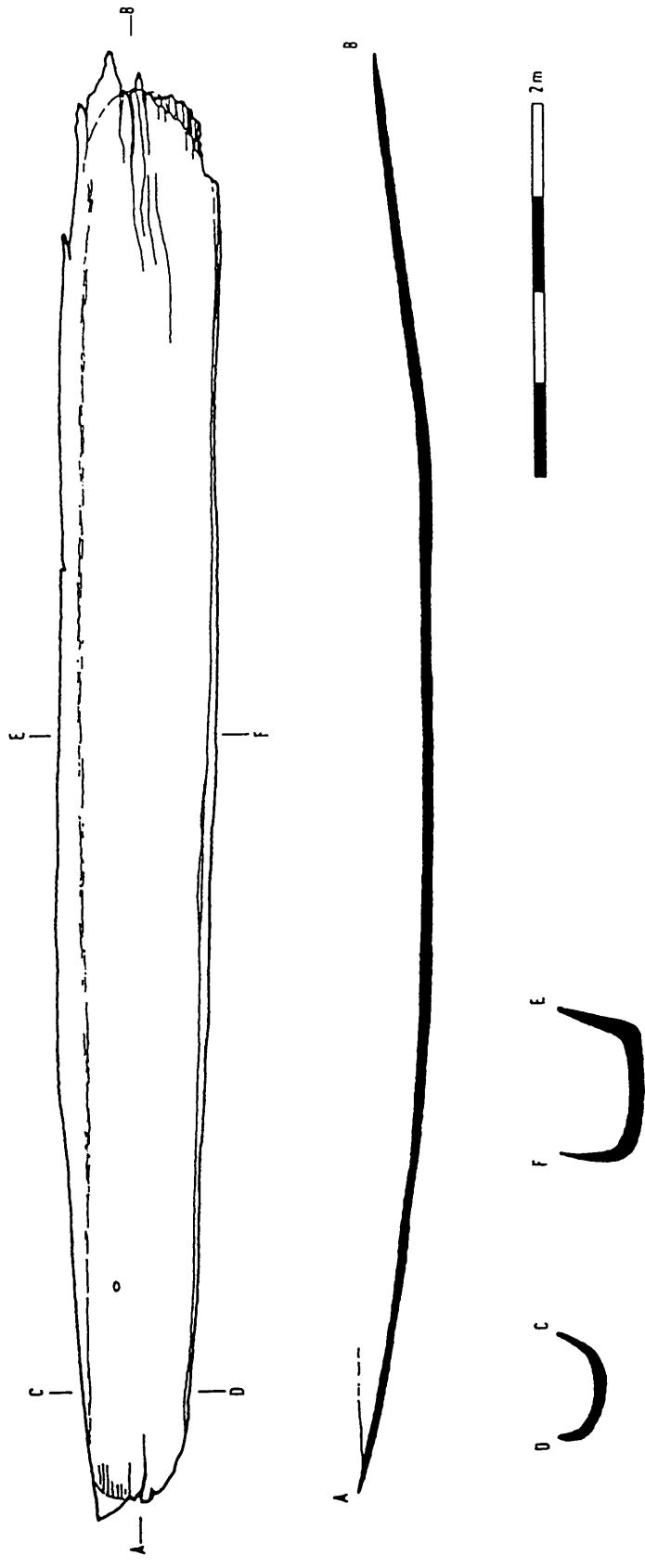


Figure 75: Portnacloyduff (after Seaby)

**Boat Number:** I331 **NGR:** M 73 96  
**Boat Name:** Portnacrinnaught **OD:** 70m (Water Level)  
**Townland:** Portnacrinnaught **Site:** Lough Gara  
**County:** Roscommon

A 'dugout canoe' was found 1975 in Lough Gara. It was examined by National Museum of Ireland personnel and was left *in situ*.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 7.62   | 1.12  |

The boat had four 'fitted paired half ribs' which were treenailed to the floor and sides, and traces of a fifth 'in the form of pressure mats' in which there were three transverse holes through the floor. Nine pairs of footrests were left proud of the floor. They were situated as three transverse rows of four blocks and three of two blocks. McGrail suggests the fitted ribs could have supported thwarts.

MacDowell, U. 1983 *Irish Logboats*, No.236; McGrail, S. 1978 *The Logboats of England and Wales*, 59-60, 75, fig.118-20; 'Correspondence Files' *National Museum of Ireland*, 1A/175.

**Boat Number:** I332-3 **NGR:** M 9 1  
**Boat Name:** Portumna **OD:** 45m  
**Townland:** Portumna **Site:** Stoneyisland Bog  
**County:** Galway

Two 'dugout canoes' were found before 1929 in Stoneyisland Bog. Their fates were not noted.

MacDowell, U. 1983 *Irish Logboats*, No.137-8; Shea, M D. 1929 'Note on "Find" at Portumna' *JGMAS* 13-14, 137.

**Boat Number:** I334 **OS 6":** 43  
**Boat Name:** Randalstown 1 (Several) **OD:** 45m  
**Townland:** Randalstown **Site:** Randalstown Bog  
**County:** Antrim

A 'single piece oak boat' was found before 1860 in Randalstown Bog. It had been 'cut up'. Benn noted that 'the bog around Randalstown crannog has already yielded several boats and parts of boats'. These were all hollowed out of large trees.

The 'single piece' boat measured 4.57m in length and 71cm in width.

Benn, E. 1860 'Observations on Irish Crannogs' *JKAS* 3, 89-90; MacDowell, U. 1983 *Irish Logboats*, No.10 ; Munro, R. 1890 *The Lake Dwellings of Europe*, 370-2; Wilde, WF. 1859

'Account of three Crannoges' *PRLA* 7, 148; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 50, 370-2.

**Boat Number:** I335 **OS 6":** 43  
**Boat Name:** Randalstown 2 **OD:** 45m  
**Townland:** Randalstown **Site:** Randalstown Bog  
**County:** Antrim

A 'boat' was found c.1860 in Randalstown Bog at a depth of 4.9m. Its fate was not noted. It probably no longer survives. It tapered from one end to the other.

Dimensions (in metres):

| Length | Max Width | Min Width |
|--------|-----------|-----------|
| 6.10   | 1.22      | 0.91      |

One third of the boat's length 'was composed of thick short planks well fastened with strong wooden pegs'.

A paddle and wooden bowl were found in the boat.

Benn, E. 1860 'Observations on Irish Crannogs', *JKAS* 3, 89-90; MacDowell, U. 1983 *Irish Logboats*, No.11; Munro, 1890 *The Lake Dwellings of Europe*, 370-2; Wood-Martin, W G. 1886 *The Lake Dwellings of Ireland*, 168, Pl.33.

**Boat Number:** I336 **OS 6":** 43  
**Boat Name:** Randalstown 3 **OD:** 45m  
**Townland:** Randalstown **Site:** Randalstown Bog  
**County:** Antrim

'A single-piece oak boat' was found in Randalstown Bog, C.1867. It was registered with the Royal Irish Academy No.2564 and later with the National Museum of Ireland (1867:254). It no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.57   | 0.71  |

MacDowell, U. 1983 *Irish Logboats*, No.12; 'Topographical Files' *National Museum of Ireland*; Raftery, JR. *Seaby Survey Files*, No.25; 'Register' 1859-1886 *Royal Irish Academy*, 233; Wakeman, WF. 1894 *Catalogue of the Antiquities in the Collection of the RIA*, 105, No.732; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*, 46.

**Boat Number:** I337

**NGR:** M 800 038

**Boat Name:** Red Island

**OD:** 30m (Water Level)

**Townland:** Red Island

**Site:** Lough Derg

**County:** Clare

A 'dugout' boat was found in Lough Derg in 1929. It was registered with the National Museum of Ireland (1929:1370). It probably no longer survives. No description was noted of the boat.

MacDowell, U. 1983 *Irish Logboats*, No.69; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I338

**NGR:** S 7 2

**Boat Name:** River Barrow 1

**Site:** River Barrow

**County:** Wexford

An boat 'hollowed out of a single oak' was found in 1813 in the River Barrow. By 1899 it had deteriorated significantly. It probably no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.18   | 1.22  |

Gratten Esmonde, T H. 1899 'Notes on Crannog and Other Finds in North County Wexford' *JRSAI*, 29, 406; MacDowell, U. 1983 *Irish Logboats*, No.277.

**Boat Number:** I339

**Site:** River Barrow

**Boat Name:** River Barrow 2

**County:** Wexford

An 'oak dug-out canoe' was found 'on the banks of the Barrow' in August 1910. Its fate was not noted. It probably no longer survives.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 11.83  | 1.17  |

'Seven stretches on the bottom at the stern end, and seven strengthened places in the sides' were noted. What is described were probably seven pairs of thwart rest and footrests.

Ffrench, J F M. 1910 'Discovery of a Dug-out Canoe on the Banks of the Barrow' *JRSAI* 40, 63; MacDowell, U. 1983 *Irish Logboats*, No.255.

**Boat Number:** I340 **OS 6":** 37,41,44,47  
**Boat Name:** River Barrow 3 **OD:** 10m  
**County:** Kilkenny-Wexford **Site:** River Barrow

A 'dugout canoe' was found in the River Barrow in 1934, between New Ross and Waterford. Its fate was not noted.

*Irish Press*, 19/7/34; MacDowell, U. 1983 *Irish Logboats*, No.256; 'Topographical Files' National Museum of Ireland.

**Boat Number:** I341 **OS 6":** 9  
**Boat Name:** River Casheen **OD:** 5m  
**County:** Kerry **Site:** River Casheen  
**Form:** Tapered

A 'dugout canoe' was found in 1932 in the River Casheen by fishermen. It had been seen 50 years previously. It was dragged to the riverbank where it was examined by National Museum of Ireland personnel. Its fate was not noted. It was noted as tapered and flat-bottomed.

Dimensions (in metres):

| Length | Max. Width | Min. Width |
|--------|------------|------------|
| 5.18   | 0.76       | 0.61       |

*Irish Press*, 3.6.32; MacDowell, U. 1983 *Irish Logboats*, No. 145; 'Topographical Files' National Museum of Ireland.

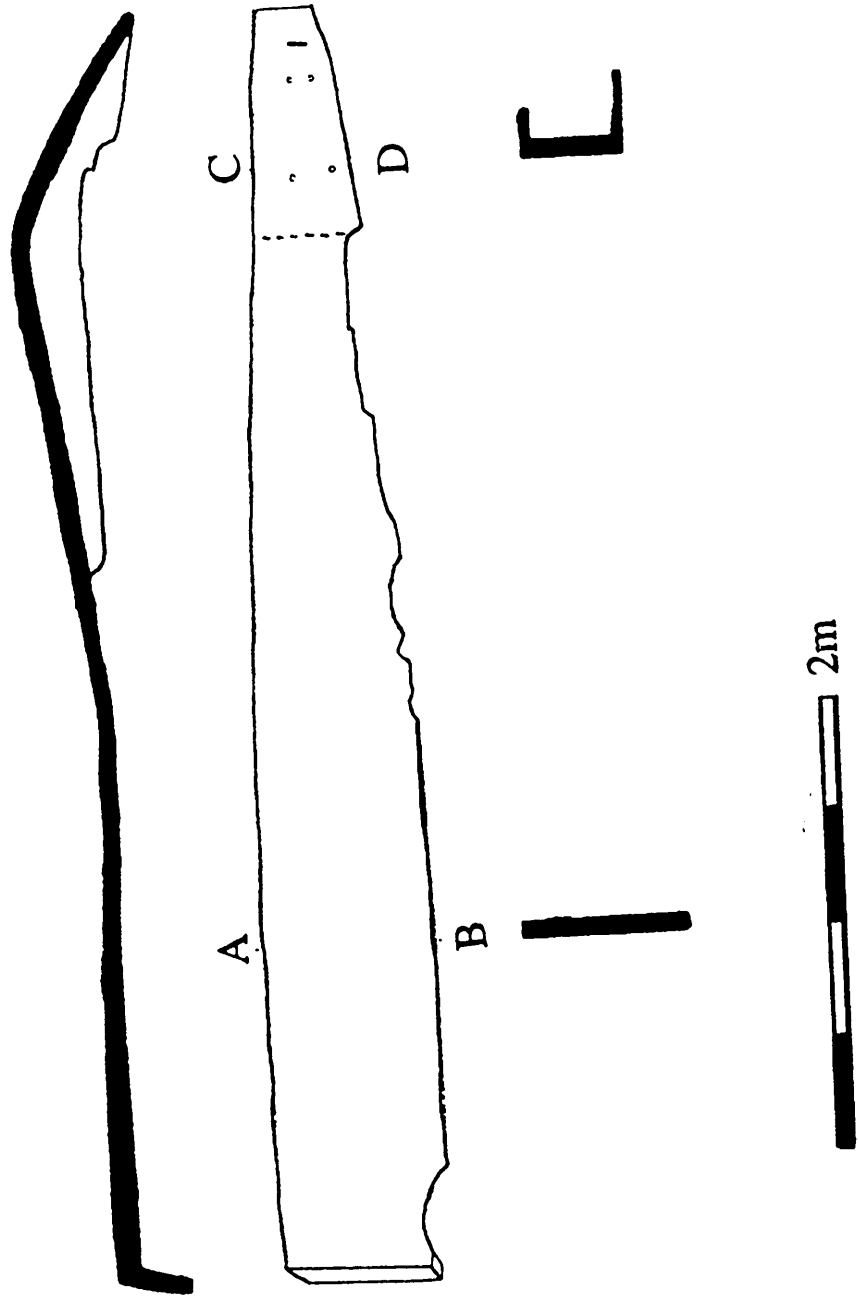


Figure 76: River Casheen (after Healy)

**Boat Number:** I342 **OS 6":** 4, 5  
**Boat Name:** River Foyle **OD:** 5m  
**County:** Tyrone **Site:** River Foyle

A 'logboat' was found during flooding in Spring 1991. It has been radiocarbon dated to 1440±30BP (GrN-19282) by Brindley and Lanting (Biologisch Archaeologisch Instituut, Groningen). It had been conserved in the Department of the Environment. In March 1993 it was examined by the writer. The boat is currently on a mounted display unit in the Tower Museum, Derry where it is inaccessible for detailed examination. Much of the port side and parts of the starboard side are missing. The bow no longer survives. The starboard side has warped outwards. A whole log was used in which several knots indicate the stern was the root end of the tree.

In plan it is parallel sided with a squared stern. In longitudinal-section, it is flat-bottomed with a rounded bow and stern. It was originally flat-bottomed with flared sides in cross-section. The stern also has a duck-billed projection (measuring 55x25x3cm).

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Base Side T | Top Side T |
|--------|-------|--------------|---------|-------------|------------|
| 4.90   | 0.55  | 0.30         | 0.05    | 0.05        | 0.01       |

Three thole pin holes in the form of rectangular blocks, are left proud of the sides, two to starboard and one to port. The holes are oval and measure between 6x3cm, 5x3cm and 4x3cm respectively. They are located 95cm, 95cm and 2.00m from the stern.

Two thwart rests survive on the starboard side at 1.48 and 2.64m from the stern. They measure 15 x 4cm.

Fry, M. *Seaby Survey Files*, No.90.

**Boat Number:** I343 **NGR:** N 41 48  
**Boat Name:** Rochfort Demesne **OD:** 80m (Water Level)  
**Townland:** Rochfort Demesne **Site:** Lough Ennell  
**County:** Westmeath

A 'dugout' boat was found in September 1968 by members of Mullingar Sub Aqua Club, 'in deep water' in Lough Ennell. It was 'beached in the little bay'. It was left in the lake. When found 'much of it was missing'. It was noted as 3.30m long.

'Correspondence Files' *National Museum of Ireland*, 1A/106/7



**Boat Number: I344**

**NGR: M 984 919**

**Boat Name: Roo**

**OD: 40m (Water Level)**

**Townland: Roo**

**Site: Tully Lough**

**County: Roscommon**

'A dugout canoe' was found in 1964, in Tully Lough. An 'iron nail' from it was registered with the National Museum of Ireland (1964:86). The boat was left *in situ*.

Dimensions (in metres):

| Surviving Length | Width | Height (int) |
|------------------|-------|--------------|
| 1.83             | 0.46  | 0.23         |

The nail 'has a large circular head, slightly domed' and the stem is rectangular in cross-section.

The lake, which measures approximately 750 by 400m, has an undated crannog (SMR No: 017-109) beside which the boat was found. The boat is possibly contemporary with it.

'Acquisitions' 1966 *JRSAI* 97, 16; 'Topographical Files' *National Museum of Ireland*.

**Boat Number: I345**

**NGR: L 713 924**

**Boat Name: Rosclave**

**OD: 5m (Water Level)**

**Townland: Rosclave**

**Site: St. Macan's Lough**

**County: Mayo**

A 'dugout' boat was found in 1951 in St. Macan's Lough. It was sent to the National Museum of Ireland where it was examined and drawn by Raftery (National Museum of Ireland) and later by Seaby. When found, the sides were damaged amidships. It no longer survives.

In plan, it was parallel-sided with rectangular ends. In longitudinal-section it was flat-bottomed with sharply inclined ends and its cross-section was rounded.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 2.79   | 0.76  |

At one end a seat was cut out of the solid and near the other was a transverse rib in the solid.

The lake, which measures approximately 400 x 200m has an undated crannog in it (SMR No.067-042) and 'ecclesiastical remains' beside it (SMR No: 076-001). The boat may be contemporary with either or both of the sites.

'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I346-7

**NGR:** H 214 517 & H 212 521

**Boat Name:** Rossfad 1-2

**OD:** 45m (Water Level)

**Townland:** Rossfad

**Site:** Lower Lough Erne

**County:** Fermanagh

Two 'dugout' boats were found in 1972 in Lower Lough Erne. Both were examined by Seaby and I346 was drawn by Hickey (Ulster Museum). Both were left *in situ*.

**I346:** This boat was found partly buried in sand. When found it consisted of the boat's bottom with little of one end surviving. In plan it tapered from the more complete end to the other. In longitudinal-section it was flat-bottomed with a rectangular end. Its cross-section was rounded.

Dimensions (in metres):

| Length | Max Width |
|--------|-----------|
| 7.66   | 0.75      |

A thickness-gauge, containing a 'wooden plug', was noted near the surviving end.

**I347: Form: Tapered.** This boat was found submerged north of Rossfad Pier. It was noted as a 5.18m long oak bottom with a maximum width of 76cm.

MacDowell, U. 1983 *Irish Logboats*, No.122-3; Seaby, WA. *Seaby Survey Files*, No.6-7.

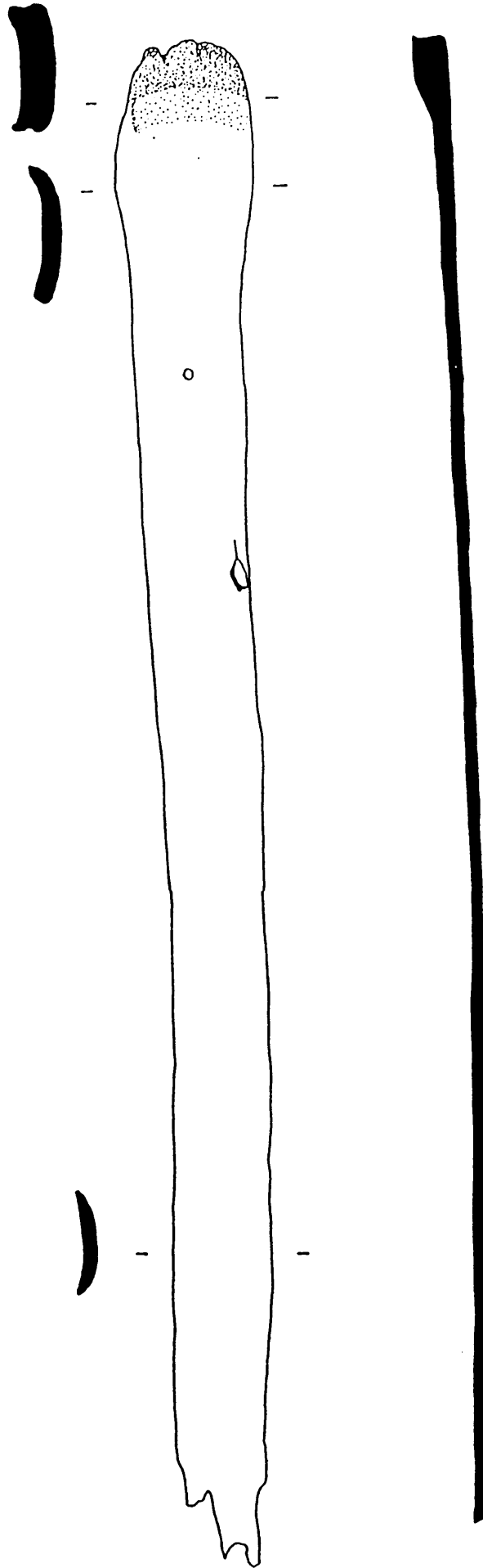


Figure 77: Rossfad 1 (after Hickey)

**Boat Number:** I348

**NGR:** O 899 346

**Boat Name:** Sleveen

**OD:** 0m

**Townland:** Sleveen

**Site:** River Casheen

**County:** Kerry

An 'oak dug-out canoe' was found in 1953, during drainage operations in the River Casheen, embedded in mud. Neither its description nor its fate was noted. It was examined by O'Kelly (National Museum of Ireland).

From the drawing it appears to be flat-bottomed in longitudinal-section with an inclined stern, rounded bow and rounded cross-section.

MacDowell, U. 1983 *Irish Logboats*, No.146, fig 45; 'Topographical Files' *National Museum of Ireland*.

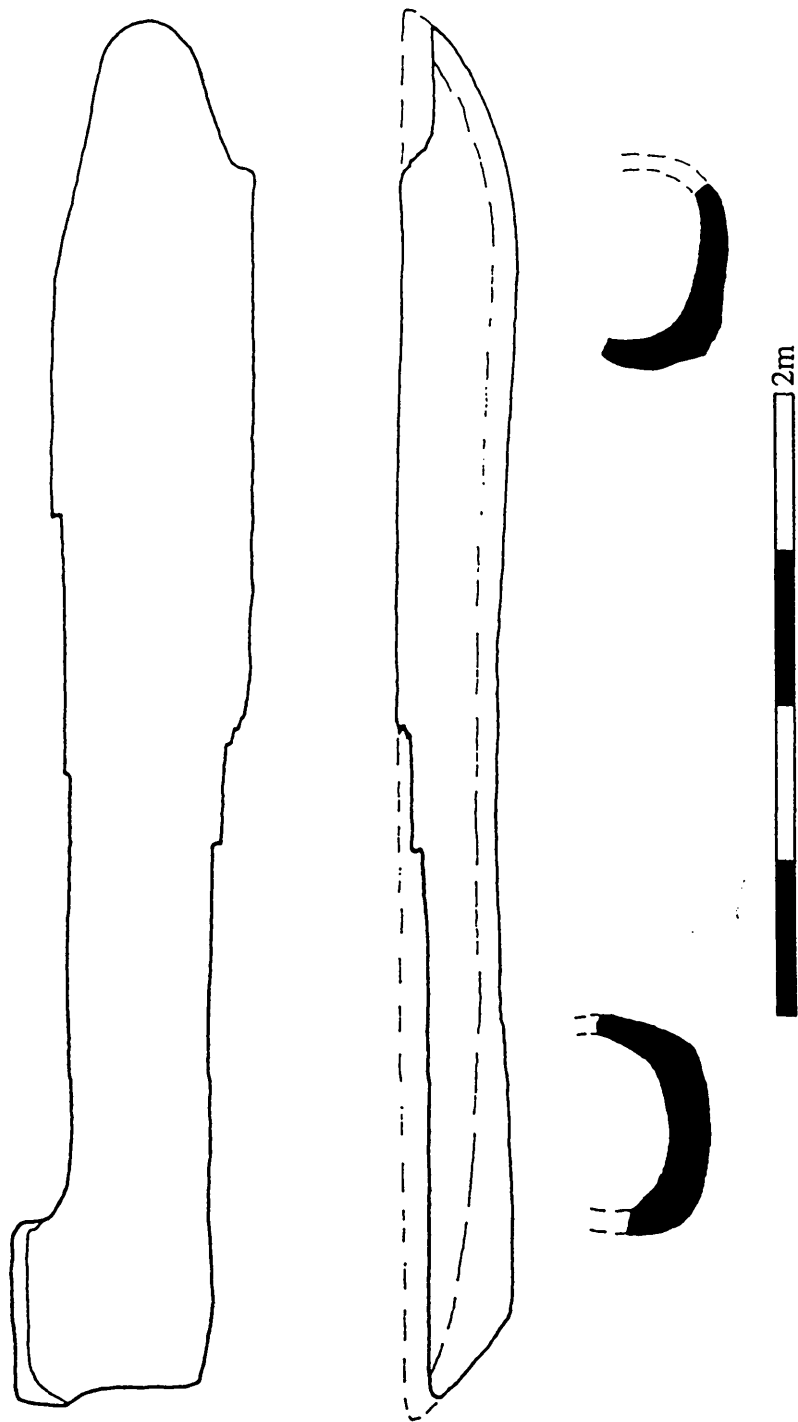


Figure 78: Sleeve (after O'Kelly)

**Boat Number:** I349 **NGR:** H 334 979  
**Boat Name:** South Ward **OD:** 5m  
**Townland:** South Ward-West Ward **Site:** Rivers Finn & Mourne  
**County:** Tyrone

An oak 'dugout' boat was found in December, 1991, at the junction of the Rivers Finn and Mourne. It was buried at the Department of the Environment Depot, Markethill. A 'felling date' for the tree from which the boat was made is 465±AD. (Q-8591). This was obtained in Queen's University. No description of the boat was noted.

Fry, M. *Seaby Survey Files*, No.91

**Boat Number:** I350 **NGR:** H 22 51  
**Boat Name:** Srahenny **OD:** 45m (Water Level)  
**Townland:** Srahenny **Site:** Lower Lough Erne  
**County:** Fermanagh **Form:** Tapered

A 'dugout boat' was found in 1887 in a sandy bay at St. Angelo, Lower Lough Erne. Its fate was not noted.

In plan, it tapered from one end to the other. Both ends were rounded. In longitudinal- section, both ends were rounded, and the cross-section was rounded also.

Dimensions (in metres):

| Length | Max Width | Min Width | Height (int) |
|--------|-----------|-----------|--------------|
| 13.36  | 0.71      | 0.53      | 0.30         |

Day enigmatically noted that in the 'narrow extremity was a seat with two hollows which gave the steersman a certain grip of the 'taut' and steadied him from rolling with the motion of the boat'. Little can be determined from this account.

Day, R. 1888 'Proceedings' *PSA* 12, 65; Day, R. 1895 'On some prehistoric remains from Lough Erne' *UJA* 2, 50; MacDowell, U. 1983 *Irish Logboats*, No 125.

**Boat Number:** I351-2 **OS 6":** 26  
**Boat name:** Stradone 1-2 **OD:** 90m  
**Townland:** Stradone  
**County:** Cavan

Two 'oak boats hollowed out of single trees' were found in Stradone. They were sent to the Royal Irish Academy and registered 1859:176-7. I351 no longer survives and I352 is currently stored in the National Museum of Ireland Depot, Daingean, where in April, 1993, it was inaccessible to examination. They were examined and drawn by Raftery (National Museum of

Ireland) and examined by Wakeman. I352 was also examined by Seaby and McGrail.

I351: In plan this boat was parallel-sided with broken ends. Its cross-section was rounded.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 6.88   | 0.81  | 0.30         |

I352: **Form: Tapered.** In Raftery's drawing the bow is shown damaged. A whole log was used. In plan, it tapered from a rectangular stern to a rectangular bow. In longitudinal-section it was flat-bottomed with inclined bow and it was rectangular in cross-section. It is now very warped and cracked.

Dimensions (in metres):

| Length | Stern Width | Bow Width | Height (int) |
|--------|-------------|-----------|--------------|
| 7.24   | 0.85        | 0.60      | 0.30         |

Four holes all between 2.1 and 2.4cm were noted in the floor. Three of them were treenailed. They were probably thickness-gauges. A 2.5cm diameter hole was 'set vertically in to the sheer on the starboard side of the stern'. Near it a second pegged hole 2x2.5cm was set vertically into the stern. Also a 'D-shaped depression' measuring 8x3cm was situated on the starboard gunwale at the stern. A repair patch was located internally on the stern. It was 36cm long and was secured by square-headed nails. Holes to hold a patch were noted under the boat by McGrail. The features at the stern may have been associated with the repair patch; however, their description is quite vague.

MacDowell, U. 1983 *Irish Logboats*, No62-3, fig 34; Seaby, WA. *Seaby Survey Files*, Raftery No.6; 'Topographical Files' *National Museum of Ireland*; Wakeman, WF. 1894 *Catalogue of Antiquities in the Collection of the RIA*, 106, No.735-6; Wilde, WR. 1859 'Account of three Crannoges' *PRIA* 7, 146.

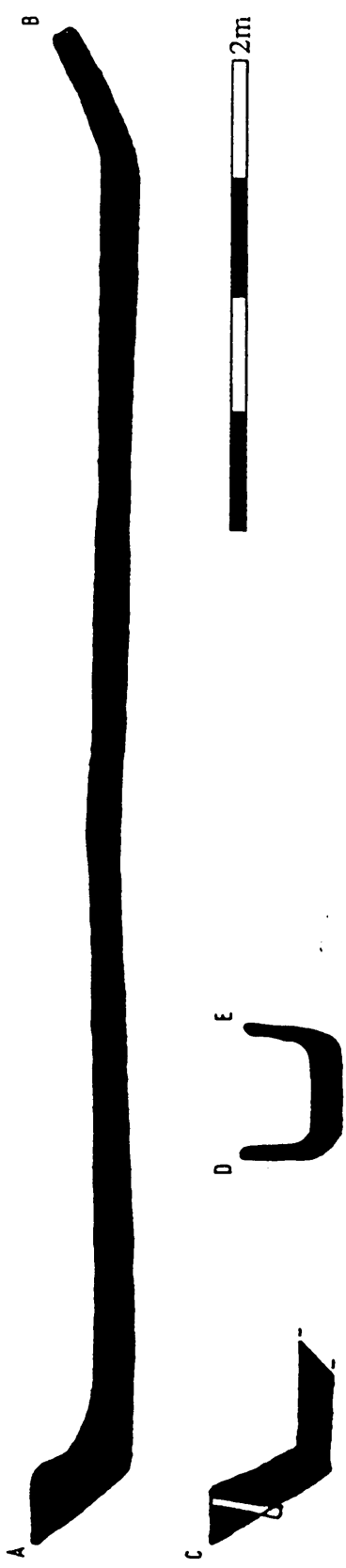
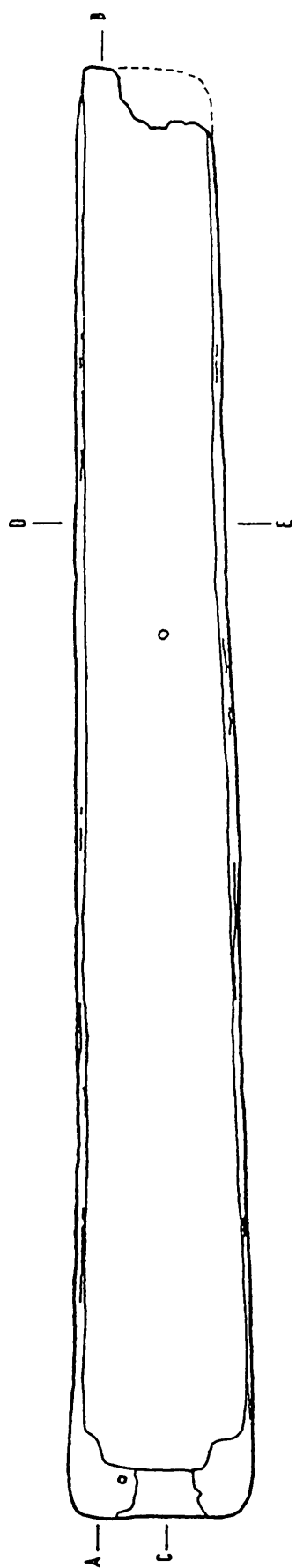


Figure 79: Stradone 2 (after Raftery)



**Boat Number:** I353 **OS 6'':** 23,29  
**Boat Name:** Strokestown **OD:** 60m  
**County:** Roscommon **Site:** Strokestown Bog

An 'oaken boat' was found before 1857. Wilde 'made inquiries after the largest and most perfect boat found in connection with the Strokestown crannoges'. It had been 'cut up' for 'roofing materials'.

It is not clear from the account whether the boat was found on, or in the vicinity of, a crannog. Two undated crannogs are located in the vicinity (SMR No.023-164 and 023-189).

Wilde, W R. 1857 'Account of three Crannoges' *PRIA* 7, 147.

**Boat Number:** I354 **OS 6'':** 45  
**Boat Name:** Summerville **OD:** 45m  
**Townland:** Summerville **Form:** Punt  
**County:** Galway

An oak dugout boat was found in a 'drained lake', c.1976. It is currently in 'The Forge', Mountbellew. Parts of both ends are missing due to radial splitting; the floor is cracked. It was examined and drawn by MacDowell in 1983. By April, 1993, its condition had changed little, the starboard side having warped outwards. It was made from a whole log.

In plan, it is parallel-sided with rectangular stern and bow. In longitudinal-section it is flat-bottomed with inclined ends. The cross-section was original rectangular.

Dimensions (in metres):

| Length | Original Width | Present Width | Ends Width | Stern Length | Bow Length | Stern Height |       |
|--------|----------------|---------------|------------|--------------|------------|--------------|-------|
| 4.76   | 0.72           | 0.85          | 0.72       | 1.00         | 0.50       | 0.57         |       |
| Bow    | Height (int)   | Height (ext)  | Floor T    | Bow Side T   | Top side T | Stern T      | Bow T |
| 0.45   | 0.32           | 0.37          | 0.05       | 0.04         | 0.02       | 0.19         | 0.08  |

A score mark, the remains of axe marks across the grain from hollowing, is located on the floor near the bow.

MacDowell, U. 1983 *Irish Logboats*, No.139, fig 5.; 'Correspondence Files' *National Museum of Ireland*, 1AG/2680.

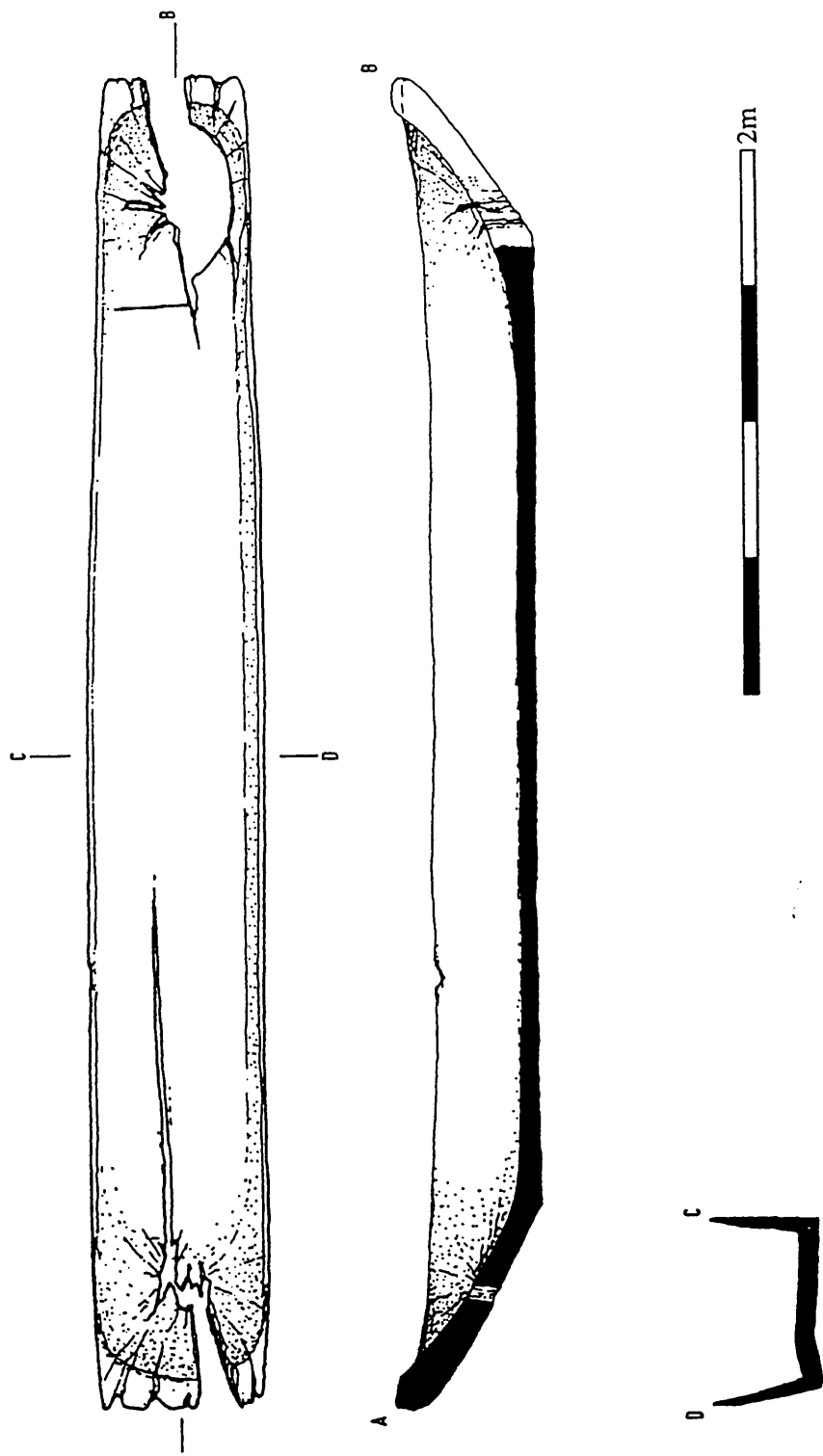


Figure 80: Summerville (after MacDowell)



Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 7.00   | 0.60  | 0.35         |

Two 5cm diameter holes were situated transversely in either end. They probably had retained trenails which secured a board or rib to prevent radial splitting.

'Topographical Files' National Museum of Ireland.

**Boat Number:** -361

**NGR:** H 10 85

**Boat Name:** Termonbacca 1-3

**OD:** 5m

**Townland:** Termonbacca

**Site:** River Foyle

**County:** Tyrone

Three 'oak dug-out canoes' were found in 1917 by fishermen in the River Foyle at St. Johnston. Their fates were not noted; they probably no longer survive.

**I359:** Both ends were missing and the sides were 'broken down'.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 5.49   | 0.79  | 0.30         |

At opposing locations the sides were noted as 'somewhat thicker' -evidently for the purpose of strengthening the beds of the row locks. The vague description could be referring to thwart seats or tholepin hole mountings.

**I360:** The sides were noted as 'not so well preserved'.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 5.64   | 0.61  |

'At one point' in the sides, a 2cm diameter thole-pin hole was noted in its mounting. Near 'the rowlocks' two 'curious semi-circular mortised tracks...are cut in the bottom', which were probably foot rests. They were 1.5cm deep. Two V-shaped grooves were located at either end which were interpreted as 'used to bed strengthening timbers'.

**I361:** This was noted as a 'fragment of a canoe'.

MacDowell, U. 1983 *Irish Logboats*, No.251-3; Wallace, JC. 1917 'A Find of Oak Dugouts' *JRSAI* 17, 85-6.

**Boat Number:** I362 **OS 6":** 20  
**Boat Name:** Tirliffin 1 **OD:** 45m  
**Townland:** Tirliffin **Site:** River Erne  
**County:** Cavan

A 'dug-out canoe' was found in 1936 during drainage operations in the River Erne. Its fate was not noted and no description is given.

MacDowell, U. 1983 *Irish Logboats*, No 64; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I363 **OS 6":** 20  
**Boat Name:** Tirliffin 2 **OD:** 45m  
**Townland:** Tirliffin **Site:** River Erne  
**County:** Cavan

A 'dug-out canoe' was found in 1937 during drainage operations in the River Erne. Its fate was not noted.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 12.19  | 0.69  | 0.41         |

MacDowell, U. 1983 *Irish Logboats*, No.65; 'Topographical Files' *National Museum of Ireland*.

**Boat Number:** I364-366 **NGR:** H 879 915  
**Boat Name:** Toome 1-3 **OD:** 10m (Water Level)  
**Townland:** Toome **Site:** Lough Neagh  
**County:** Antrim

Three 'canoes...hollowed out of a single piece of oak' was found in 1856 during drainage operations at Toome Bar, Lough Neagh. I364 was registered with the Royal Irish Academy (1863:1624). None of the three boats survive.

**I364:** This boat was noted as having duck-billed projections at either end and was flat-bottomed.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 6.10   | 0.51  | 0.36         |

**I365-6:** No description given.

MacDowell, U. 1983 *Irish Logboats*, No.15-7; Seaby, W A. *Survey Files*; 'Topographical Files' *National Museum of Ireland*; Wakeman, WF. 1894 *Catalogue of the Antiquities in the Collection of the RIA*, 105, No.730; Wood-Martin, WG. 1886 *The Lake Dwellings of Ireland*,

**Boat Number:** I367**NGR:** H 9 88 905**Boat Name:** Toome 4**OD:** 10m (Water Level)**Townland:** Toome**Site:** Lough Neagh/Lower River Bann**County:** Antrim**Form:** Punt

A dugout boat was found in 1954 during dredging operations in the River Bann. It was examined and drawn by Thompson and Seaby. It was then housed in Carrickfergus Castle where it was examined and drawn by MacDowell. In 1983 part of one side had collapsed outwards. It is currently being stored at the Department of the Environment Depot, Castlewellan. By March, 1993, warping had caused the hull to twist along its length. The floor is cracked and the sides and ends are no longer intact. The boat was made from a half log.

In plan, it was parallel-sided with rectangular ends, the longitudinal-section is flat-bottomed with inclined ends, and the cross-section was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Stern L | Bow L | Width | Height (int) | Floor T | Bow Side T | Top Side T |
|--------|---------|-------|-------|--------------|---------|------------|------------|
| 4.13   | 0.37    | 0.60  | 0.61  | 0.25         | 0.05    | 0.03       | 0.01       |

Six holes at 0.39, 1.03, 2.95, 3.43m and two at 3.71m from the stern are all oval in shape measuring 2.5 x 2cm. They would originally have been circular. They were used as thickness-gauges, except for two set in a transverse line across the floor which may have been used to secure a fitted rib to strengthen the hull.

MacDowell, U. 1983 *Irish Logboats*, No.19, fig 1; Seaby, WA. *Seaby Survey Files*, No 26.

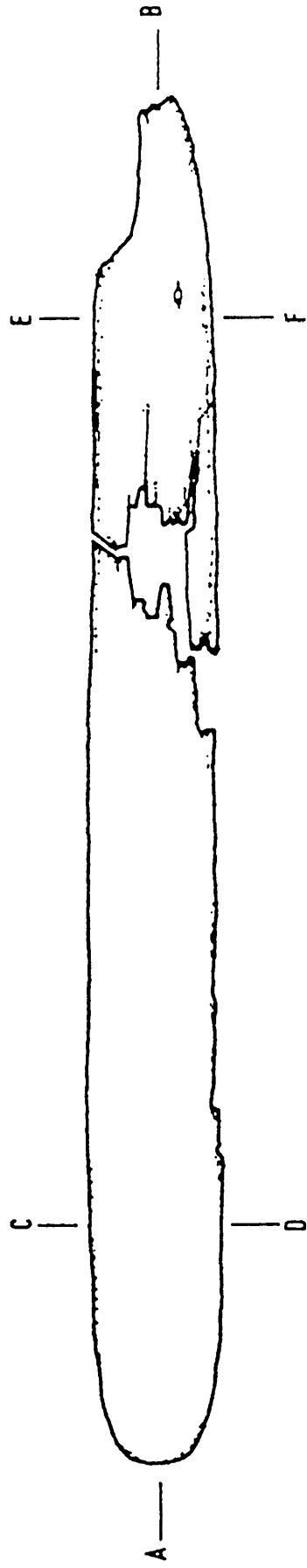


Figure 81: Toome 4 (after MacDowell)

**Boat Number:** I368

**NGR:** H 9 88 906

**Boat Name:** Toome 5

**OD:** 10m (Water Level)

**Townland:** Toome

**Site:** Lough Neagh/Lower River Bann

**County:** Antrim

**Form:** Canoe

An 'oak' dugout boat was found in the River Bann in 1957. It was examined and drawn by Seaby and Thompson (Ulster Museum), then sent to Carrickfergus Castle, where it was examined and drawn by MacDowell. It is currently stored at the Department of the Environment Depot at Castlewellan. When MacDowell examined it, it consisted of a bottom of a boat and was broken into two pieces.

In plan, it was parallel-sided with round ends. It is flat-bottomed.

Dimensions (in metres):

| Length | Width | Floor T |
|--------|-------|---------|
| 3.85   | 0.36  | 0.03    |

53cm from one end, and slightly off the longitudinal axis, is a thickness-gauge which was originally circular. It now measures 3 x 1.5cm.

MacDowell, U. 1983 *Irish Logboats*, No 18, fig 20; Seaby, W A. *Seaby Survey Files*, No.29.



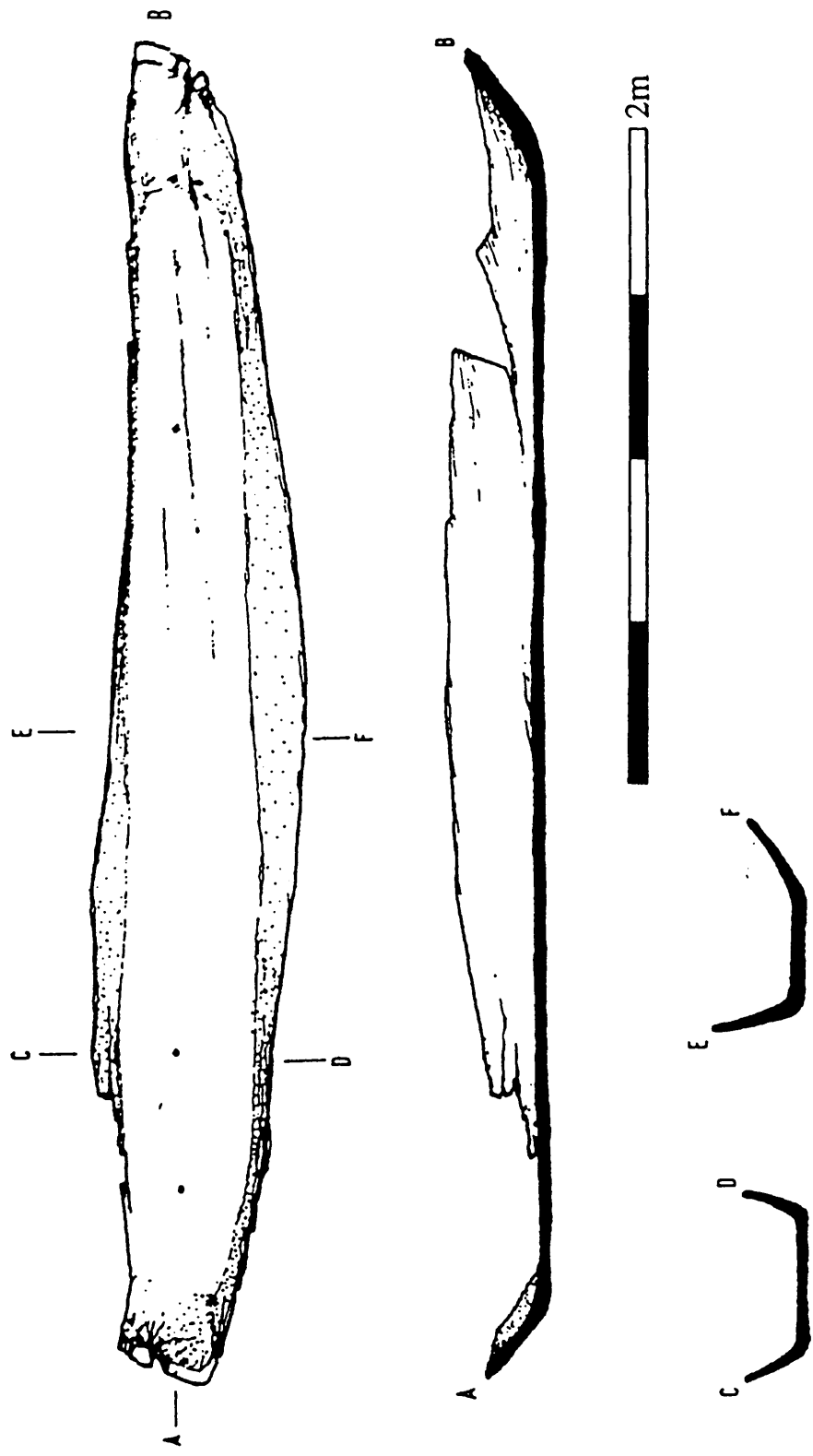


Figure 82: Toome 5 (after MacDowell)

**Boat Number:** I369

**NGR:** H 988 906

**Boat Name:** Toome 6

**OD:** 10m (Water Level)

**Townland:** Toome

**Site:** Lough Neagh/Lower River Bann

**County:** Antrim

**Form:** Canoe

An oak 'dug-out canoe' was found by a Scuba Diver in 1964, partly buried in sand in the River Bann. It was sent to the Ulster Museum where it was examined and drawn by Seaby (Ulster Museum). It no longer survives. When found, part of the port side was missing, the starboard side was worn down and both ends were damaged.

In plan, it was parallel-sided with rounded ends. In longitudinal-section, it was flat-bottomed with rounded end and its cross-section was rectangular. Dimensions (in metres):

| Length | Width | Height (ext) |
|--------|-------|--------------|
| 3.51   | 0.53  | 0.51         |

Tool marks were noted (a 'sharp-edge' cut on the floor near the bow).

MacDowell, U. 1983 *Irish Logboats*, No.82; Seaby, WA. *Seaby Survey Files*, No.30.

**Boat Number:** I370

**NGR:** H 334 982

**Boat Name:** Town Parks

**OD:** 5m

**Townland:** Town Parks- West Ward

**Site:** River Foyle

**County:** Tyrone

An 'oak' dugout boat was found in September 1987, in the River Foyle. It was split longitudinally in two halves. One half was found on the west riverbank and the other on the east bank. It is currently stored in an open water tank in Donegal County Council depot, Lifford, where access for examination is quite difficult. It was examined and drawn by Fry (Department of the Environment) and Bourke (Ulster Museum). When found, both the bow and stern were damaged. A knothole indicates the stern as the root end of the tree.

In plan, it appears to have been parallel-sided with rounded ends. Its longitudinal-section is flat-bottomed with rounded ends and in cross-section it is rounded.

Dimensions (in metres):

| Length | Height (int) | Width | Side L | Bow L | Floor T | Sides T |
|--------|--------------|-------|--------|-------|---------|---------|
| 4.80   | 0.50         | 0.65  | 0.50   | 0.50  | 0.04    | 0.02    |

Internally, both the bow and stern have ledges cut into them which probably held rests. Two pairs of opposing tholepin hole mountings and thwart rests were left proud of the sides. The two tholepin holes are located at 65cm and 1.79cm from the stern. The thwarts rest are 1.15 and 2.20cm from the stern.

Fry, M. *Seaby Survey Files*, No.67.

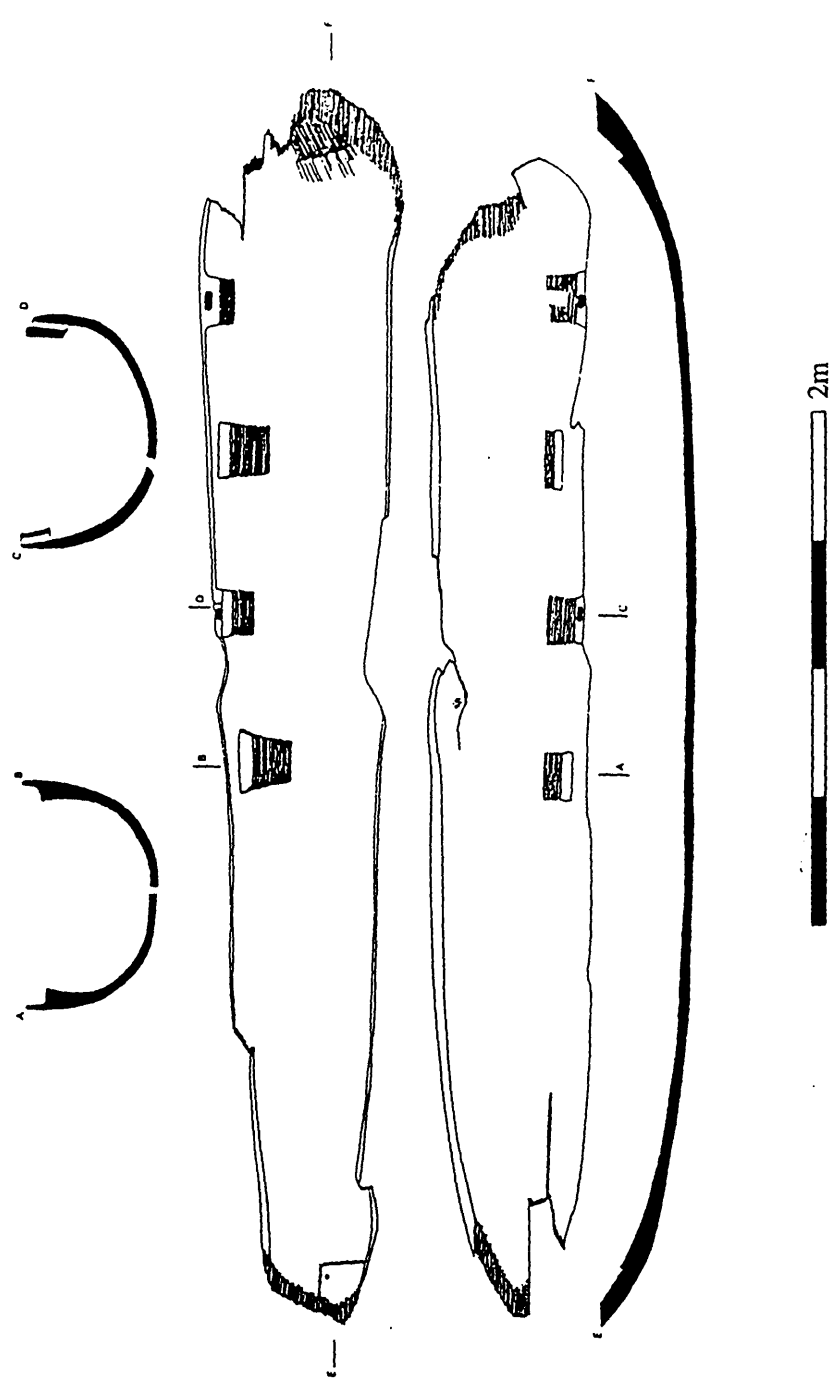


Figure 83: Town Parks (after Bourke)

**Boat Number:** I371 **NGR:** H 34 56  
**Boat Name:** Trillick 1 **OD:** 140m  
**Townland:** Trillick **Site:** Drumdarragh Lake  
**County:** Tyrone

'A single tree canoe' was found at Drumdarragh. No description was given; it no longer survives. An 'oak paddle which had been found...at Drumdarragh Crannog' was noted. The account is vague and does not say whether the boat was associated with the crannog.

MacDowell, U. 1983 *Irish Logboats*, No.242; Seaby W A. *Seaby Survey Files*.

**Boat Number:** I372 **NGR:** H 34 56  
**Boat Name:** Trillick 2 **OD:** 140m  
**Townland:** Trillick **Site:** Drumdarragh Lake  
**County:** Tyrone

A 'boat formed out of a single oak-tree' was found c.1885 in Drumdarragh lake by the shore. It was cut up for firewood. Its length was noted as 5.49m. It was flat-bottomed with thin sides.

MacDowell, U. 1983 *Irish Logboats*, No.243; Seaby, W A. *Survey Files*.

**Boat Number:** I373-379 **NGR:** H 34 06  
**Boat Name:** Trinity Island 1-7 **OD:** 50m (Water Level)  
**Townland:** Trinity Island **Site:** Lough Oughter  
**County:** Cavan

Seven 'dug-out canoes' were found in 1959, in 'the mud' on the shore of Trinity Island, Lough Oughter. Their fate was not noted. Two were recorded 20m apart, another two on the north shore, and three 'together' on the east shore.

**I373:** This boat was noted as 4.88m long, 46cm wide and 'in fair condition'.

**I374:** The boat was 7.32m long and 1.22m wide. Two circular holes were noted 30cm 'apart in the stern'. They were 4cm diameter. It is possible that they were either thickness-gauges or used to secure a fitted rib for strengthening the hull.

No descriptions were recorded of the other boats.

'Correspondence Files' *National Museum of Ireland*, 1A/164/59;. 'Correspondence Files' *National Museum of Ireland*, 1A/187/59.

**Boat Number:** 380 **NGR:** H 137 566  
**Boat Name:** Tully **OD:** 45m (Water Level)  
**Townland:** Tully **Site:** Lower Lough Erne  
**County:** Fermanagh

A 'dugout canoe' was found in 1937 in Home Bay, Lower Lough Erne. Its fate was not noted. The bow was rounded and 'the stern end had one cut for a rowlock in the side'.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 13.71  | 0.91  | 0.23         |

MacDowell, U. 1983 *Irish Logboats*, No.126; Mogeey, JM. 1946 'Wooden Canoes' *UJA* 9, 70.

**Boat Number:** I381 **NGR:** G 79 95  
**Boat Name:** Tullybeg **OD:** 30m (Water Level)  
**Townland:** Tullybeg **Site:** Lough MacHugh  
**County:** Donegal

An oak 'logboat' was found in 1975 in Lough MacHugh. 'It was left exposed where it was found' and probably no longer survives.

In plan, it was parallel-sided and its cross-section was rectangular.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 3.35   | 0.51  | 0.10         |

MacDowell, U. 1983 *Irish Logboats*, No.93. pl.1.

**Boat Number:** I382 **OS 6":** 7  
**Boat Name:** Tumna **OD:** 45m  
**Townland:** Tumna **Site:** River Shannon  
**County:** Roscommon

A 'logboat' was found in June 1988 by scuba divers in the River Shannon. It was examined and drawn by sports divers and students of Cornell University. It was left *in situ*.

In plan, it was parallel-sided with rounded-point bow and squared stern.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.75   | 0.65  |

Two repair patches were noted on the floor near the bow, both of which had 'at least three dowel holes', and the narrower patch had 'a row of three regularly-spaced iron nails at 5cm

intervals'. Timbers were also noted as floor boards in the boat. However, their description is enigmatic and they could have been part of possible collapsed sides.

'Correspondence Files' *National Museum of Ireland*, 1A/160/88.

**Boat Number: I383**

**Boat Name: Unprovenanced 1**

This 'logboat' is currently stored in the National Museum of Ireland Depot, Daingean. It was examined and drawn by MacDowell in 1983. In April, 1993, it was inaccessible to further examination. The remains consisted of part of the boat's floor which was warped.

In plan, it was 'sub-rectangular', and flat-bottomed with an inclined end in longitudinal-section. Its cross-section was rounded.

Dimensions (in metres):

|              |
|--------------|
| <b>Width</b> |
| 0.70         |

A transverse groove was noted 15cm from the inclined end. It measured 6cm in width at the top and 2.5cm at the bottom, and was 6cm deep. It was interpreted as a sternboard groove. At 2.75cm from this end was a rib left proud of the floor which would have been used to strengthen the boats' hull. A mast step was located 10cm from the bow. It measured 5cm in diameter and was surrounded by a 15cm diameter circular ridge.

MacDowell, U. 1983 *Irish Logboats*, No.278, fig 15

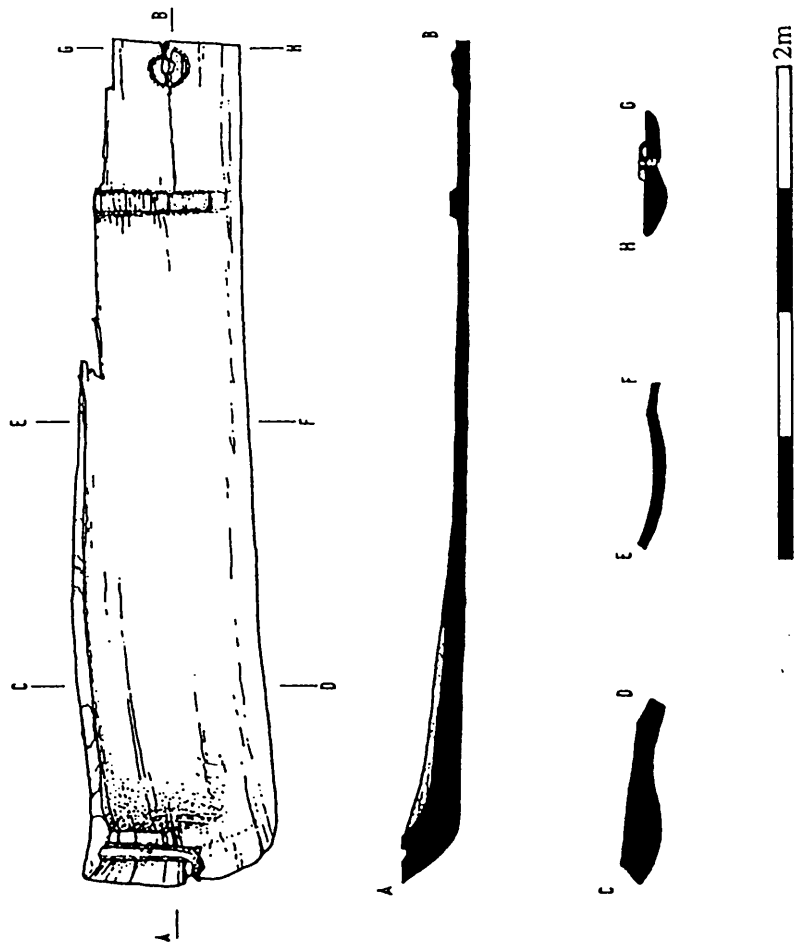


Figure 84: Uprovenanced 1 (after MacDowell)

**Boat Number: I384**

**Boat Name: Unprovenanced 2**

A 'logboat' located at the National Museum of Ireland Depot, Daingean, was examined and drawn by MacDowell in 1983. In April 1993 it was no longer accessible to examination. It consists of a bottom only.

In plan, it is parallel-sided with one rounded end and the other sub-rectangular. The longitudinal-section is flat-bottomed and the rounded ends inclined. In cross-section it was rectangular.

Dimensions (in metres):

| Length | Width | Height |
|--------|-------|--------|
| 3.84   | 0.69  | 0.08   |

An oval thickness-gauge which was originally circular is located amidships. It measures 3 x 2.5cm.

MacDowell, U. 1983 *Irish Logboats*, No.279, fig 16.



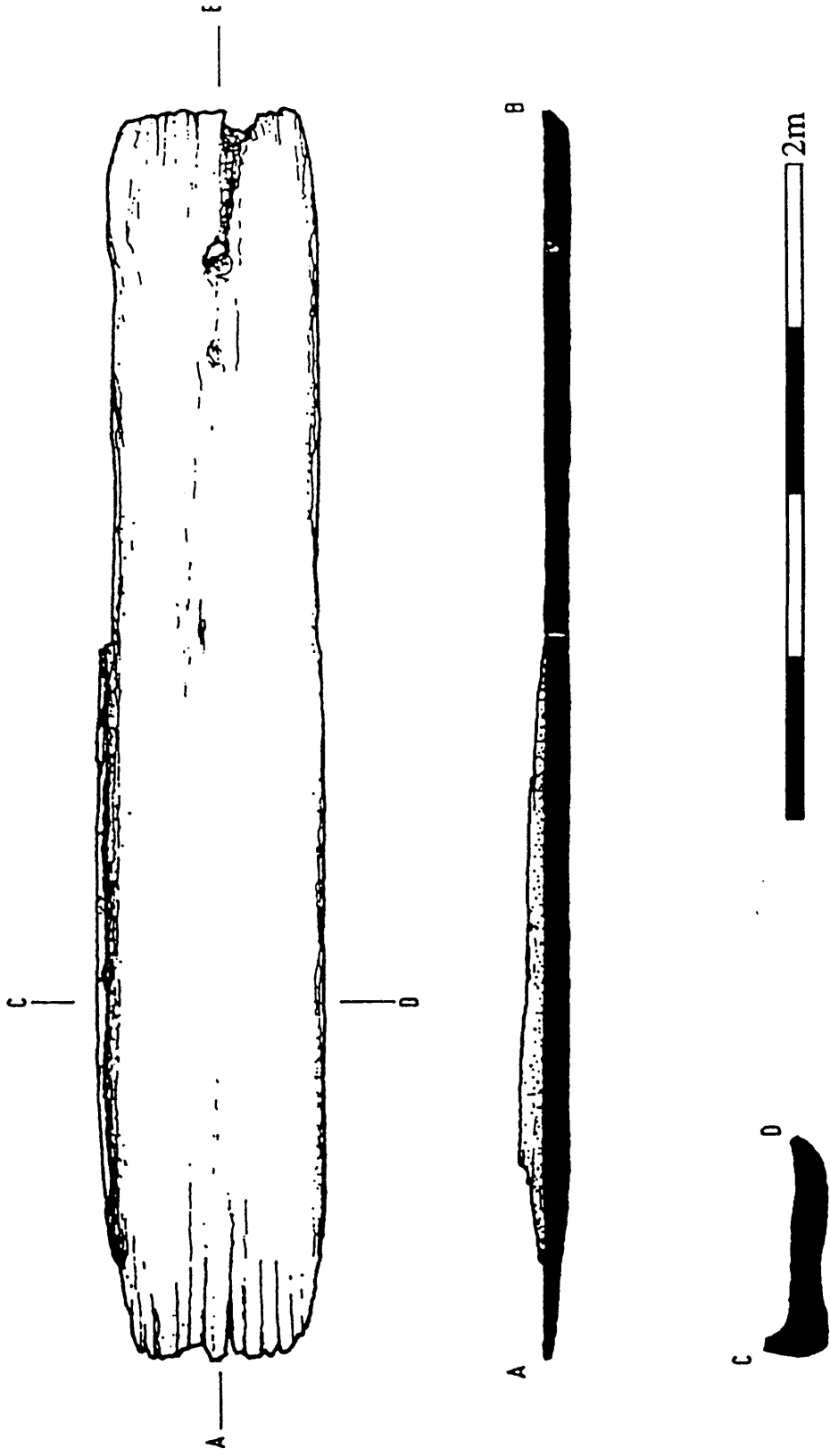


Figure 85: Uprovenanced 2 (after MacDowell)

**Boat Number: I385**

**Boat Name: Unprovenanced 3**

In storage, at the National Museum of Ireland Depot, Daingean. It was examined and drawn by MacDowell in 1983. Its remains consist of the bottom, which by April 1993 had not deteriorated.

In plan, it is parallel-sided with one end missing; the other is sub-rectangular. In longitudinal-section it is flat-bottomed with an inclined end, and its cross-section is rectangular.

Dimensions (in metres):

| Length | Width | Floor T |
|--------|-------|---------|
| 5.17   | 0.67  | 0.08    |

Two thickness-gauges are located on the boats long axis at 63cm (2cm diameter) and 3.35m (1.5cm diameter) from the surviving end.

MacDowell, U. 1983 *Irish Logboats*, No.280, fig.17.

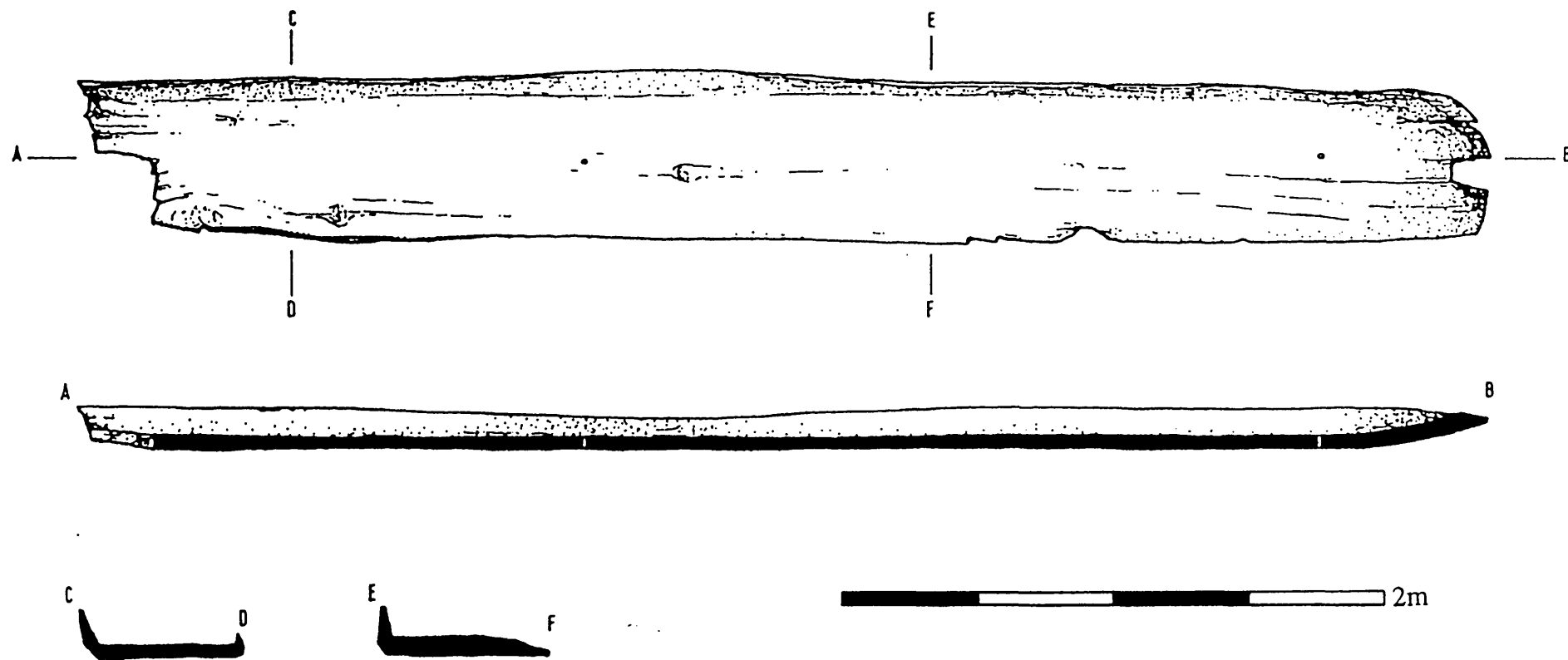


Figure 86: Uprovenanced 3 (after MacDowell)

**Boat number: I386**

**Form: Punt**

**Boat Name: Unprovenanced 4**

In storage at the National Museum of Ireland Depot, Daingean, it was examined and drawn by MacDowell, in 1983. It had previously been drawn by Raftery. It consisted 'mainly of the floor with portions of the sides' with damaged ends. The floor had a crack on the long axis, which, by April, 1993, had extended to c.3.5cm in length.

In plan, it is parallel-sided with squared ends, which inclines up from a flat-bottom in longitudinal-section. Its cross-section is flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Base Sides T | Top Sides T |
|--------|-------|--------------|---------|--------------|-------------|
| 7.15   | 0.71  | 0.17         | 0.07    | 0.04         | 0.02        |

The boat has thirteen holes. At one of the ends where the wood is cracked along the grain are 'two staggered rows of four and three holes' which are 2.5cm in diameter. It is possible that they held a repair patch or fitted ribs to prevent splitting. Three holes are located on the floor by one side, and two in a similar position on the other side. They were probably used as thickness-gauges as were the two located on the boats long axis. All the holes measured 2.5cm in diameter.

MacDowell, U. 1983 *Irish Logboats*, No.281, fig.18; Raftery, R. *Seaby Survey Files*, No.9.

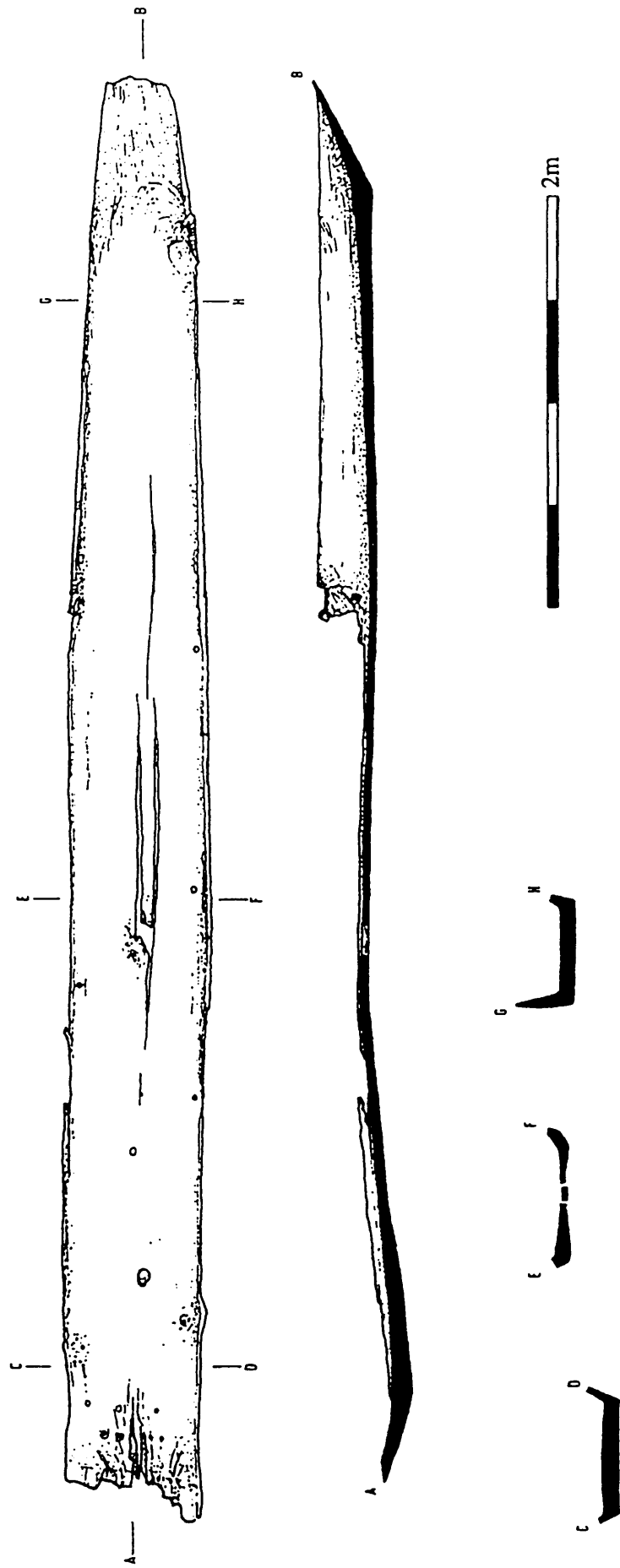


Figure 87: Uprovenanced 4 (after MacDowell)

**Boat Number: I387**

**Form: Punt**

**Boat Name: Unprovenanced 5**

Now split longitudinally into two pieces, the boat was examined and drawn by MacDowell in 1983, in the National Museum of Ireland Depot, Daingean. Raftery had drawn it previously. One piece comprises part of one end and most of one side. The remainder of the boat is in the other. The larger piece is also split along most of its length. A knot in the bow indicated that the stern was the root end of the tree.

It was parallel-sided with a marginal taper to the ends which were squared. In longitudinal-section it was flat-bottomed with inclined ends. Its cross-section is flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width | Ends L | Floor T | Sides T | Height (int) |
|--------|-------|--------|---------|---------|--------------|
| 3.78   | 1.03  | 0.55   | 0.06    | 0.04    | 0.20         |

MacDowell, U. 1983 *Irish Logboats*, No.282, fig 19; Raftery, R. *Seaby Survey Files*, Raftery, No.11.

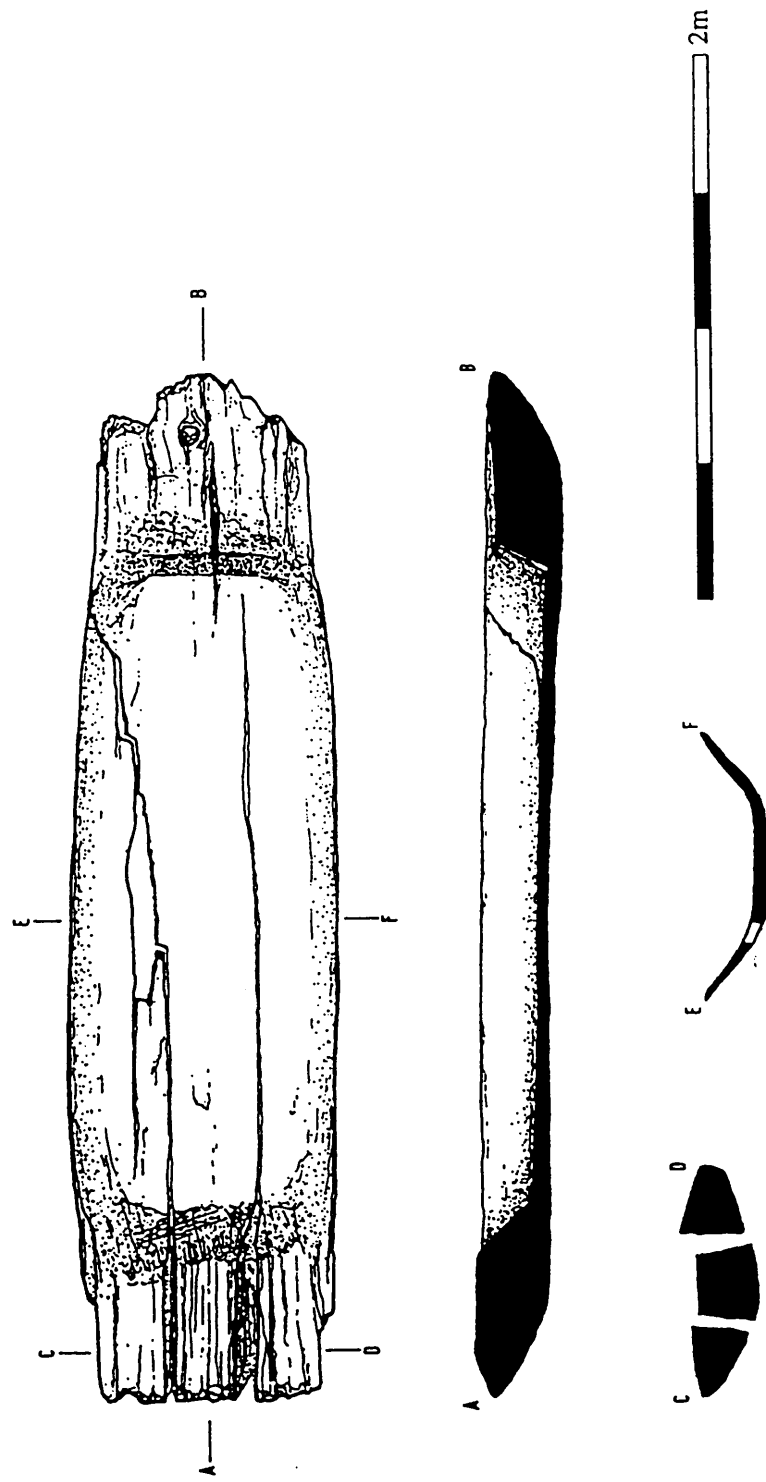


Figure 88: Uprovenanced 5 (after MacDowell)

**Boat Number: I388**

**Form: Punt**

**Boat Name: Unprovenanced 6**

This dugout boat, which is stored at the National Museum of Ireland Depot, Daingean, was examined by MacDowell. It had previously been drawn by Raftery. In April, 1993, it was inaccessible to examination. Parts of the sides were broken and held in place by iron bands - a modern repair. Other parts of the sides were lying under the boat in 1983. The boat was also examined by McGrail in 1974 who noted a horizontal treenail in the stern which he interpreted as a modern repair. A whole log was used.

In plan, it was parallel-sided with a squared stern and sub-rectangular bow. Both ends inclined up from a flat-bottom. In cross-section, it was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width | Height (int) | Floor T | Sides T | Stern L | Bow L |
|--------|-------|--------------|---------|---------|---------|-------|
| 4.15   | 0.85  | 0.21         | 0.10    | 0.06    | 0.53    | 0.56  |

The boat had two opposing pairs of tholepin-hole mountings and two opposing pairs of thwart rests left proud of the side.

A vertical groove was noted set in the bow of unknown function. On the stern a 'dovetailed' repair measured 15cm in length. It contained two 1.5cm diameter holes which retained their trenails.

MacDowell, U. 1983 *Irish Logboats*, No. 283, fig. 63; McGrail, S. 1978 *The Logboats of England and Wales*, 37; Raftery, R. *Seaby Survey Files*, Raftery No. 5.



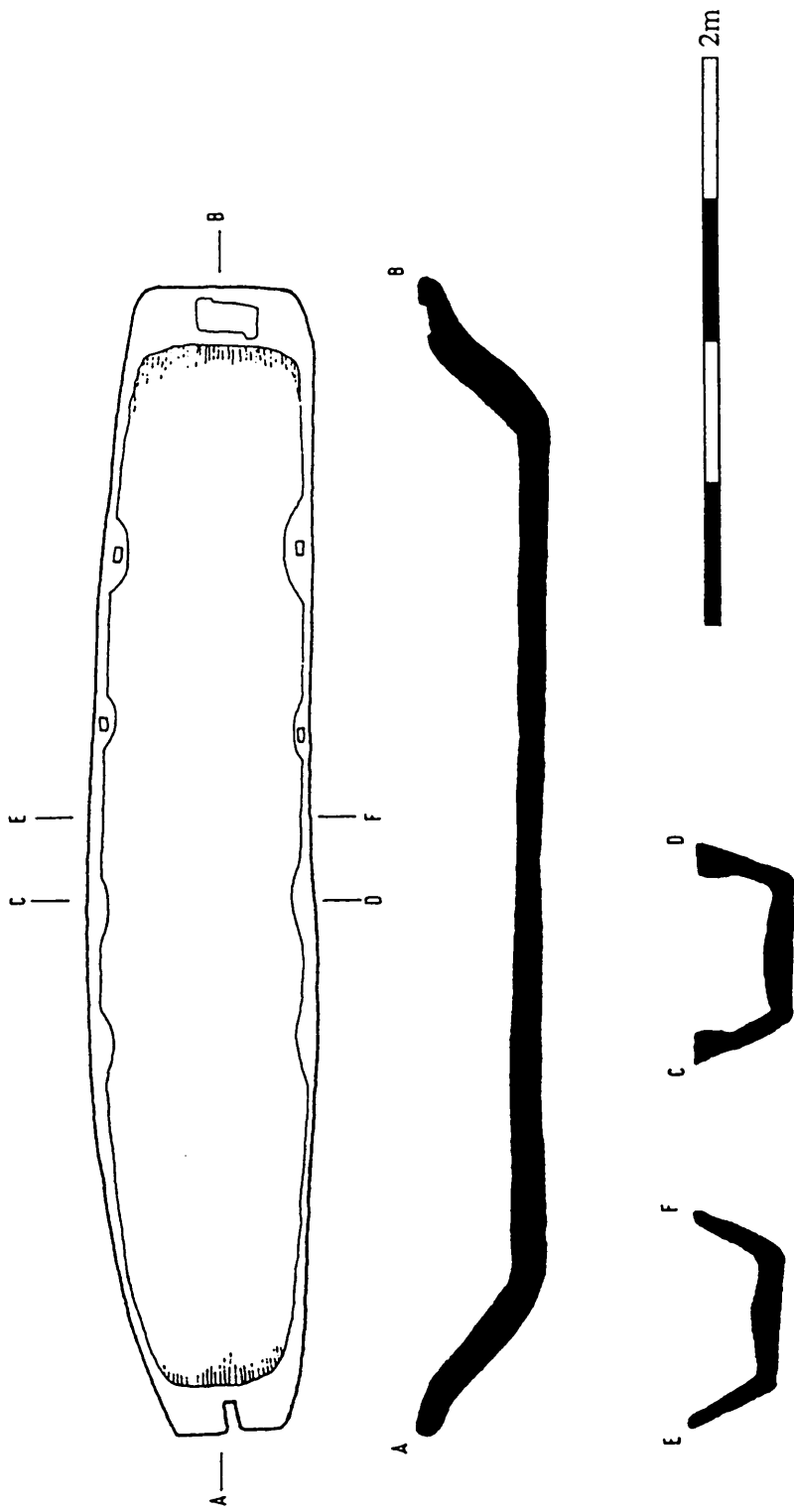


Figure 89: Uprovenanced 6 (after Raftery)

**Boat Number:** I389 **NGR:** H 304 956  
**Boat Name:** Urney Glebe **OD:** 5m  
**Townland:** Urney Glebe **Site:** River Finn  
**County:** Tyrone

A 'dugout' boat was found in the 'mid-1980's in the River Finn. It was examined by Fry (Department of the Environment) and buried at their depot, Markethill. No description of it was noted except that it was a 'fragment of substantial size'. It was radiocarbon dated to 310±30BP (GrN-16865) by Brindley and Lanting (Biologisch Archaeologisch Instituut, Groningen).

Fry, M. *Seaby Survey Files*, No.79.

**Boat Number:** I390-394 **NGR:** See Below  
**Boat Name:** West Ward 1-5 **OD:** 5m  
**Townland:** West Ward **Site:** River Foyle  
**County:** Tyrone

Five dugout boats were found in the River Foyle in September 1987. They became uncovered in the east bank as a result of flooding.

**I390:** **NGR:** H 334 982. This oak boat was examined and drawn by Fry (Department of the Environment) and Bourke (Ulster Museum) and left *in situ*. When found both ends and the port side were missing. In plan it was parallel-sided, flat-bottomed in longitudinal-section with a gentle curve towards either end. The cross-section was rounded.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 3.60   | 0.60  |

**I391:** **NGR:** H 335 983. **Form:** Canoe. When this oak boat was examined by Fry and Bourke *in situ*, only the gunwale was visible. It was embedded in gravel. Donegal County Museum took custody of it and it is currently stored at Fort Dunree, where it was examined in February 1993. Its starboard side has warped outwards, both ends are split and the starboard gunwale by the bow no longer survives. It was made from a whole log and its three knots indicate the bow was the root end of the tree. In plan, it was parallel-sided with rounded ends. The bow has a rectangular duck-billed projection. In longitudinal-section, it is flat-bottomed with a rounded stern and inclined bow and its cross-section was originally rounded.

Dimensions (in metres):

| Length | Stern L | Bow L | Width | Original W | Floor T | Sides T |
|--------|---------|-------|-------|------------|---------|---------|
| 3.07   | 0.50    | 0.70  | 0.72  | 0.55       | 0.06    | 0.03    |

A 4cm diameter hole is situated in the duck-billed projection on the port bow. It was probably

used to retain a mooring-pole. An opposing pair of tholepin-hole mountings are located at 0.60m from the stern. At 1.15m from the stern is an opposing pair of thwart rests. They were left proud of the sides. The tholepin-hole mountings measure 23x6cm and the thwart rests 20x12cm. The oval tholepin holes are 4x3cm.

**I392: NGR: H 333 983.** An 'oak dugout' boat survived for 'half or two-thirds' of its length which included the stern. It was noted as 5.12m long and 1.12m wide. It had two thole-pin hole mountings and two thwart rests left proud of one side. The other side had one set of both. The 'flattened' stern had three circular holes, one of which retained its treenail. It was probably used to retain a fitted rib to prevent splitting along the grain. The boat was examined and drawn by Fry (Department of the Environment) and Bourke (Ulster Museum).

In plan, it tapered from the stern which was squared. In longitudinal-section it was flat-bottomed with an inclined stern and was rounded in cross-section. It was buried at the Department of the Environment Depot, Markethill.

**I393: NGR: H 333 983.** The remains of an oak dugout boat consisted of the starboard side and part of the floor. It was measured and drawn by Fry (Department of the Environment) and Bourke (Ulster Museum). It was buried at the Department of the Environment Depot, Markethill. Both ends were damaged.

In plan, it was straight-sided, flat-bottomed with inclined ends in longitudinal-section, and rounded in cross-section.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 4.72   | 0.28  |

A hole was noted in one end which may have been a thickness-gauge. The remains of a solid rib left proud of the floor. It would have been used to strengthen the hull.

**I394: NGR: H 333 983.** The remains of this oak boat consisted of most of the bottom's length and width and part of one end. It was examined and drawn by Fry (Department of the Environment) and Burke (Ulster Museum). It was buried at Markethill. In plan it was roughly straight-sided, with an inclined end from a flat-bottom in longitudinal-section, and appears to have been rounded in cross-section. In plan the stern was rectangular or sub-rectangular.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 3.52   | 0.60  |

Fry, M., Seaby Survey Files, No.68-9, 74-6.

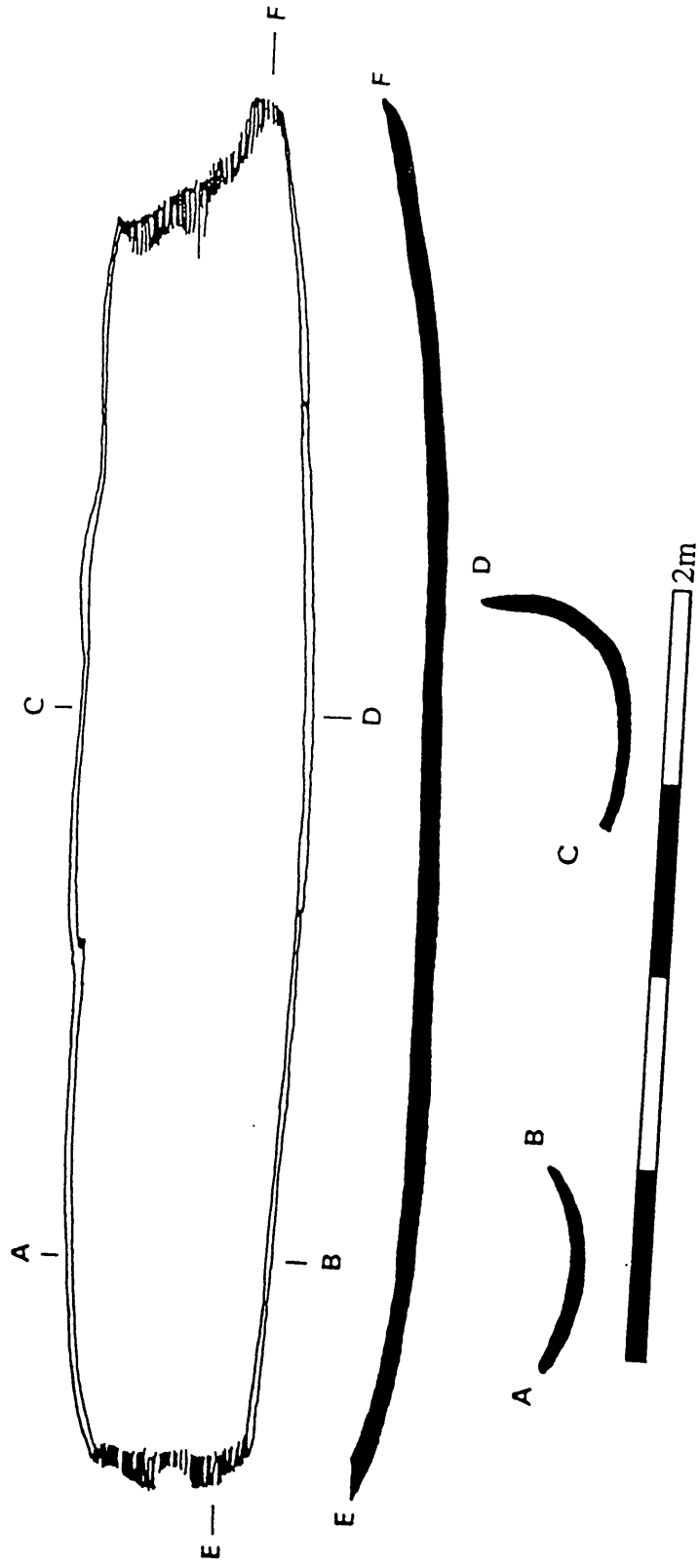


Figure 90: West Ward 1 (after Bourke)

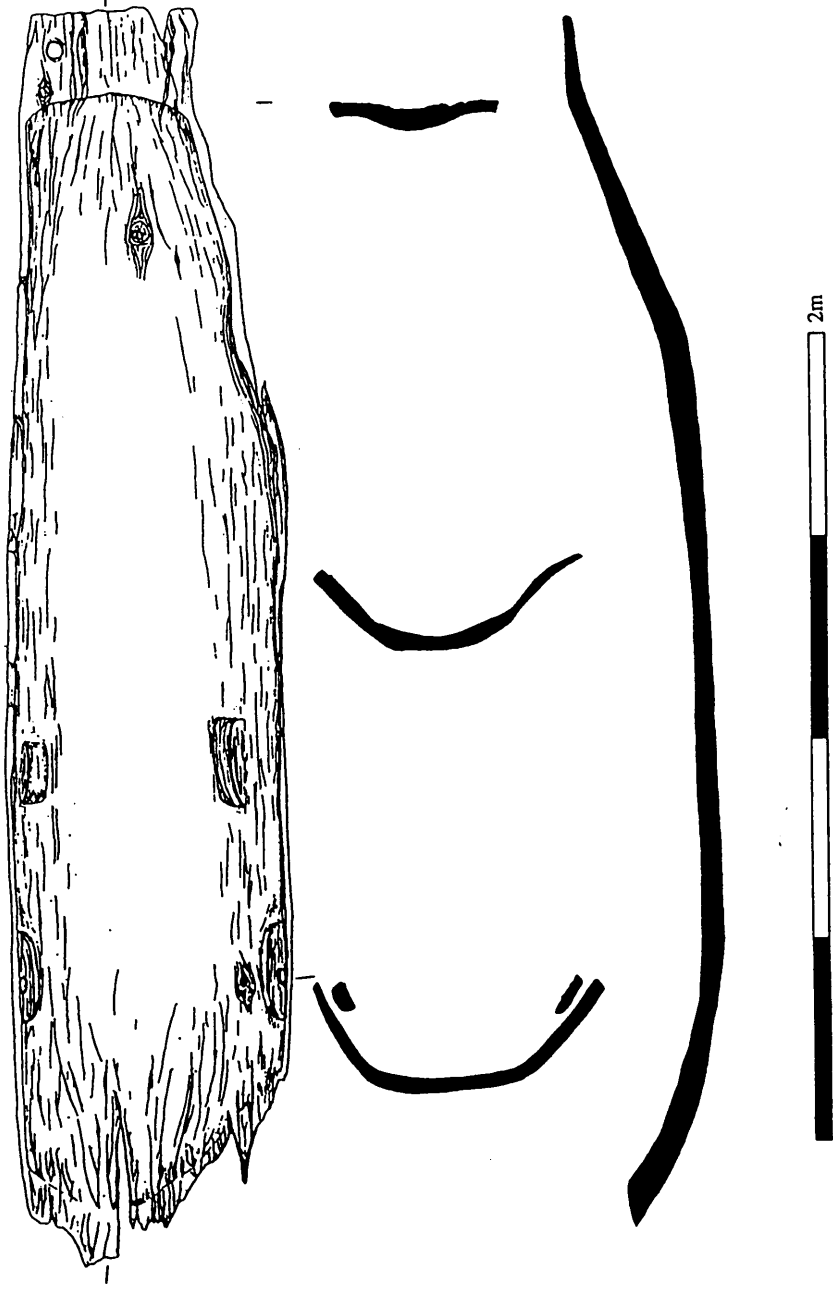


Figure 91: West Ward 2

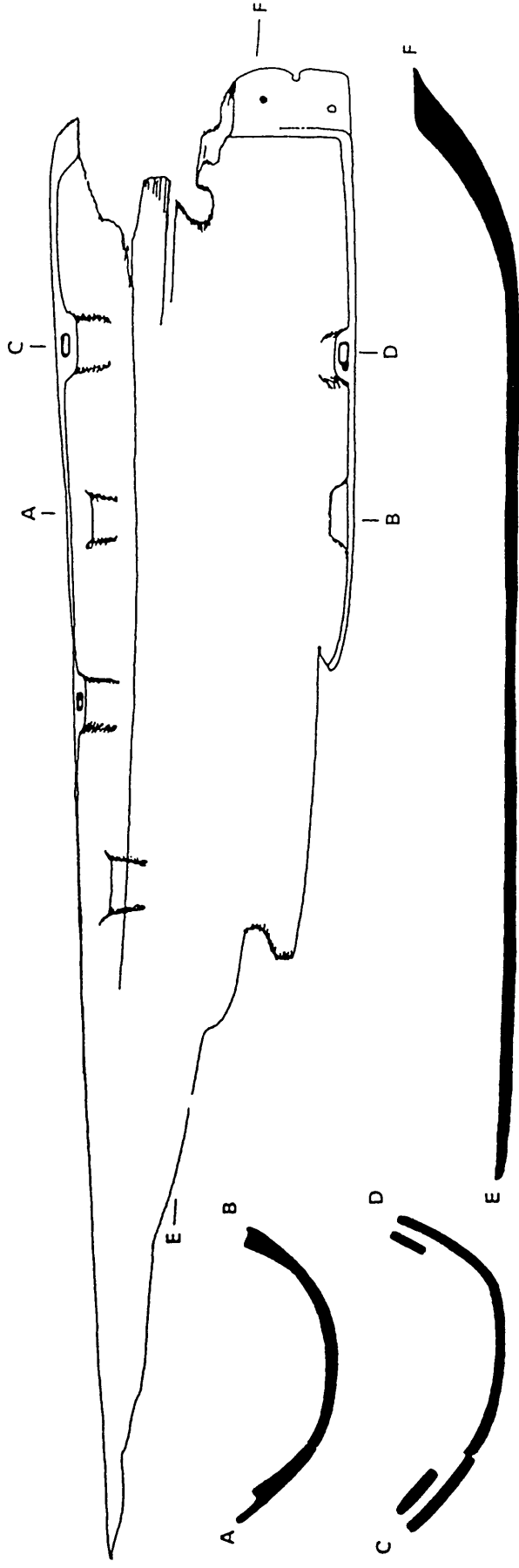


Figure 92: West Ward 3 (after Bourke)

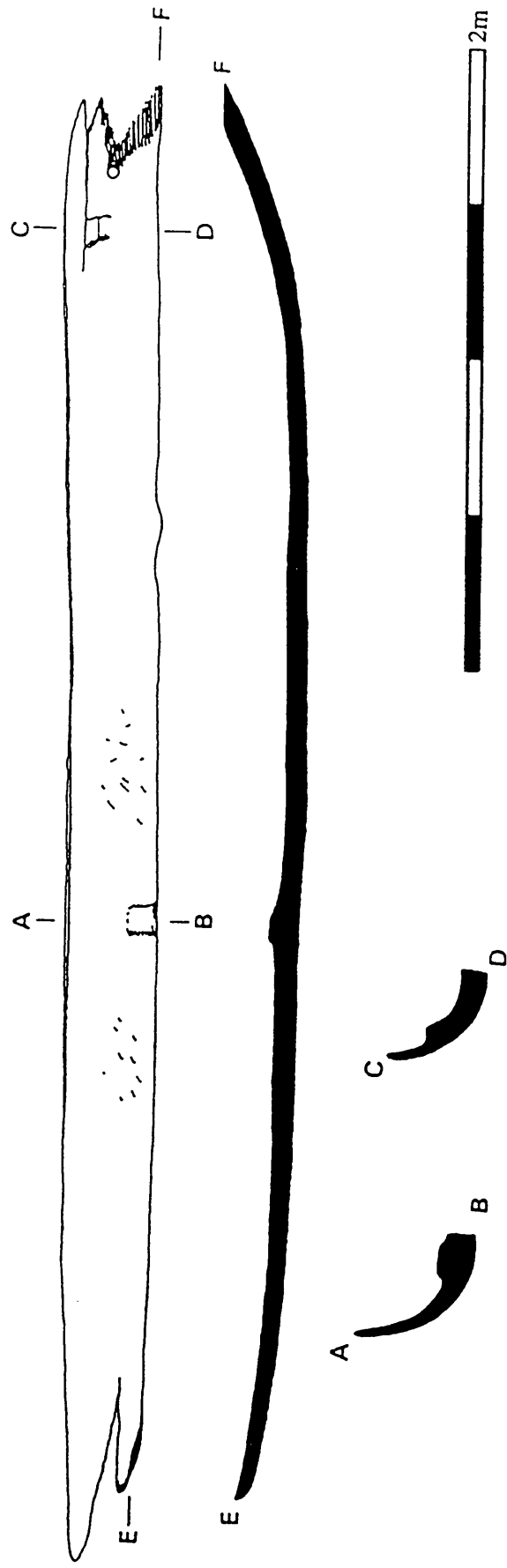


Figure 93: West Ward 4 (after Bourke)

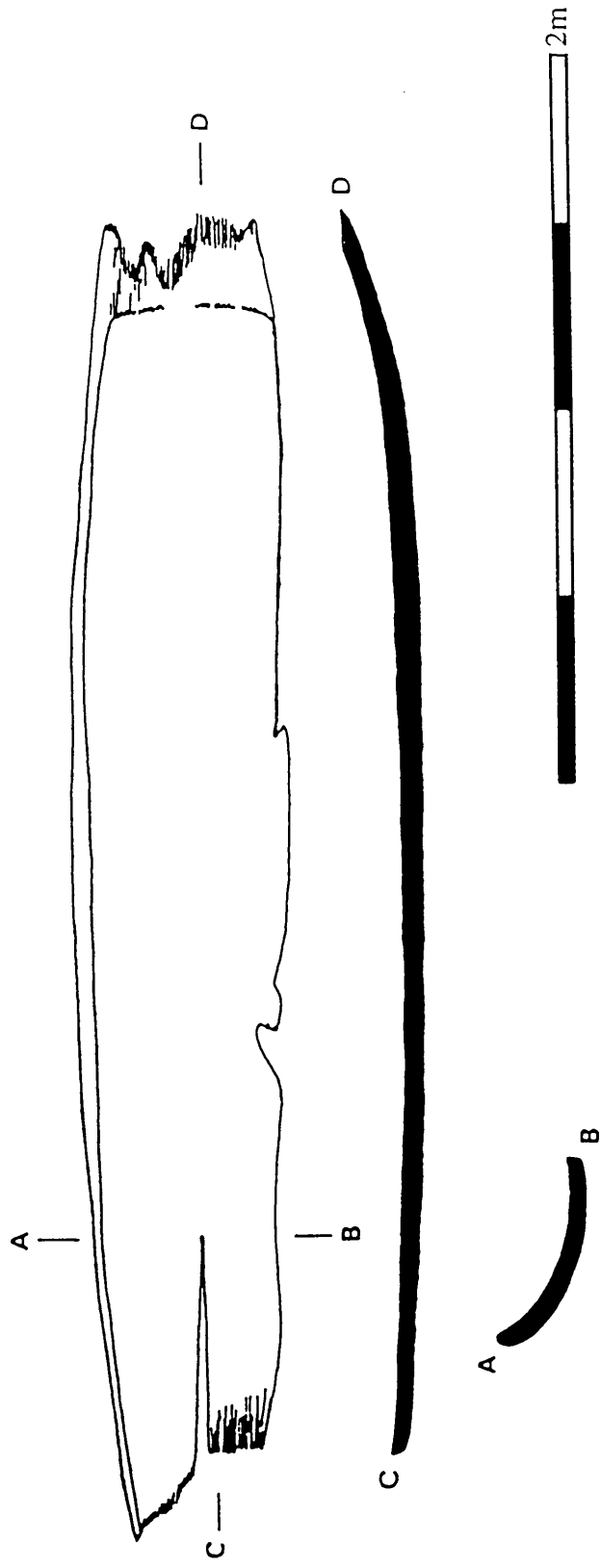


Figure 94: West Ward 5 (after Bourke)





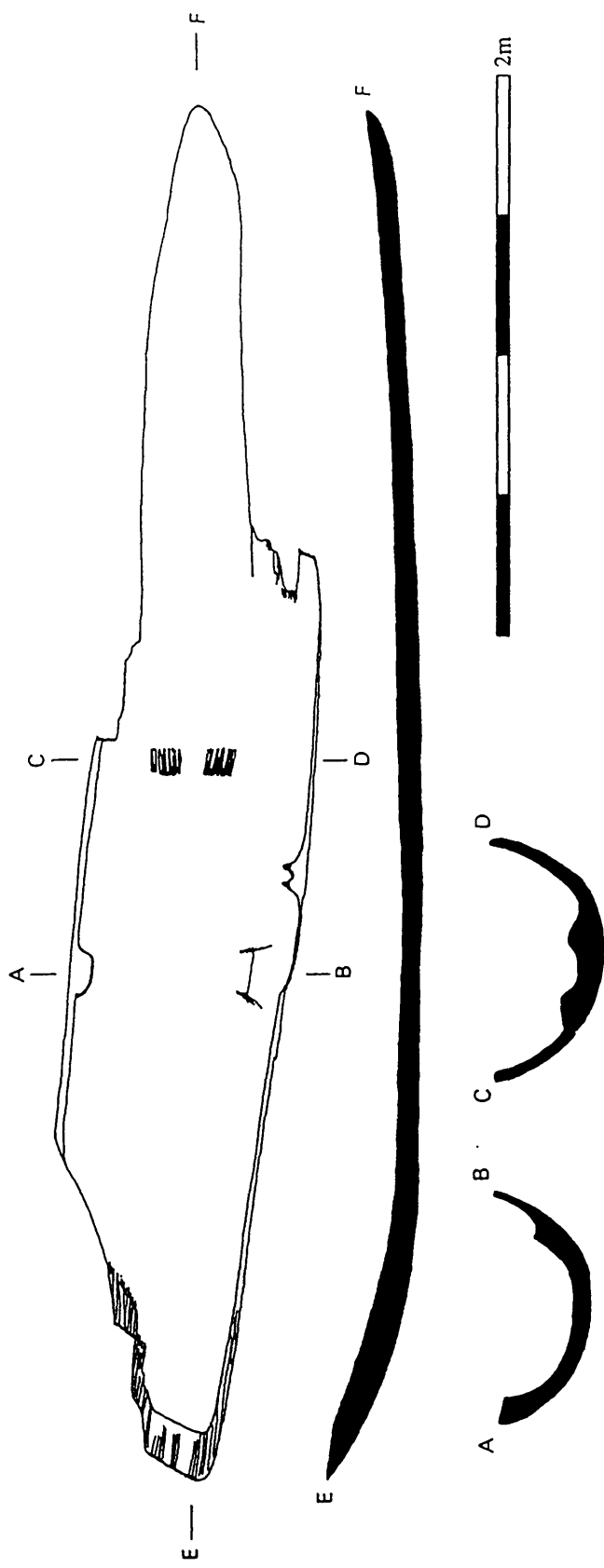


Figure 95: West Ward 6(after Bourke)

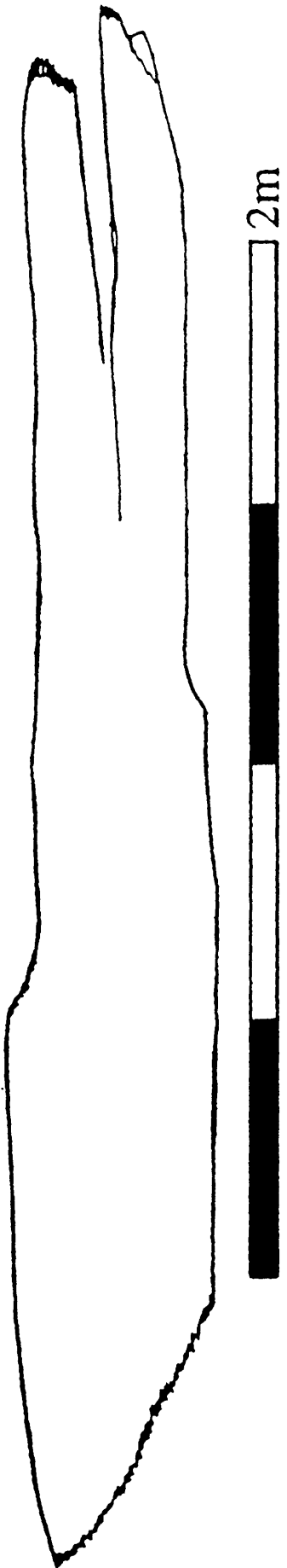


Figure 96: West Ward 7 (after Bourke)



| Length | Bow Width | Stern W | Bow W | Sides T |
|--------|-----------|---------|-------|---------|
| 3.82   | 0.78      | 0.50    | 0.15  | 0.03    |

A 24 x 3.5cm block was left proud of the floor 1.24m from the stern. It may have been a footrest or the remains of a strengthening rib. On the port side, a patch which covered a gap was secured by four trenails set through 2.5cm diameter horizontal holes. Two 3cm diameter holes were set horizontally into the stern. Between them, a crack had been repaired by a wooden patch secured by eight iron nails. The two holes may be associated with this repair.

**I401: Form: Tapered.** When found, on the shore near a crannog, this boat was damaged at one end. It was examined by Lucas (National Museum of Ireland) where it was registered 1955:76. The gunwales did not survive. In plan it tapered from amidships to either end. It no longer survives.

Dimensions (in metres):

| Length | Width | Floor T |
|--------|-------|---------|
| 5.13   | 0.99  | 0.04    |

Two footrests were left proud of the floor at 2.20 and 3.20m from the bow. They measured c.26 x 6cm and 2cm in height. A thickness-gauge was set 4.00m from the bow on the long axis. It measured 2cm, in diameter. The boat was repaired by a 26 x 10.5cm patch, 93cm from the bow on the port side. It was secured by four iron nails one of which had a 2cm diameter circular head and two 'were more like spikes'.

**I402: Form: Tapered.** Found on the east side of the crannog, the boat, after examination, was left *in situ*. It was 'almost completely covered by a peaty substance and vegetation'. The gunwales survived for only half of its length.

In plan, it tapered from one end to the other, and it was rectangular in cross-section. The bow was pointed in plan.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 7.70   | 0.70  |

The boat was repaired with a wooden patch at the turn of the bilge, 2.35m from the bow. The patch measured 1.65mx21cm. It was secured by trenails, of which two were *in situ*. Three pairs of footrests were noted at 3.65, 4.60 and 5.46m from the bow. They were set transversely with a 5 to 6cm gap between them.

**I403:** Found on the east shore of the lake near the crannog, this boat was examined by National Museum of Ireland personnel and left *in situ*. It was noted as a 'dugout canoe' with 'some plug holes'.

The lake, which measures approximately 800 x 400m, contains three crannogs (SMR No.005-

045; 046 and 058) which were first discovered in 1955, at the same time as the boats, when the lake level dropped. The crannog on which, or near which, the boats were found (005-058), had finds recovered from it during survey which indicate 'a Medieval date for at least a phase of its use'. I399, 400 and 402 are contemporary to it and were used by its inhabitants. Boats I401 and 403 were probably contemporary to that crannog, or one of the other crannogs which were not dated.

Four of the boats were repaired with the use of iron nails.

MacDowell, U. 1983 *Irish Logboats*, No.187-92; 'Topographical Files' *National Museum of Ireland*.

**Boat Number: I404**

**NGR: T 247 747**

**Boat Name: Yardland**

**OD: 5m**

**Townland: Yardland**

**Site: River Avoca**

**County: Wicklow**

A 'dugout canoe' was found by the south bank of the Avoca River in 1966, as a result of flooding. When found 'approximately half of its original length was present'. It was examined and drawn by O'Riordain in the finder's garden. Its fate was not noted and it probably no longer survives.

In plan, it was parallel-sided with an inclined end which had a duck-billed projection. In longitudinal-section it was flat-bottomed with a rounded end and was flat-bottomed with flared sides.

Dimensions (in metres):

| Length | Width (int) | Height (int) | Sides T | Floor |
|--------|-------------|--------------|---------|-------|
| 1.75   | 0.66        | 0.34         | 0.02    | 0.04  |

A 2.5cm diameter thickness-gauge was located in the floor.

'Topographical Files' *National Museum of Ireland*.

## APPENDIX 2

### ARTEFACTS PREVIOUSLY MISTAKEN AS LOGBOATS

**Name:** Ardagh  
**Townland:** Ardagh  
**County:** Monaghan

An 'oaken boat or trough, with handles' was found before 1845 in a bog. It was drawn by Shirley. Its fate is not known. Some doubt has been cast on it as a logboat by previous writers i.e. MacDowell, McGrail and Wood-Martin. It has been referred to variously as a trough or a chute for a horizontal mill. In view of the descriptions and the drawing, the writer favours the former.

It is parallel-sided in plan, with rectangular ends with two 'pole-like' projections at one end. In cross-section it is rounded, and flat-bottomed with 'solid' vertical ends in longitudinal-section.

Dimensions (in metres):

| Length | Width |
|--------|-------|
| 3.65   | 0.91  |

MacDowell, U. 1983 No.194; McGrail, S. 1978 1,68; 'Topographical Files' *National Museum of Ireland*; Seaby, WA. *Seaby Survey Files*; Shirley, EP. 1845 209, Fig.1; Wilde, WR. 1857 202-4; Wood-Martin, WG. 1886, 50

**Name:** Athlone 1-2  
**Townland:** Athlone  
**County:** Westmeath

The National Museum of Ireland's correspondence files refer to the discovery of 'two dug-out canoes' in the River Shannon by Athlone, by Mr Donal Boland, Tullamore, and other members of Athlone Sub-Aqua Club. However Mr Boland informed the writer that no dugout boats had ever been found by Athlone Sub-Aqua Club.

Boland, D. *pers. comm.* 1991; 'Correspondence Files' *National Museum of Ireland*, 1A/172/89

**Name:** Ballyhack

**Townland:** Ballyhack

**County:** Waterford

An artefact was described in the National Museum of Ireland's Topographical Files as a 'small logboat' recovered from Waterford Harbour through trawling. It was radiocarbon-dated to 3728±20 BP (UB-3492). However an examination by the writer determined that it was not a boat. Based on its overall form and the complexity of its features it would have been used as a base-plate for a composite structure, possibly as part of a fish weir (Gregory; forthcoming).

It was made from one-third of a knot-free log, which was tangentially split and at the time of examination consisted of two parts.

Dimensions (in metres):

| Length | Max Width | Min Width | Length of Piece 2 | Max Height | Min Height |
|--------|-----------|-----------|-------------------|------------|------------|
| 3.53   | 0.77      | 0.11      | 2.52              | 0.23       | 0.07       |

The object has been hollowed out from the narrow end for 3.18m where it rises in a near vertical face to a level surface 32cm wide, which continues on the wider end. In plan, this level area tapers along the side from which the piece was broken off, towards the narrow end for 59cm which terminates in a second near vertical face of 21cm in width. Between either face, the edge of the hollowed area is defined by a curved slope of c.45°. The edge of the opposing side has a 6cm wide flat border, from which the cross-sectional profile depicts a 30° downward slope into the artefact.

Several features indicate that this object was used in conjunction with a number of composite objects. A 2cm wide groove was originally cut to bisect the main timber and the broken-off piece for most of the main timber's length. On the 'flat surface' at the wider end there is an L-shaped groove. The longer part (34cm) runs across the grain. The shorter part (16cm) runs along the grain in the direction of the narrow end. Its average depth is 4cm. There are also at least fourteen deliberately drilled holes on the flat surface of 2.5cm in average diameter. Their depths vary from 3 to 7cm.

The existence of the longitudinal groove cut through the boat clearly shows that this was not intended to be a boat, since it would have immediately shipped water. In conjunction with the other features, it appears that this was intended to be a base-plate into which other composite parts were fitted.

Gregory, N. *'An Enigmatic Object from Waterford Harbour'*, *Archaeology Ireland*: forthcoming. Bray.



**Name:** Fermanagh

**County:** Fermanagh

'A fine Irish canoe, cut out of one block of an oak tree' was found before 1853 in County Fermanagh. It was put in the Isaac Glenny Collection, County Down. However it probably no longer survives.

The only description given is that it had curved sides and was in good condition.

Dimensions (in metres):

| Length | Width | Height (int) | Side Thickness | End Thickness |
|--------|-------|--------------|----------------|---------------|
| 2.06   | 0.38  | 0.41         | 0.06           | 0.10          |

It is very doubtful if this was a boat. Its narrowness and relatively excessive thickness to floor and sides would have made it an extremely unstable craft. It was probably a trough.

Gray, W. 1885: 162; MacDowell, U. 1983: No.127.

**Name:** Drummond

**Townland:** Drummond

**County:** Tyrone

A 'dug-out canoe' was found c.1901 at a depth of 3.60m in a lake near Thornhill. Its fate was not noted and probably no longer survives.

In plan it was parallel-sided with rounded ends and a rounded cross-section. Its longitudinal-section was flat-bottomed with rounded ends.

Dimensions (in metres):

| L    | W    | H(int) | Floor Thickness | Side Thickness |
|------|------|--------|-----------------|----------------|
| 2.00 | 1.09 | 0.49   | 0.15            | 0.15           |

At either end was a large external vertical ring which was made out of the solid. The entire 'boat' has an extremely cumbersome appearance to it. If it was used as a boat it could not have travelled significant distances. It is possible that it could have been towed behind another boat and carried cargo in the form of a 'slip'. However its very large width and thickness of the floor and sides would make it a very poor boat or slip. It would have spent much of the time wallowing on the surface of the water. If it had acted as a boat, its excessive thickness would not have enabled it to carry any significant load without swamping. It is more likely to have been a trough.

Latimer, W T. 1901: 298-9; MacDowell, U. No.254; Seaby, W A. No.18.

**Name:** Levallinree  
**Townland:** Levallinree  
**County:** Mayo

'Four dugout canoes' were found in *circa* 1983 on a crannog. However the description of one of them does not compare with that of a logboat. It is 'half pear-shaped' and made of 'white deal'.

Dimensions (in metres):

| Length | Maximum Width (ext) | Minimum Width (int) |
|--------|---------------------|---------------------|
| 1.5    | 0.60                | 0.35                |

Its length is very short for a boat, as is the variation in the widths of either end of that length. Its shape is not comparable to any recorded logboat, and no Irish logboat has been made from deal. It is much more likely this is some form of trough.

Lawless, C. O'Floinn, R. Baillie, M. and Brown, D. 1989: 22.

**Name** Muskerry  
**Townland:** East Muskerry  
**County:** Cork

An oak 'canoe' was found before 1897 c.1.5m 'below the surface of a mound consisting of the debris of an old cooking place' which had 'fragments of what may have been rude pottery'. It was examined and photographed by Gillman. Its fate was not noted, and probably no longer survives.

In plan, it tapered from a rectangular end to the other end, which was squared. Its cross-section was rounded and in longitudinal-section both ends were inclined upwards.

Dimensions (in metres):

| Length (ext) | Length(int) | Width | Floor & Side Thickness | Stern Width |
|--------------|-------------|-------|------------------------|-------------|
| 4.88         | 3.35        | 0.70  | 0.10                   | 0.73        |

There were 'handles for lifting the boat' with orifices under them, through which a mooring rope might be passed.

MacDowell suggests that the 'handles would add some doubt...as any such projections from the side would be a poor design...causing resistance in the water'. The wide sides were unusually thick for a boat. The difference between the external and internal lengths (over 1.3m) was very large. The impression created is of a boat that would have had an unusually large displacement in the water and consequently a low freeboard. Dugout boats are constructed with the least amount of unnecessary wood remaining. The site itself is that of a fulacht fiadh, and no remains of a previous lake were noted. 'Water' had worn 'a passage some fifty feet or more deep'

nearby. This would suggest the location of a stream or river for the fulacht fiadh, and by no means navigable for a logboat. This object was in all probability a trough for the fulacht fiadh. Gillman, H W. 1897: 385-6; MacDowell, U. 1983: No.71; 'Miscellanea', 1897: 431: 'Topographical Files' *National Museum of Ireland*.

**Name:** Moore Lodge

**Townland:** Moore Lodge

**County:** Antrim

An 'alder coracle' was found in 1918 under 1.8m of bog. It was sent to Belfast Art Museum where it no longer survives. It was examined and drawn by Seaby in the 1960s.

In plan it tapered from one end to the other, both of which were rounded. It was flat-bottomed with rounded ends in longitudinal-section and was rounded in cross-section.

Dimensions (in metres):

| Length | Width (ext) | Width(int) | Height (ext) | Height (int) |
|--------|-------------|------------|--------------|--------------|
| 1.44   | 0.46        | 0.25       | 0.48         | 0.41         |

Seaby noted a 'flat flange or rim had been carved round the edge'. Also 'keel-like projections...ran vertically from the rim to a point' 25cm below it. 3.8cm diameter holes were set horizontally through these projections.

MacDowell suggests this was more likely to be 'some kind of tub/trough' because of its 'small size'. Its excessive floor and side thickness would suggest it is a trough, definitely not a boat.

MacDowell, U. 1983: No.3, fig 24; 'Topographical Files' *National Museum of Ireland*; Seaby, WA. *Seaby Survey Files*, No.23.

**Name:** Pembroke

**Townland:** Pembroke

**County:** Cork

An elm 'dug-out canoe' was found in 1965 on Lough Mahon shore. It was registered in the National Museum of Ireland (1965:6) where it no longer survives. It was examined and drawn by O'Kelly, who expressed doubts as to it being a dugout boat.

In plan it tapered from its mid-point to pointed ends. In longitudinal-section, it was flat-bottomed with one vertical end and the other end was 'either rounded or rectangular'. Its cross-section was flared.

Dimensions (in metres):

| Length (ext) | Length (int) | Width (ext) | Width (int) | Height (int) |
|--------------|--------------|-------------|-------------|--------------|
| 1.70         | 1.48         | 0.45        | 0.30        | 0.38         |

The object has extremely thick ends and sides, accompanied by an unusual shape. The species of wood has been previously recorded in Irish or European logboats. The only evidence to suggest this was a boat is its location on a lakeshore. It was not a boat, probably was a trough.  
MacDowell, U. 1983: No.72; 'Topographical Files' *National Museum of Ireland*.

**Name:** Scallon  
**Townland:** Scallon  
**County:** Fermanagh

An oak 'dug-out' boat was found during turf cutting in 1910. Its description is reminiscent of a trough or chute for a horizontal mill. MacDowell notes that it probably no longer survives. However, it has been recently radiocarbon-dated to 305±30 B.P. (GrN-14744) by Brindley and Lanting (Art Biologisch- Archaeologisch Instituut, Groningen). Its present location is not known. Seaby also doubted its authenticity as a boat.

It was noted as flat-bottomed, with 'sides slightly rounded' and the ends were 'almost square'.

Dimensions (in metres):

| Length | Width | Height (int) |
|--------|-------|--------------|
| 1.68   | 0.76  | 0.76         |

Beacon, noted external 'handles' set 'about 9 inches' from the bottom of the boat 'with 1 inch diameter' holes in them.

Handles at such location would interfere with a boat's performance as would square and vertical ends. The 'handles' with holes were probably used as a means of mounting it to some other fixture such as a horizontal wheel mill.

Beacon, E. 1910: 249; MacDowell, U. 1983: No.124; Seaby, WA. *Seaby Survey Files*: No.11

**Name:** Teerona  
**Townland:** Teerona  
**County:** Clare

An oak 'dug-out canoe' was found in 1988 to the east of Lough Cullanyheeda's or Lake Cullane's shore. It was examined and drawn by Cahill (National Museum of Ireland). In February 1993, it was undergoing conservation and was inaccessible to examination. It is located at the Craggaunowen Project, Sixmilebridge, and was radiocarbon-dated to *circa* 1550BC (GrN-15968) by Brindley and Lanting (Biologisch Archaeologisch Instituut, Groningen). It was made from a half log.

In plan, it is parallel-sided with rounded ends and is rounded in cross-section.

Dimensions (in metres):

| Length<br>(ext) | Length<br>(int) | Width | Height<br>(int) | Floor T | Side T | End T |
|-----------------|-----------------|-------|-----------------|---------|--------|-------|
| 5.53            | 3.70            | 1.01  | 0.30            | 0.18    | 0.76   | 0.90  |

The 'canoe' was 're-used as the trough of a fulacht fiadh'. It contained 'the remains of fine cracked stone, burnt soil and bones'.

The object probably was not a boat, since its bottom, sides and ends are unusually thick for a boat. Logboats require as much excess wood as possible to be removed to provide effective manoeuvrability and freeboard. Unfortunately the object was inaccessible to examination at the time of survey.

O'Connell, L, *Craggaunowen Project: pers. comm.*; 'Correspondence Files' *National Museum of Ireland*, 1A/152/88.

### APPENDIX 3

#### CATALOGUE OF SCOTTISH LOGBOATS EXAMINED

**Boat Name:** Cambuskenneth: **Form:** Canoe  
**District:** Stirling  
**Region:** Central  
**Survey Date:** 15/7/92

The remains consist of a flat bottom, part of the sides on both quarters and indications of the bow and stern by an upturn of the floor at both ends. The port quarter is a separate piece which has warped out of its original shape, with a length of 1.37m, maximum width of 27cm and thickness of 2cm. The centre of the floor has been raised along its length, as a process of drying-out which has resulted in a series of cracks along its length. The chine survives on both sides indicating the survival of the entire width of the dugout boat's floor. On the basis of its angle, the sides rose vertically.

It is parallel-sided for most of its length, but tapers slightly to the bow for c.1m, which appears to have been pointed as suggested by both the taper of the floor and the slight upturn of the hull. The shape of the stern was rounded or a rounded point in plan.

The boat appears to have been made from a half-log. The pattern of radial splitting in the stern has increased its original width by c.10cm. Overall length is 5.92m, the width varies from 1m at 59cm from the bow to 81cm at the stern which originally would have been c.71cm, with an overall average of 69cm. The boat's maximum surviving internal height is 24cm on the starboard quarter and 2 to 2.5cm thick. The floor is 5 to 5.5cm thick. There are four large knotholes in the floor located in the bow-most half of the boat, of which their angle through the timber indicates that the stern was the root end of the tree.

Nineteen circular holes are set through the floor at ninety degrees to the timber. All are c.2cm in diameter and 5 to 5.5cm deep. Ten of them form a central line along the floor while the remaining nine are set in two opposing lines along the sides at the upturn of the floor. Some of them remain as semi-circles where the remainder has been eroded away. Their location and shape are as follows:

| Number | Metres from Stern | Metres from Port | Metres from Starboard | Shape    |
|--------|-------------------|------------------|-----------------------|----------|
| 1      | .44               | .33              | .31                   | Circular |
| 2      | 1.12              | .40              | .28                   | Circular |
| 3      | 1.61              | .33              | .28                   | Circular |

| Number | Metres from Stern | Metres from Port | Metres from Starboard | Shape      |
|--------|-------------------|------------------|-----------------------|------------|
| 4      | 2.18              | .33              | .32                   | Circular   |
| 5      | 2.69              | .33              | .34                   | Circular   |
| 6      | 3.24              | .33              | .29                   | Circular   |
| 7      | 3.71              | .33              | .30                   | Circular   |
| 8      | 4.23              | .29              | .35                   | Circular   |
| 9      | 4.28              | .31              | .25                   | Circular   |
| 10     | 5.37              | .19              | .20                   | Circular   |
| 11     | .55               | ----             | 0                     | Circular   |
| 12     | .55               | 0                | ---                   | Circular   |
| 13     | 1.25              | ---              | 0                     | Circular   |
| 14     | 1.26              | 0                | ---                   | Circular   |
| 15     | 2.90              | ---              | 0                     | Circular   |
| 16     | 2.90              | 0                | ---                   | Circular   |
| 17     | 3.71              | ---              | 0                     | Semicircle |
| 18     | 4.21              | 0                | ---                   | Semicircle |
| 19     | 4.33              | ---              | 0                     | Semicircle |

The first set of ten holes located along the central axis of the floor probably served the purpose of thickness gauges, while the most plausible use of the opposing pairs is for dowels to hold fitted ribs in place.

**Boat Name:** Closeburn:

**Form:** Dissimilar-ended

**District:** Nithsdale

**Region:** Dumfries and Galloway

**Survey Date:** 30/10/92

In poor condition, most of the oak boat's starboard side no longer remains. The timber is quite warped through drying which has led to distortion of the hull. Part of the bottom along the starboard side at the

stern has not survived. The timber is quite knotted throughout its entire length and indicates that the stern was the root end of the tree.

The boat is flat-bottomed both internally and externally, from which the parallel sides rise vertically and is finished with a slight tumblehome as it approaches the gunwales. Both internally and externally the bow section is rounded on all three planes taking-up c.34cm of the boat's length. The stern consisted of a sternboard whose groove is the sole remains. It is situated at 4 to 5cm. From the stern, square-sectioned, 2.5cm wide and 3cm in maximum depth. It survives to the full height of the port side.

The boat's respective external and internal lengths and widths from the highest points are; 3.48m, 3.32m, c.56cm and c.52cm. The bottom is c.8cm thick and the sides are c.5cm from which they taper up to c.2cm at the highest surviving point on the starboard gunwale. The respective external and internal heights of the side at this point are c.50cm and c.42cm.

Internally in the bow section there are tool marks both on the port and starboard sides. On the port side, an axe being swung towards the stern at angle of 45° to the grain of the wood made them. Their measurements would suggest a blade signature length of c.8cm. The five smaller marks on the starboard side follow the grain of the wood more closely, again towards the stern. The average blade signature lengths appear to have been c.6cm. Because of the deeper angle into the wood, an adze possibly made them. The purpose of the marks on both sides was a finishing process of internally thinning the sides.

Ten holes pierce the boat, six of them are in three sets of two across the floor, which were drilled for radiocarbon sampling. The stern-most four are plugged flush with floor. The remaining four holes are in two roughly opposing pairs through either side of the bow. Their location, shape and dimensions are as follows;

| Hole | Metres from Stern | Metres from Port | Metres from Bow | Metres above Floor | Shape  | Dimension -s |
|------|-------------------|------------------|-----------------|--------------------|--------|--------------|
| 1    | 0.71              | 0.08             | ----            | ----               | circle | 1.5cm        |
| 2    | 0.71              | 0.36             | ----            | ----               | circle | 1.5cm        |
| 3    | 1.72              | 0.07             | ----            | ----               | circle | 1.5cm        |
| 4    | 1.72              | 0.36             | ----            | ----               | circle | 1.5cm        |
| 5    | 2.94              | 0.06             | ----            | ----               | circle | 1.5cm        |
| 6    | 2.94              | 0.32             | ----            | ----               | circle | 1.5cm        |
| 7*   | ----              | ----             | 0.21            | 0.17               | oval   | 4x2.5        |
| 8*   | ----              | ----             | 0.34            | 0.06               | oval   | 5.5 x 3.5    |



| Hole | Metres from Stern | Metres from Port | Metres from Bow | Metres above Floor | Shape | Dimension -s |
|------|-------------------|------------------|-----------------|--------------------|-------|--------------|
| 9*   | ----              | ----             | 0.28            | 0.14               | oval  | 3.5 x 2.5    |
| 10*  | ----              | ----             | 0.29            | 0.09               | oval  | 5x3.5        |

\* Holes 7 to 8 are located on port and 9 to 10 on starboard.

A possible function of the holes in the bow is that of retaining a seat with a possible backrest, but this is by no means conclusive.

**Boat Name:** Craigsglen: **Form:** Canoe  
**District:** Banff and Buchan  
**Region:** Grampian  
**Survey Date:** 3/7/92

The dugout boat consists of two lengths of oak, both of which are end pieces with the mid-section missing. The timber is in poor condition suffering from cracks along the grain with a split in the stern.

The probable bow, which is the longest section, is 1.46m long by 48cm wide. Incorporating part of the floor and the side, the respective thicknesses are 5 and 2cm. It tapers to a straight end. Like the stern section this piece is rounded in cross-section both internally and externally while in elevation it is flat-bottomed. Originally square in shape, a hole located in the port bow is now U-shaped as one side of it has worn away. It is 13cm long, 7cm wide and 16cm deep. The bow itself is 21.5cm thick, 14 and 21cm in respective internal and external heights. At 53cm from the bow a rib has been carved in the solid which is 12cm wide and 5.5cm high. It extends across the boat for its surviving width.

The stern section consists of the floor and the stern itself. 1.18m long and 52cm wide, the 8cm wide split increases its width to 60cm. Both internally and externally the stern rises vertically for an internal height of 20cm. Including a duckbill projection of 10cm in length, the thickness of the stern is 29cm. Part of the starboard side survives for a length of 70cm. It is 2.5cm thick rising internally to a height 20cm. At the junction of the stern and the duckbill projection is a circular hole of 7cm in diameter and 7.5cm in depth. It was drilled from the bottom of the boat and would originally not have penetrated the wood. It could possibly have served as mooring hole, which is also the most likely purpose of the hole in the bow. Tool marks are visible on the floor at the junction of the stern. Due to their poor condition nothing could be determined about them.

The boat appears to have been parallel-sided. Neither the bow nor the stern survive to their original height.

**Boat Name:** Dalmarnock: **Form:** Tapered  
**District:** Banff and Buchan  
**Region:** Grampian  
**Survey Date:** 6/8/92

The dugout boat found in May 1975 during the construction of the A9 route to the south of Dalguise village is presently located half-way along the western shore of the Mill Dam loch, on the Atholl Estates north of Dunkeld (Grid Ref. NO 031 465).

Lying perpendicular to the shore, half of the boat is presently out of the water due to a fall in the loch's water level. Consisting of the bottom, the rounded ends survive in plan and the part above water has a very flaky surface. There is little splitting and no signs of warping. Several small knots are located throughout the timber, but they give no indication as to the root end of the tree. In plan the boat tapers from the wider end which is most probably the stern, to the bow which is under water. The bottom curves up to the chine, which survives on both sides. Overall surviving length is 4.47m, maximum width at 1.30m from the stern is 79cm and the thickness of the floor varies from 4.5 to 5cm. A circular hole set vertically through the floor on the longitudinal axis and 27cm from the stern, is 3cm in diameter and 5cm deep. It probably served the purpose of a thickness gauge.

Two small portions of the boat were cut off for sampling, the first of which is 84cm from the stern is square in shape measuring 19.5cm by 19cm, while the second sample was taken from the port side 88cm from the stern. It measures 11 by 6cm.

**Boat Name:** Dumbuck **Form:** Dissimilar-ended  
**District:** Dumbarton  
**Region:** Strathclyde  
**Survey Date:** 31/7/92

In extremely poor condition, this dugout boat is mounted on a wall at a height of approximately 3.5m above the floor. The surface of the oak timber is extremely flaky and has suffered from slight warping. The bow most half of the boat does not survive to its full width, while between 4.50m and the stern a large number of splits occur, the longest of which is 4.50m. The stern itself is composed of at least four large fragments, but due to the split nature of the wood this is difficult to determine. The stern most half has surviving chines, which extend into the worn-down flared sides.

In plan the boat tapers from the stern to a pointed bow on all three planes. Due to the fragmentary nature of the stern it is impossible to determine the nature of this end accurately. It most probably was straight-ended with the possibility of the having a sternboard. At c.5m from the bow, there is a knothole through

the base of the port side, from which can be determined that the stern was the root end of the tree. The overall length is 9.72m, maximum surviving width is 88cm at 5.92cm from the stern. At the same distance from the stern the highest surviving side is 14cm internally and c.22cm externally. The thickness of the bottom is c.8cm and 6cm for the side.

Several oval holes are situated on the floor, of which not all penetrate the floor. Their location, size and other details are as follows:

| Hole Number | Metres from Bow | Metres from Starboard (S) or Port (P) | Dimensions | Pierces the floor; |
|-------------|-----------------|---------------------------------------|------------|--------------------|
| 1           | 2.54            | S .09                                 | 5x3cm      | ✓                  |
| 2           | 2.54            | P .08                                 | 7x4cm      | ✓                  |
| 3           | 2.97            | S .05                                 | 4x2.5cm    |                    |
| 4           | 4.18            | S .075                                | 4.5x2.5cm  |                    |
| 5           | 4.57            | S .185                                | 8x5cm      | ✓                  |
| 6           | 4.57            | P .185                                | 8.4x4.5cm  | ✓                  |
| 7           | 5.92            | P .16                                 | 5x3.5cm    | ✓                  |
| 8           | 6.63            | S .17                                 | 6.5x5cm    | ✓                  |
| 9           | 6.63            | P .155                                | 5x3cm      | ✓                  |

Their most likely purpose is that of fitted ribs dowelled into place as there appear to be possible indentation lines across the grain in to places corresponding to the holes. However this is very difficult to ascertain due to the flaky nature of the wood. They would originally have been circular, but have developed an oval shape through warping.

**Boat Name:** Eadarloch

**Form:** Punt

**District:** Lochaber

**Region:** Highland

**Survey Date:** 14/7/92

The boat consists of a 4.75m long and 64cm wide flat length of oak. The full extent of the floor is present since the chine remains on all edges. There is also a vague depiction of the form of both the bow and stern. The wood has several cracks along the grain, while the centre for its entire length has a raised profile as a result of warping. It is roughly parallel-sided in plan with a slight taper towards the bow, which is 53cm wide. Several small knots and one large knot hole of 4.5cm in diameter and 4cm in depth

is located 1.54m from the stern and 24.5cm from port. The angle of the knots through the timber indicates that the stern was the root end of the tree. At 2.23m from the stern and 16.5cm from port, there is a large ragged hole through the floor of 36 by 12cm, which has a crack running from it to the stern.

The bow appears to have risen at an angle from the flat bottom to a flat or blunt end in plan. As indicated by the chine, the sides were vertical. Although accessibility to the stern made examination difficult, it appears to have been similar in form to that of the bow. The boat varies in thickness from 2 to 5cm throughout its entire length.

A keelson of 6.5cm in maximum width and 3.3cm in maximum height is located centrally along the bottom for the boat's length. Its average width and height is 5.3 and 2.7cm respectively. Originally rectangular in section, its edges have become rounded through wear. A pair of footrests is located 2.82m from the bow. While the starboard one of which a stump remains is inaccessible to further examination, the other footrest located 18cm from port measures 13.5 by 11cm and 4.5cm high. It is sub-rectangular or oval in shape.

**Boat Name:** Errol 2

**Form:** Dissimilar-ended

**District:** Perth and Kinross

**Region:** Tayside

**Survey Date:** 29/6/92

This flat-bottomed oak dugout boat is in poor condition with the starboard side missing for the stern most quarter of the boat's length, while part of the port side does not survive. The parallel sides flare slightly from the floor. The pointed bow rises from the bottom and the stern with its ragged end held a sternboard, which no longer survives.

The boat is centrally split from stern to bow, with a second split along the junction of the starboard side and the floor starting at c.75cm from the bow and continuing for the remainder of the side. The surface of the timber is worn giving it a wave-like appearance. This is especially so around its numerous knots and knot holes, none of which give any indication as to the root end of the tree. The pith of the log is visible in the bow indicating the use of a whole log. The boat is held together on its display unit by several iron bands bolted to it.

Overall length is 8.64m, and width is 1.20m, which tapers to the pointed bow. Respective internal and external heights are 30 and 50cm. In thickness the bottom varies between 9 and 12cm, of which it originally would have had a more uniform thickness of c.12cm. The sides are 8cm thick. The worn-down sternboard groove is rectangular in section lasting for the surviving width of the boat, c.9cm wide and 3.5cm in depth.

At least eight tool marks are located on the floor in an area between 1 and 1.20m from the bow. Possibly made by an adze, their average blade width appears to be 3cm. The slight convex marks are at right angles to the grain of the wood.

Seven sets of modern holes of c.2cm diameter have been drilled into the floor and sides. Through these, iron bolts had been inserted and attached to iron bands to support the boat. This can be seen by the perfectly square shape of several of them, their unworn appearance relative to the remainder of the boat and the impression of the bolts in the wood. Their location and number of each set are as follows:

| Number of Set | Number of Holes | Metres from Bow |
|---------------|-----------------|-----------------|
| 1             | 5               | 2.30            |
| 2             | 5               | 4.15            |
| 3             | 5               | 4.60            |
| 4             | 4               | 4.85            |
| 5             | 1               | 5.15            |
| 6             | 6               | 7.75            |
| 7             | 2               | c.8             |

Between 4.15 and 4.60m from the bow, thirty-three small circular holes of varying diameters pierce the starboard side on either side of a diagonal split for the side's full height. Due to the nature of the display unit they were inaccessible to examination, but appeared to be 1cm and less in diameter. While there was no apparent order to them, sixteen of them are located on the bow side of the split with the remainder on the stern side. Their purpose was to repair the split by stitching the side together.

**Boat Name:** Forfar 2

**Form:** Dissimilar-ended

**District:** Perth and Kinross

**Region:** Tayside

**Survey Date:** 2/7/92

In extremely poor condition, the oak boat has split into three lengths and a fourth part from the starboard side which is reported to have been cut off by a spade when the boat was found. It has distorted from its original shape through warping, and the timber is much eroded along the grain. Parts of both ends remain, giving an indication of their original form. The timber itself is extremely knotted, but they can not determine the root end of the tree.

In plan the boat is parallel-sided with a rounded cross-section both internally and externally. Its elevation is that of a flat bottom curving up to a rounded bow, while externally it rose vertically to a flat or blunt stern. Internally the floor was terminated by the sharp incline of the stern.

Maximum surviving length is 2.65cm, width as an aggregate of all four sections is c.60cm. The internal height of the sides survive to a maximum of c.30cm, the floor is 9 to 10cm thick, while the sides vary

between 3 and 5cm. An insufficient amount of the bow remains to examine, but the stern is 27cm thick, 16cm in internal height and 22cm in maximum surviving external height.

The section cut from the starboard side measures 32 by 14 by 4cm. A knothole through the piece of wood could be mistaken as man-made due to the regularity of its shape. The 3 remaining pieces consist of part of the starboard side, floor, stern and bow. The central piece is of the floor and part of the bow and stern. The port side and floor make up the remaining section.

**Boat Name:** Glasgow, Hutcheson Bridge                      **Form:** Tapered  
**District:** City of Glasgow  
**Region:** Strathclyde  
**Survey Date:** 28/8/92

Made of oak, this 2.6m long dugout boat is in very poor condition. Splitting occurs along the junction of the floor and the starboard side for the boats entire length, as with the port side at about halfway up its side. The floor along its longitudinal axis is also split from the stern for a length of 95cm. The exterior of the port side is badly flaked. As it is on display, both the exterior of the starboard side and the bottom were unable to be examined. A series of iron bands and right-angle brackets hold the boat intact and the sternboard is a recent insertion for display purposes. The bow does not survive to its full extent and the sides taper in height from the stern down to the bow. Several knots also occur on the floor of which their angle through the timber indicates that the stern was the root end of the tree.

The boat's sides flare out from a flat bottom. In plan it tapers from the stern to the bow. The maximum width at the stern is 59cm and at floor level it is 44cm, while the respective widths at 30cm from the bow are 45 and 33cm. The bow survives as an upturn from the bottom, which is rounded on all three planes. At c.4cm from the stern, the modern sternboard is situated in a groove of c.2cm in width and c.5cm deep. The sides appear to survive to their original height at the stern of c.32cm. Their thickness at the junction of the floor is 4cm from where they taper to 1cm at the gunwales. The thickness of the floor is c.4cm. At 13.5cm from the stern and situated on the starboard side at a height of 23cm from the floor is an oval-shaped hole which pierces the wood at right angles to the side. It measures 3 by 2.5cm and 3cm deep. Originally it was probably circular but shrinkage of the wood could have caused its present shape. Due to its proximity to the sternboard groove, it may have served to secure the sternboard in some manner.

Several tool marks are situated both in the port bow and the starboard quarter. The bow marks are c.25cm from the bow and within 10cm from port. Their width appears to be c.4cm and the tool was swung along the grain towards the bow. From the angle and the location of the mark, it appears to have been made by an adze, which would have been used, in the finishing process of the boat's manufacture. The stern marks of which there are five, are situated internally on the starboard side at c.40cm from stern and c.10cm from the floor. They are c.6cm wide and the tool that made them was swung parallel to the side so that the

marks are at an angle of 45° to the grain of the wood. They were most likely made by an axe, which was used in the finishing process of the boat's manufacture.

**Boat Name:** Glasgow, Rutherglen Bridge                      **Form:** Punt  
**District:** City of Glasgow  
**Region:** Strathclyde  
**Survey Date:** 30/7/92

At the date of examination this dugout boat was found to be extremely inaccessible, where it is in storage on a shelf.

In poor condition, the floor has warped upwards across the grain amidships, while neither the bow nor the stern survive to their full extent. The wood of both ends is cracked and only the port and starboard chines remain, except for a small length on either side, which survives to an internal height of 6cm. The knot-free log and straightness of the grain suggest that this is from either a plantation or a forest.

The boat is flat-bottomed and parallel-sided with a slight flare to the sides. The bow is rounded point in shape and the stern is blunt or straight-ended rising vertically both internally and externally from the bottom. Its overall length is 3.63m, maximum surviving width is 62cm at the bow, thickness of the floor is c.5cm and varies from 3 to 1cm from the base to the highest point of the sides. The bow is 22cm thick and 10.5 and 22.5cm in respective internal and external heights while the thickness of the stern is 23.5cm and 4.5 and 11.5cm in height.

Pair of footrests in the form of two rectangular-shaped hollows are situated in the floor 6cm from either side and 1m from the stern. They measure 10.5 by 8cm and 2cm deep.

**Boat Name:** Glasgow, Springfield 1                              **Form:** Dissimilar-ended  
**District:** City of Glasgow  
**Region:** Strathclyde  
**Survey Date:** 30/10/92

Now in storage in the National Museum of Scotland, the dugout boat's surface is very flaky. It is in poor condition with the stern most half of the starboard side and the port quarter no longer survives. Part of the bottom along the starboard side is also missing. Two splits occur centrally along the floor, one in the bow half and the other in the stern. The stern section is also held together by an iron band.

Its vertical sides rise from a flat floor and bottom and are roughly parallel-sided. The bow section is pointed both internally and externally on all three planes and begins at 35cm from the bow. The stern terminates in a stern-board groove at c.8cm from the stern. It is situated on the midpoint of a raised area which starts c.19cm from the stern. It is c.3cm high and covers the width of the boat. The groove itself is in extremely poor condition due to the flaky nature of the wood on a series of small cracks along the

grain. It originally had a square-sectioned shape which is now quite worn. The width of the groove is now c.6cm and 2 to 3cm deep.

A number of possible tool marks were visible in the floor, but nothing could be determined about them due to the poor condition of the wood.

The boat's overall length is 3.15m, c.55cm wide at the stern and c.47 towards the bow. The greater width of the stern section could be due to warping. The bottom and the base of the sides are 5cm thick while the sides taper to 2cm at their highest point. Respective maximum internal and external heights are 25 and 30cm.

**Boat Name:** Glasgow, Springfield 2                      **Form:** Tapered  
**District:** City of Glasgow  
**Region:** Strathclyde  
**Survey Date:** 22/7/92

The bottom, part of the port side and part of the bow constitute the remains of this dugout boat. The timber is knot-free which would suggest the tree came from a plantation or forest. On the basis of the remains of the port side, the sides flared slightly from the flat bottom and floor, which tapers from the stern to a pointed bow. The stern is enclosed by a sternboard groove. The bottom does not survive to its original width. The floor rises up to the sternboard groove on either side thereby increasing the floor's thickness from 5 to 9cm along the central axis, which in turn increases to towards the sides. On the basis of this, the boat's original maximum width would have been c.1.10m, while it is presently 80cm. Originally the average width was c.85cm where the starboard chine is visible amidships. The overall length is 5.56m and the port side survives for a length of 4.73m from the stern, with respective internal and external heights of 24 and 33cm and c.5cm in thickness. While the bow's sides are missing, it is a rounded point in plan. Also rounded point in plan is a projecting keelson, 8.5 by 7.5cm at the top of the bow tapering to the bottom of the bow. The bow itself is 50cm thick, 30cm in internal height and 40cm in maximum surviving width.

The sternboard groove is located 21cm from the end, 4cm wide, 62cm long, where it fades into the port side at 8cm above the floor. It is rectangular sectioned in which the remains of axe marks can be seen in its base.

Two holes which were probably used as thickness-gauges are located in the floor at 1.25 and 2.78m from the stern. Now slightly oval in shape through warping they would originally have been circular. Their respective dimensions are 3 by 2cm and 3 by 2.5cm. The second hole is plugged with what appears to an oak dowel.



**Boat Name:** Glasgow, Springfield 5

**Form:** Dissimilar-ended

**District:** City of Glasgow

**Region:** Strathclyde

**Survey Date:** 30/7/92

On a shelf in the museum store, the boat has been bolted to its cradle. Examination of a large portion of the boat was made impossible due to large objects being stored on the boat. Made of oak, it is in poor condition. While the chine on both sides remain, very little of the sides themselves survive giving a maximum internal and external height of 9.5cm and 14.5cm respectively. Both the bow and stern are alike with the stern being the wider end. They both incline up from the flat-bottom and in plan taper slightly from the parallel sides so that the flare of the sides disappears. Length of the boat is 3.60m surviving width is 55cm, which originally could have been up to 65cm on the basis of the angle of the sides if they were 25 to 30cm high. The width of the stern is 51cm and c.43cm for that of the bow. In thickness the floor is 5cm and the sides are 3cm.

**Boat Name:** Kilbrinie Loch 3

**Form:** Tapered

**District:** Cunninghame

**Region:** Strathclyde

**Survey Date:** 30/7/92

In storage on a shelf in the museum, its accessibility was quite difficult at the date of examination. It is in a very poor condition with oak surface both flaked and cracked. It does not survive to its full extent. Both ends are damaged with a large split along the junction of the floor and side at the narrow end. Approximately 75cm from the narrow end there is a knot hole in the floor measuring 5 by 4cm. Both ends are internally and externally rounded on all three planes of which the narrow one probably is the bow. The parallel-sided boat has a rounded cross-section. Most of the sides appear to have survived to their full height except for parts of the port side. There are several small knots in the hull. Its overall length is 3.08m, 71cm amidships in width, internal and external heights of the sides are 23 and 27cm respectively, bottom thickness is 4cm and the sides vary from 2 to 3cm.

On the starboard gunwale and c.1.25m from the stern is a thwart support in the form of a 21cm long and 18cm wide internal thickening of the side of 2cm. 6cm into this raised area from either end of it, there is a rectangular indentation of 2cm in depth and 9 by 8cm in area. This indentation was the receptacle for the thwart. At 75cm and 1m from the stern on the same side and 3.5cm below the gunwale are two rectangular holes measuring 3.5 by 2cm and 3.5cm deep. It is quite possible that they held some form of laterally fitted oar support. Two iron bolts through the floor hold the boat to its wooden cradle.

**Boat Name:** Knaven  
**District:** Banff and Buchan  
**Region:** Grampian  
**Survey Date:** 20/8/92

'In 1850 a logboat was discovered during drainage operations in the Moss of Knaven. It was subsequently placed under water...at Nethmuir.' (Mowat; 1996: 48).

At the date of survey, enquiries were made in Nethmuir regarding the dugout boat. Not only was the boat unheard of, but neither was there any form of open water in the locality. The land in the area appears to be intensively farmed. As a result of this farming, a previous pond or such like which could have housed the boat, could have been drained leaving no trace of the boats location.

**Boat Name:** Littlehill **Form:** Dissimilar-ended  
**District:** Strathkelvin  
**Region:** Strathclyde  
**Survey Date:** 30/7/92

Situated on a shelf in the museum store, accessibility to examination of the boat was quite difficult. Having suffered from splitting the hull is also quite warped. The timber is very knotted with one large knothole through the bottom indicating that the stern was the root end of the tree. An iron band holds the starboard side in place.

The boat's parallel sides flare out from the flat bottom. Unfortunately its full length is no longer present as the stern does not survive. The incomplete remains of the bow is pointed on all three planes, while the stern is square in plan. The starboard side survives for a length of 2.50m from the bow and the port for 2m. Overall length is 3.82m, amidships it is c.58cm wide. The highest surviving point is 20cm internally on the starboard side, where it tapers in thickness from 3cm at the base to 1cm at the top. The floor thickness measures 4 to 5cm.

Two iron bolts are set through the floor where they are attached to braces under the boat. A hole located 3.19m from the stern which is 3cm in diameter and 3.5cm deep does not penetrate the floor and is probably a modern unfinished hole, for the same purpose as the bolt-holes.

**Boat Name:** Loch Ard  
**District:** Strathkelvin  
**Region:** Strathclyde  
**Survey Date:** 3/9/92

'In September 1986 sports divers discovered a logboat in Loch Ard; it lay in about 5m depth of water at a point 3m S of a crannog and 120m WSW of the Altskeith Hotel. A section of the boat measuring 3.7m in length, 0.8m in beam and with an interior depth of about 0.5m was identified; the cross-section was noted

as semi-circular. One end had been lost but timber-work and heaped stones were thought to indicate the location of the other.' (Mowat, 1996: 50)

The object in question was rediscovered 5.5m due south of the crannog at a depth of 1.6m. Unfortunately, it is not a dugout boat but is a substantial sized timber that may possibly be structurally related to the crannog. No indications of the timber having been worked were visible at the date of survey. It may simply be a tree trunk that was deposited there by natural or other means.

Located parallel to the crannog on an east-west alignment, it measures 3.1m in overall length before one end it disappears into the loch bed. One side also disappears into the loch bed and is 80cm in maximum width up to this point. The exposed end splits into a swallowtail at c.1.5m along its length, where its maximum thickness is c.35cm along the longitudinal axis. In appearance, the main part of the body looks deceptively like an overturned dugout boats bottom, with a slight cross-sectional curve to it. There was no sign of any 'heaped stones' in the immediate vicinity of the timber, of which the surrounding loch bed consisted of silt.

**Boat Name:** Loch Arthur 2

**District:** Strathkelvin

**Region:** Strathclyde

**Survey Date:** 22/8/92

In 1966-7 archaeological survey revealed a 'possible fragment of a dug-out canoe' on the south-east side of the crannog in Loch Arthur and about 15m SSW of the remains of a possible jetty.' (Mowat; 1996: 52).

A circular area of 30m in diameter centred on the above location was thoroughly searched. No dugout boat are any 'possible fragment' of one was found.

The method of search was performed by lowering a weighted line attached to a buoy at 15m SSW of the jetty. Attached to the weights was another line which was marked at metre intervals. By using a compass and holding on to the line a metre from the weights, a circular area around the weights was searched after which the line was let out by another metre. This process was repeated thirteen times. Due to the extremely silty nature of the loch bed, the search was often performed in the stirred-up silt which resulted in little or no visibility. However the area was thoroughly searched, some of by feel alone. The 'possible fragment' could have been one of several large branches found, or since its discovery, it could have disintegrated. The only other plausible explanation for the lack of its discovery is that the silt has covered it to a sufficient depth that it could no longer be found.

**Boat Name:** Loch Doon 1

**Form:** Barge

**District:** Cumnock and Doon Valley

**Region:** Strathclyde

**Survey Date:** 21/7/92

This 3.37m long boat is in good condition except for the ends which are both radially split, causing the bow area to increase from its original width. As a result of deterioration of the log, the stern has two holes, the first through the centre where the pith was and the other is at the junction of the floor and the starboard side. Both ends have loose pieces of wood which have been nailed into place. On the floor there are several small cracks. While the whole log has been used, it is completely knot-free which indicates the tree came from either a plantation or a forest. The lack of knots and the straightness of the grain make this log an excellent choice for making a dugout boat.

Parallel-sided, the vertical sides rise from a flat bottom finishing in tumblehome at the gunwales. The bow is rounded on all three planes. Originally it would have risen vertically in the interior to a flat top. The stern also rises vertically from the floor to a previously flat top, but externally it remains in an unfinished state as a rough horizontal projection where the crosscutting of the log has not been removed. Equally unfinished is the floor of the boat which rises in the centre and is accompanied by a profusion of adze and two score marks. Its maximum thickness is 18cm where the floor rises slightly to the bow, elsewhere the floor is c.14cm. The boat's maximum width is 85cm at the bow, while the stern measures 78cm. The sides at their base are 7cm thick tapering to 2cm at the gunwales. The bow is 27cm thick, 29cm in internal height and 50cm externally. The stern's respective internal and external heights are 28 and 47cm, 19cm thick or 29cm when the horizontal projection is included. The tool marks were made by an adze with a slight concave blade of c.4cm in width. The remains of the two score marks are located at 63cm and 2.10m from the bow, of which the former is c.23cm long and c.3.5cm wide and the latter is c.24cm long and c.2.5cm wide.

The boat has been radiocarbon dated to 509±110 ad (SRR-501). However the two core holes at 84cm and 3.10m from the bow along the port chine have been drilled to a depth of 28cm which suggests that a date of c.600±110 ad would be more appropriate (Damien Goodburn, pers. comm.).

**Boat Name:** Loch Glashan 1

**Form:** Tapered

**District:** Argyll and Bute

**Region:** Strathclyde

**Survey Date:** 30/7/92

This oak dugout boat is in very poor condition. The bow is radially split with a quarter of it missing on the port side. Internally there are a series of cracks and a large split situated on the starboard side at the junction of the floor and the side. Externally the wood is very badly flaked. The boat is mounted in a steel cradle in which the bottom and the port side were inaccessible. Warping has also occurred, twisting the

hull slightly from its original form. The pith is visible in the centre of the bow indicating the use of the whole log. In form it is flat-bottomed from which the flared sides taper slightly from the stern to the bow. The stern is enclosed by a sternboard groove, while the bow is externally rounded on all three planes and internally inclines at a sharp angle from the floor. On the front of the bow there is a small keelson or cutwater, level to the bow's flat top it continues down the boat's length to the stern. Also at the bow a horizontal circular hole pierces the keelson. It is c.2cm in diameter and probably served the purpose of receiving a painter.

The boat's overall length is 3.05m, 83cm wide near the stern which appears to have warped outwards, and 73cm near the bow. The maximum internal height along the starboard side is c.20cm and c.30cm externally. The thickness of the floor varies between 8 and 10cm, while the sides are 4cm.

At c.75cm from the bow, thwart supports have been left along the sides as flat-topped projections. Their respective port and starboard lengths are 59 and 43cm, at 6 and 4cm above the floor they are up to 3cm in width. A rectangular thwart of rectangular cross-section lies across the supports. It measures 61 by 12cm and is 5.5cm thick. The keelson measures 5cm in width and projects for 3.5cm and is sub-rectangular in cross-section. The sternboard groove is 2cm wide and 2.5cm deep, extending up to the surviving height of the sides.

**Boat Name:** Loch Kinord 4  
**District:** Kincardine and Deeside  
**Region:** Grampian  
**Survey Date:** 21/8/92

'In 1875 a boating party discovered a...logboat about 30 yards (27.5m) SE of the Prison Island crannog; it was apparently filled with stones.' (Mowat; 1996: 62).

A circular area of 40m in diameter centred on the above location was thoroughly searched. No dugout boat or any stones were found.

The method of search was performed by lowering a weighted line attached to a buoy at 30m south-east of the crannog. Attached to the weights was another line which was marked at metre intervals. By using a compass and holding on to the line a metre from the weights, a circular area around the weights was searched after which the line was let out by another metre. This process was repeated eighteen times. Due to the extremely silty nature of the loch bed, the search was often performed in the stirred-up silt which resulted in little or no visibility. However the area was thoroughly searched, some of by feel alone. Although there were numerous large branches, no boat was found. It could have disintegrated since its discovery. The only other plausible explanation for the lack of its discovery is that the silt has covered it to a sufficient depth that it could no longer be found.

The warden of the National Park informed me of the location of the boat he was given on hearsay. This was as near the crannog between it and the island-castle. This area was also searched up to 40m from the

crannog and 20m across. The method used in the search was that of finning on a compass bearing taken on the island-castle and its reciprocal on the crannog.

**Boat Name:** Loch Laggan 3  
**District:** Badenoch and Strathspey  
**Region:** Highland  
**Survey Date:** 18/8/92

'In 1948 the remains of a 'fir' logboat...were seen 'in the sand' at the E end of the loch, and to the south of the mouth of the River Pattack'. (Mowat; 1996: 63).

No dugout boat or the remains of one was found.

The method of search was performed searching the sand on foot which was littered with tree trunks and branches either resting on or protruding from the sand. After this, by using a compass the water was searched parallel to the shore area at intervals of 1 to 2 metres which was dictated by the visibility of the water. This was done to a depth of 3 metres.

The lack of its rediscovery is probably due to either it having disintegrated or being covered up by sand.

**Boat Name:** Loch Laggan 4  
**District:** Badenoch and Strathspey  
**Region:** Highland  
**Survey Date:** 18/8/92

'In 1949 a further 'fir' logboat was discovered on the S shore of the Loch, just E of King Fergus' Isle'. (Mowat; 1996: 63).

No dugout boat was found.

The method of search was performed searching the sand on foot which was littered with tree trunks and branches either resting on or protruding from the sand. Compass was then used in the water to search the Loch parallel to the shore area at intervals of 1 to 2 metres which was dictated by the visibility of the water. This was done to a depth of 3.5 metres.

The lack of its rediscovery is probably due to either it having disintegrated or being covered up by sand.

**Boat Name:** Loch Laggan 5  
**District:** Badenoch and Strathspey  
**Region:** Highland  
**Survey Date:** 19/8/92

'...in 1949, Mr BM Peach noted the 'undoubted remains of a canoe bottom' in a bay on the N side of the Loch about '1/4 miles from the eastern end'. (Mowat; 1996: 63).

No dugout boat or the remains of one was found.

The method of search was performed by searching the bay area either by snorkelling or diving depending on the depth and using a compass to stay parallel to the shore and working at intervals of 1 to 2 metres which was dictated by the visibility of the water. This was done to a depth of 3.5 metres.

The lack of its rediscovery is probably due to either it having disintegrated or being covered up by sand.

**Boat Name:** Loch Leven  
**District:** Perth and Kinross  
**Region:** Tayside  
**Survey Date:** 19/6/92

In two small pieces, the remains little resembles any part of a dugout boat. The smaller piece is in poor condition having suffered from radial splitting. It is roughly pyramidal in shape with a square base, which measures 13.5 by 12cm, and 9.5cm in height. The roots of a branch of 8cm in diameter extend into the base for 10cm. This piece could be either from the bow or stern of a boat.

The second and more puzzling fragment is also in poor condition, its surface is very flaky nature to it. This parallel-sided piece is rectangular in cross-section, with one end being straight or blunt while the other is quite ragged from where it had broken away from the remainder of the object. A shallow worn-down groove of 11cm in width and 2cm deep runs across the grain on one face, while on the opposite face and 4cm from one side, a wall or projecting section of wood runs along the grain for the fragment's entire length. It is 33.5cm long, 2cm wide and 3.5cm high. Several tool marks are situated on the same face as the groove, but due to the flaky nature of the wood, little more can be said about them.

It is remotely possible that the second fragment could have been either a side or bottom piece of a dugout boat. However both faces have their own feature of which neither one could be located externally. In considering the groove as that of a sternboard groove, the projecting piece on the opposite side would have served no useful function and would have been too frail to survive in such an external location.

**Boat Name:** Loch of Kinnordy **Form:** Canoe  
**District:** Angus  
**Region:** Tayside  
**Survey Date:** 29/6/92

Originally parallel-sided with a rounded bottom rising to vertical sides, warping has distorted the oak boat with the bow now at an angle of 45 degrees to port. Pointed in form on all three planes, the projecting bow has been referred to that of a zoomorphic-shaped head. The stern is rounded on all three planes. Splitting and warping has occurred throughout its length and the full height of its sides is not present. The largest split of c.1.80m in length runs from a knot in the floor to the port quarter. There are at least 9 knots and 3 knotholes in the sides and floor. Halfway up both ends the pith is visible indicating the whole log was used. It could not be determined which was the root end of the tree.

While the bow's vaguely zoomorphic-shaped head can not be ruled out, the 'mouth' was probably originally a full horizontal hole used for a mooring rope. A possible score mark on the starboard side, 55cm from the bow is 11cm long, 2.5cm wide and 11mm deep. Overall length is 4.32m, 83cm in width and the maximum height of the sides at the bow is 65cm and 35cm amidships. The sides are c.3cm thick and the floor averages at 5cm.

**Boat Name:** Lochlea 3

**Form:** Canoe

**District:** Kyle and Carrick

**Region:** Strathclyde

**Survey Date:** 13/7/92

A thorough examination of this dugout boat was impossible since it is on display in a glass case. The various dimensions used in this report have taken from Mowat (1996: 69). They are as follows; Overall length = 3.18m, width is 'up to 0.65m in beam'. The portside which is detached is 'now nailed in an inappropriate position'. The starboard side survives to a height of 26cm near the stern. The floor and sides measure about 6cm and 3cm respectively.

The port side which has been nailed into position, while ill fitting is the only conceivable location for it. It appears to be in 'an inappropriate position' due to warping of the hull. Two paddles and three oars have been placed inside the boat thereby obscuring possible features.

The boat's form consists a rectangular-shaped stern in plan, with just the upturn of the floor surviving in elevation. It is wider than the bow which is more rounded in plan and thus probably the bow. Eight holes in four opposing pairs have been drilled vertically through the floor near either side. They now have an elongated shape but were probably originally circular. Their locations are as follows:

| Hole Number | Metres from Bow | Metres from Port | Metres from Starboard |
|-------------|-----------------|------------------|-----------------------|
| 1           | c.0.58          | c.0.15           | ----                  |
| 2           | c.0.58          | ----             | c.0.15                |
| 3           | c.1.28          | c.0.15           | ----                  |
| 4           | c.1.28          | ----             | c.0.15                |
| 5*          | -----           | -----            | -----                 |
| 6*          | -----           | -----            | -----                 |
| 7           | c.2.85          | c.0.10           | ----                  |
| 8           | c.2.85          | ----             | c.0.20                |



| Hole Number | Metres from Bow | Metres from Port | Metres from Starboard |
|-------------|-----------------|------------------|-----------------------|
|             |                 |                  |                       |

\* Holes 5 and 6 are obscured by the paddles and oars in the boat.

These holes would have served as either thickness-gauges and/or for retaining fitted ribs. In view of the overall size of the boat the latter is quite unlikely.

On the basis of the angle of a large knothole through the floor at c.1.40m from the bow, the stern was the root end of the tree. The knot is 7cm in diameter. Another knothole located in the bow is perfectly circular and as such appears to have been deliberately drilled through. This could have served as a mooring hole.

**Boat Name:** Lochmaben, Castle Loch 1                      **Form:** Canoe

**District:** Annandale and Eskdale

**Region:** Dumfries and Galloway

**Survey Date:** 2/7/92

The bottom and part of one end are the surviving remains of this dugout boat. With long cracks throughout its length, the nature of the wood's surface is quite flaky. The remains of a vertical side survives by the end of the boat to a height of 11.5cm externally and is 2cm thick. The end is pointed in plan with a V-shaped cross-section. Inclining up from a flat bottom, it is 30cm thick and c.17cm high. The other end of the boat is defined by a slight upturn of the edges of the floor and is rounded in plan and therefore the stern. The partly surviving side by the bow is on starboard. The port chine also survives. The boat appears to have been parallel-sided. Its overall length is 3.86m, maximum width is 52cm and the bottom is c.3cm thick.

Eight holes pierce the floor vertically by the sides in opposing pairs. Their locations and dimensions are as follows:

| Hole number | Metres from Bow | Dimensions | Port side (P) Starboard (S) |
|-------------|-----------------|------------|-----------------------------|
| 1           | 0.46            | 2x2cm      | S                           |
| 2           | 0.46            | 2x2cm      | P                           |
| 3           | 0.91            | 2x2cm      | S                           |
| 4           | 0.91            | 2x2cm      | P                           |
| 5           | 1.46            | 2x2cm      | S                           |

| Hole number | Metres from Bow | Dimensions | Port side (P) Starboard (S) |
|-------------|-----------------|------------|-----------------------------|
| 6           | 1.46            | 2x2cm      | P                           |
| 7           | 2.06            | 2x2cm      | S                           |
| 8           | 2.06            | 4.5x2cm    | P                           |

Hole number 8 was most probably eroded into its present shape. Their purpose was that of thickness-gauges or fitted ribs. In view of the size of the boat, the former reason is the most likely.

**Boat Name:** Lochmaben, Kirk Loch 1                      **Form:** Punt  
**District:** Annandale and Eskdale  
**Region:** Dumfries and Galloway  
**Survey Date:** 1/7/92

This dugout boat consists of the bottom and the remains of either end, its full width does not survive. In very poor condition, there is a large elongated hole in the centre of the floor measuring 1m by 23cm at its longest and broadest points. The timber has been eroded along the grain and five knots are visible on the floor, none of which enable the root end of the tree to be determined, as they appeared to be at right angles to the tree. Both ends are very worn down. Internally they incline upwards from an rounded bottom and floor. The boat appears to have been similar-ended, with the smaller of the two measuring 31cm in thickness and 11cm in internal height. The other end is 28cm thick and 19cm in internal height. It is impossible to determine which are the bow and stern.

An elongated hole through the floor located at 61cm from the taller end and measures 4cm long, 2.3cm wide and 1.5cm deep. It could be man-made, but it is equally possible that it occurred through erosion. If it is man-made it, its function would most likely have been that of a thickness-gauge. Overall length is 2.53m, 54cm in maximum width amidships and c.6cm in thickness.

**Boat Name:** Lochmaben, Kirk Loch 2                      **Form:** Dissimilar-ended  
**District:** Annandale and Eskdale  
**Region:** Dumfries and Galloway  
**Survey Date:** 1/7/92

In poor condition, one end and the flat bottom remain with the other end terminating in a swallowtail on the floor. The root end of the tree can not be determined from the angle of the three knotholes in the floor. Along one side the chine survives to a height of 2cm for most of the boat's surviving length. The end inclines upwards from the bottom both internally and externally which is 21cm thick and 7cm in internal

height. Overall length is 2.71, maximum surviving width is 53cm and c.2.5cm in floor thickness. One portion of the side nearest the remaining end survives to a height of 8.5cm and a thickness of 1.4cm.

Three small circular holes with respective diameters of 8mm, 5mm and 3mm are modern and possibly were drilled to enable the boat to be wall-mounted. Five other holes are set vertically through the floor in one set of three across the boat and a second set of two also transversely across the floor. They were probably used to retain fitted ribs and/or thickness-gauges. Their location, shape and dimensions are as follows:

| Hole Number | Metres from Bow | Distance from Starboard | Shape | Dimensions |
|-------------|-----------------|-------------------------|-------|------------|
| 1           | 0.92            | 31cm                    | Oval  | 7.4x2cm    |
| 2           | 0.90            | 13cm                    | Oval  | 7x2cm      |
| 3           | 0.90            | 0cm                     | Oval  | 5x2.5cm    |
| 4           | 1.54            | 33cm                    | Oval  | 9x3cm      |
| 5           | 1.54            | 16cm                    | Oval  | 7.5x2cm    |

**Boat Name:** River Clyde

**Form:** Tapered

**Region:** Strathclyde

**Survey Date:** 21/7/92

In an extremely poor condition, the dugout boat's surface is very flaky. Warping has split and cracked along its length. The angle of the very knotted timber indicates that the stern is the root end of the tree. The remains consist of the bottom, most of the port side, the starboard chine and part of the stern board. The bow's remains consist of a slight upturn of the flat bottom. As indicated by the port side and starboard chine, the vertical sides taper from the stern to a pointed bow. The whole log was used. Splitting has mainly occurred where knots have caused structural weaknesses in the hull. A large split occurs along the port chine.

Overall length is 6.54m, maximum width at the stern is 87cm tapering to 66cm at 1.50m from the bow and 79cm amidships. The port side's respective internal and external heights are 57 and 64cm. In thickness the floor varies from 4 to 7cm, while the port side averages at 3.5cm. This side survives for a length of 1.55m. The sternboard groove which was rectangular in section has now become rounded at the edges through wear and survives to the full height of the port side where it is 9cm wide and tapers to 4.5cm on the floor. Its depth is c.5cm. The surviving section of the board which remains in the groove, is 63cm long, 8.5cm in maximum width and 3cm thick. The floor thickens at either side of the groove. One thwart support is located 1.65m from the stern on the portside which can be identified as a flat-topped

bulge 23.5cm above the floor. 3cm at its widest, it tapers in both directions into the side giving it a length of 28.5cm. Vertically it tapers into the side at the junction of the floor. A possible second thwart support 3.50m from the stern is also on the port side. This could equally be just a thickening of the side at this point. At 13cm above the floor it is c.21cm long and 3cm wide.

Six holes pierce the floor vertically of which three plugged. They consist of one set of three holes in a transverse line, one hole central in the floor and the remaining two forming a transverse line. Originally circular at 3cm in diameter, they have developed a slightly oval shape through warping. The plugs remain circular in section. Their locations are as follows:

| Set Number | Hole Number | Metres from Stern | Distance from Port | Plugged? |
|------------|-------------|-------------------|--------------------|----------|
| 1          | 1           | 1.10              | 16cm               | No       |
| 1          | 2           | 1.10              | 34cm               | Yes      |
| 1          | 3           | 1.10              | 52cm               | Yes      |
| 2          | 1           | 2.48              | 33cm               | No       |
| 3          | 1           | 2.81              | 15cm               | No       |
| 3          | 2           | 2.81              | 35cm               | Yes      |

Two repair areas the first of which is defined by seven 4mm by 3mm oval holes above a large knothole of 31 by 21 cm in size. It is located at the junction of the port side and the floor. The nail holes are spaced at 2cm intervals above the hole. The second repair area on along the starboard chine has six holes of the same shape and dimensions as the other nail holes. Their locations are as follows:

| Hole Number | Distance from Stern |
|-------------|---------------------|
| 1           | 1.94m               |
| 2           | 2.00m               |
| 3           | 2.07m               |
| 4           | 2.19m               |
| 5           | 2.32m               |
| 6           | 2.38m               |

The port repair would have held some form of patch over the knothole. At the time of repair it may not necessarily have developed into a hole, but may have been a weak or vulnerable area in the boat's hull. In

the absence of the starboard side, the manner of the repair along here can not now be determined. The purpose of the holes across the floor was for either thickness-gauges and/or to retain fitted ribs. However, since the plugs are flush with the surface of the wood and show no signs of having been broken, thickness-gauges were their most likely function.

**Boat Name:** River Tay  
**District:** Perth and Kinross  
**Region:** Tayside  
**Survey Date:** 16/7/92

Labelled as a 'fragment of Prehistoric canoe found in the River Tay near Perth', it is a 16.4cm long length of oak with a respective width and thickness of 3.2 and 2.9cm. D-shaped in cross-section, the ends have modern saw marks while the one flat surface has a ragged appearance. It could have been part of any object, but could be part of a gunwale.

**Boat Name:** White Loch  
**District:** Wigtown  
**Region:** Dumfries and Galloway  
**Survey Date:** 2/7/92

In six pieces of varying lengths, it is in extremely poor condition, with a flaky surface which has suffered considerably from warping and splitting. Apart from two large knots, there are no discernible features to the boat.

As it is displayed, the overall length of the six pieces is 4.20m and its maximum width amidships is 75cm.

APPENDIX 4

LIST OF LOGBOAT FEATURES

| Irish Logboats |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                |                     |
|----------------|----------|-----------------------|-------------------|-------------|-----------------|------------|------------|----------------|----------------|--------|--------------|---------------|------------------|----------------|-----------|-----------------|--------------------|------------------|----------------|---------------------|
| Boat Name      | Caulking | Duck-bill Projections | Extensions - Side | Fal se Kels | Fitted Transoms | Foot Rests | Mast Steps | Met al Fxtures | M ooring Holes | N ails | Raise d Bows | R e p a i r s | Ri bs - Integral | Ri bs - Fitted | S e a t s | Strakes - Wash. | Strakes - Running. | Th ole pin Holes | Th wa rt Rests | Th ick ne ss-gauges |
| Altdrumman     |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  | ✓              |           |                 |                    |                  |                | ✓                   |
| Annagh         |          |                       |                   |             |                 |            |            |                |                | ✓      |              | ✓             |                  |                |           |                 |                    |                  |                |                     |
| Aughamullan    |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    | ✓                |                |                     |
| Ballinderry 3  |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    | ✓                | ✓              |                     |
| Ballinphort    |          |                       |                   |             |                 |            |            |                |                |        |              | ✓             | ✓                | ✓              |           |                 |                    |                  |                |                     |
| Ballintober    |          |                       |                   |             |                 |            | ✓          |                |                |        |              |               |                  |                |           |                 |                    |                  |                |                     |
| Ballyhaunis 2  |          |                       |                   |             |                 |            |            |                |                | ✓      |              |               |                  |                |           |                 |                    |                  |                |                     |
| Ballynahinch 3 |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    | ✓                |                |                     |
| Ballyscullion  |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Bannmouth      |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                |                     |
| Baronscourt    |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    | ✓                | ✓              |                     |
| Bellarena      |          | ✓                     |                   |             |                 |            |            |                |                |        |              | ✓             |                  |                |           |                 |                    |                  |                |                     |
| Beltoy 1       |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Beltoy 2       |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  | ✓              |           |                 |                    | ✓                | ✓              |                     |
| Black River    |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  | ✓              |           |                 |                    |                  |                |                     |
| Brockish       |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                | ✓         |                 |                    |                  | ✓              | ✓                   |
| Bunduvowen     |          |                       |                   |             | ✓               |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Cahore 1       | ✓        |                       |                   |             |                 |            |            |                |                |        | ✓            |               | ✓                |                |           |                 |                    |                  |                | ✓                   |
| Cahore 2       |          |                       |                   |             | ✓               |            |            |                |                |        |              |               | ✓                | ✓              |           |                 |                    |                  | ✓              |                     |
| Callow         |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Castledargan   |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Castlefreke    |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Cavan          |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Church Island  |          |                       |                   |             |                 |            |            |                |                |        |              |               | ✓                |                |           |                 |                    |                  |                | ✓                   |
| Claddagh River |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 | ✓                  |                  |                |                     |
| Claggarnagh    |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                |                     |
| Clonaslee 1    |          |                       |                   |             |                 |            |            |                | ✓              |        |              |               | ✓                |                |           |                 |                    |                  |                |                     |
| Clonlisk       |          |                       |                   |             |                 |            |            |                | ✓              |        |              |               |                  |                |           |                 |                    |                  |                |                     |
| Clooncoe 1     | ✓        |                       |                   |             |                 |            |            |                |                |        |              |               |                  | ✓              |           |                 |                    |                  |                | ✓                   |
| Clooncunny 1   |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               | ✓                |                |           |                 |                    |                  |                |                     |
| Clooncunny 2   |          |                       |                   |             |                 |            |            |                |                | ✓      |              |               |                  | ✓              | ✓         |                 |                    |                  |                |                     |
| Cloontarsna 1  |          |                       |                   |             | ✓               |            |            |                |                |        |              |               |                  |                | ✓         |                 |                    |                  |                |                     |
| Clowninny      |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  | ✓              |           |                 |                    |                  |                | ✓                   |
| Coleraine      |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    | ✓                | ✓              |                     |
| Collinstown    |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  | ✓              |                     |
| Copney         |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                |                     |
| Corlummin 3    |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Corrachuill    |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  | ✓              |           |                 |                    |                  |                |                     |
| Co. Tyrone     |          |                       |                   |             |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                | ✓                   |
| Co. Waterford  |          |                       |                   | ✓           |                 |            |            |                |                |        |              |               |                  |                |           |                 |                    |                  |                |                     |
| Creagh 1       |          |                       |                   |             |                 | ✓          |            |                |                |        |              |               |                  |                |           |                 |                    |                  | ✓              | ✓                   |
| Creagh 3       |          |                       |                   |             |                 |            |            |                | ✓              |        |              |               |                  |                |           |                 |                    |                  | ✓              |                     |
| Crevinish 1    |          |                       |                   |             | ✓               |            | ✓          |                |                |        |              |               | ✓                |                |           |                 |                    |                  |                | ✓                   |

| Boat Name            | Caulking | Duck-bill Projections | Extensions - Side | Fal se Kels | Fitted Transoms | Foot Rests | Mast Steps | Met al Fixtures | Mooring Holes | Na ils | Raised Bows | Re pairs | Ribs - Integral | Ribs - Fitted | Seats | Strakes - Wash. | Strakes - Running | Tholepins in Holes | Thwart Rests | Thicknes s-gauges |
|----------------------|----------|-----------------------|-------------------|-------------|-----------------|------------|------------|-----------------|---------------|--------|-------------|----------|-----------------|---------------|-------|-----------------|-------------------|--------------------|--------------|-------------------|
| Culleen More         |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    |              | ✓                 |
| Currygrane           |          |                       |                   |             |                 |            |            |                 |               | ✓      |             |          |                 |               |       |                 |                   |                    |              |                   |
| Deerpark             |          |                       |                   |             |                 | ✓          |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Derris Lower 4       |          |                       |                   |             |                 |            |            |                 |               |        |             |          | ✓               |               |       |                 |                   |                    | ✓            |                   |
| Derrya 1             |          |                       |                   |             |                 |            |            |                 |               | ✓      |             | ✓        |                 |               |       |                 |                   |                    |              | ✓                 |
| Derrya 2             | ✓        |                       |                   |             | ✓               |            | ✓          |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Derrya 3             |          |                       |                   |             |                 |            |            |                 |               | ✓      |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Derryad 1            |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    |              |                   |
| Derryad 2            |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    | ✓            |                   |
| Derryalla 1          |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Derryalla 2          |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Derrybroughas        |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    | ✓            | ✓                 |
| Derryco              |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    | ✓            | ✓                 |
| Derrycoagh           |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    |              | ✓                 |
| Derrycrew            |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Derrygally 2         |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Derryinver           |          |                       |                   |             |                 |            |            |                 | ✓             |        |             |          |                 | ✓             |       |                 |                   |                    | ✓            |                   |
| Derryloiste          |          |                       |                   |             | ✓               |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              |                   |
| Derrymore            |          |                       |                   |             |                 | ✓          |            |                 |               | ✓      |             |          |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Doon 2               |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    |              | ✓                 |
| Doon 3               |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Downpatrick          |          |                       | ✓                 |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              |                   |
| Drinagh              |          |                       |                   |             |                 |            | ✓          |                 |               |        |             |          |                 |               |       |                 |                   |                    |              |                   |
| Drumleague           |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  |              |                   |
| Drumreask 1          |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Drumreask 3          |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    |              |                   |
| Dullaghan            |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    | ✓            |                   |
| Dunshaughlin 1       |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Edencrannon 1        |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Edencrannon 2        |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Eskragh 1            |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Eskragh 2            |          |                       |                   |             | ✓               |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              |                   |
| Fahy                 |          |                       |                   |             | ✓               | ✓          |            |                 |               |        |             |          |                 | ✓             | ✓     |                 |                   |                    |              |                   |
| Fossa More           |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Garraunfadda         | ✓        |                       | ✓                 |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              |                   |
| Glassaneeran Lower   |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Glassaneeran Upper 2 |          |                       |                   |             |                 | ✓          |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  | ✓            | ✓                 |
| Hacknahay            |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 | ✓             |       |                 |                   |                    |              |                   |
| Headford             |          |                       |                   |             |                 |            |            |                 |               |        |             |          | ✓               |               |       |                 |                   |                    |              |                   |
| Illanee 1            |          |                       |                   |             |                 |            |            |                 |               |        |             |          | ✓               |               |       |                 |                   |                    |              | ✓                 |
| Inch 3               |          |                       |                   |             |                 | ✓          |            |                 |               |        |             |          | ✓               |               |       |                 |                   |                    |              |                   |
| Inchacooley          |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Irishtown            |          |                       |                   |             |                 | ✓          |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              |                   |
| Killygowan 1         |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   |                    |              | ✓                 |
| Kilturbid            |          |                       |                   |             |                 |            |            |                 |               | ✓      |             | ✓        |                 | ✓             |       |                 |                   |                    |              | ✓                 |
| Knockaville          |          |                       |                   |             |                 |            |            |                 |               |        |             |          |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Knockbrack           |          |                       |                   |             |                 |            |            |                 | ✓             |        |             |          | ✓               |               |       |                 |                   |                    |              | ✓                 |

| Boat Name        | Caulking | Duck-bill Projections | Extensions - Side | Fal se Kels | Fitted Transoms | Foot Rests | Mast Steps | Metal Fixtures | Mooring Holes | Nails | Raised Bows | Repairs | Ribs - Integral | Ribs - Fitted | Seats | Strakes - Wash. | Strakes - Running | Tholepins in Holes | Thwart Rests | Thicknes-s-gauges |
|------------------|----------|-----------------------|-------------------|-------------|-----------------|------------|------------|----------------|---------------|-------|-------------|---------|-----------------|---------------|-------|-----------------|-------------------|--------------------|--------------|-------------------|
| Legg 1           |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Lemonfield       |          |                       |                   |             |                 | ✓          |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  |              | ✓                 |
| Levaghery        |          |                       |                   |             |                 | ✓          |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  |              | ✓                 |
| Levallinree 3    |          |                       |                   |             |                 |            |            |                |               |       |             |         | ✓               |               |       |                 |                   |                    |              |                   |
| Lisnagonnell 4   |          |                       |                   | ✓           |                 | ✓          |            |                | ✓             |       |             |         |                 |               |       |                 |                   |                    | ✓            |                   |
| Lough Elia       |          |                       |                   |             |                 |            |            |                |               | ✓     |             |         |                 |               |       |                 |                   |                    |              |                   |
| Lough Ennell 1   |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            |                   |
| Lough Ennell 2   |          |                       |                   |             | ✓               |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Lough Owel 1     |          |                       |                   |             | ✓               |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Lurgan           |          |                       |                   |             |                 |            |            |                |               |       |             | ✓       |                 |               |       |                 |                   |                    |              | ✓                 |
| Lynn             |          |                       |                   |             | ✓               |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              |                   |
| Maghery 1        | ✓        |                       |                   |             |                 | ✓          |            |                |               |       |             |         | ✓               |               |       |                 |                   | ✓                  | ✓            | ✓                 |
| Moy              |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            | ✓                 |
| Mullaghcloe      | ✓        |                       |                   |             |                 | ✓          |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              |                   |
| Mullan Lower 1   |          |                       |                   |             |                 |            |            |                |               |       |             | ✓       |                 | ✓             |       |                 |                   |                    | ✓            | ✓                 |
| Mullynascarty    |          |                       |                   |             |                 |            |            |                |               |       | ✓           |         | ✓               |               |       |                 |                   |                    | ✓            | ✓                 |
| North Ward       |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            |                   |
| Oldbridge        |          |                       |                   |             |                 |            |            |                |               |       |             |         | ✓               |               |       |                 |                   |                    |              | ✓                 |
| Portadown 2      |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Portanure        |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            |                   |
| Portmore         |          |                       | ✓                 |             |                 | ✓          |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            | ✓                 |
| Portnacrinnaught |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 | ✓             |       |                 |                   |                    |              |                   |
| River Barrow 2   |          |                       |                   |             |                 | ✓          |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            |                   |
| River Foyle      |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Rosclave         |          |                       |                   |             |                 |            |            |                |               |       |             |         | ✓               |               |       |                 |                   |                    | ✓            |                   |
| Rosfad 1         |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Srahenny         |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    | ✓            |                   |
| Stradone 2       |          |                       |                   |             |                 |            |            |                |               | ✓     |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Templemoyle 2    |          |                       |                   |             |                 | ✓          |            |                |               |       |             |         |                 | ✓             |       |                 |                   |                    |              |                   |
| Termonbacca 1    |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Termonbacca 2    |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 | ✓             |       |                 |                   | ✓                  |              |                   |
| Toome 1          | ✓        |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              |                   |
| Toome 4          |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Toome 5          |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Town Parks       |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| Trinity Island 2 |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Tumna            |          |                       |                   |             |                 |            |            |                |               | ✓     |             |         | ✓               |               |       |                 |                   |                    |              |                   |
| Unprovenanced 1  |          |                       |                   |             | ✓               |            | ✓          |                |               |       |             |         | ✓               |               |       |                 |                   |                    |              |                   |
| Unprovenanced 2  |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Unprovenanced 3  |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Unprovenanced 4  |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |
| Unprovenanced 5  |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               | ✓     |                 |                   |                    |              |                   |
| Unprovenanced 6  |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| West Ward 2      | ✓        |                       |                   |             |                 |            |            |                |               | ✓     |             |         |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| West Ward 3      |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 | ✓             |       |                 |                   |                    |              |                   |
| West Ward 4      |          |                       |                   |             |                 |            |            |                |               |       |             |         | ✓               |               |       |                 |                   |                    |              | ✓                 |
| West Ward 6      |          |                       |                   |             |                 | ✓          |            |                |               |       |             |         |                 |               |       |                 |                   | ✓                  | ✓            |                   |
| West Ward 9      |          |                       |                   |             |                 |            |            |                |               |       |             | ✓       |                 |               |       |                 |                   |                    |              |                   |
| Whitewood 1      |          |                       |                   |             |                 |            |            |                |               |       |             |         |                 |               |       |                 |                   |                    |              | ✓                 |



| Boat Name                | Caulking | Duck-bill Projections | Extensions - Side | Fal se Kels | Fitted Transoms | Foot Rests | Mast Steps | Met al Fixtures | Mooring Holes | Nails | Raised Bows | Re pairs | Ribs - Integral | Ribs - Fitted | Seats | Strakes - Wash. | Strakes - Running | Tholepin Holes | Thwart Rests | Thicknes s-gauges |
|--------------------------|----------|-----------------------|-------------------|-------------|-----------------|------------|------------|-----------------|---------------|-------|-------------|----------|-----------------|---------------|-------|-----------------|-------------------|----------------|--------------|-------------------|
| Whitewood 2              |          |                       |                   |             |                 |            |            |                 |               | ✓     |             |          | ✓               |               |       |                 |                   |                |              |                   |
| Whitewood 3              |          |                       |                   |             |                 | ✓          |            |                 |               | ✓     |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Whitewood 4              |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              |                   |
| Yardland                 |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| <b>Scottish Logboats</b> |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              |                   |
| Black Loch               |          |                       |                   |             |                 |            |            |                 | ✓             |       |             |          |                 |               |       |                 |                   | ✓              |              | ✓                 |
| Bowling 1                |          |                       |                   |             |                 |            |            |                 | ✓             |       |             | ✓        |                 |               |       |                 |                   |                |              |                   |
| Bowling 2                |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   | ✓              |              |                   |
| Buston 1                 | ✓        |                       | ✓                 |             | ✓               |            |            |                 | ✓             |       |             |          | ✓               | ✓             |       | ✓               |                   | ✓              |              | ✓                 |
| Buston 3                 |          |                       |                   |             | ✓               |            |            |                 |               |       |             |          |                 | ✓             |       |                 |                   |                | ✓            |                   |
| Cambuskenneth            |          |                       |                   |             |                 |            |            |                 |               |       |             | ✓        |                 | ✓             |       |                 |                   |                |              | ✓                 |
| Castlemilk               |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Closeburn                |          |                       |                   |             | ✓               |            |            |                 |               |       |             |          |                 |               | ✓     |                 |                   |                |              | ✓                 |
| Craigsglen               |          |                       |                   |             |                 |            |            |                 | ✓             |       |             |          | ✓               |               |       |                 |                   |                |              | ✓                 |
| Dalmarnock               | ✓        |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Dalmuir                  |          |                       |                   |             | ✓               |            |            |                 |               |       |             |          |                 | ✓             |       |                 |                   |                |              |                   |
| Dernaglar Loch           |          |                       |                   |             | ✓               |            |            |                 |               |       |             |          |                 | ✓             |       |                 |                   |                |              |                   |
| Dowalton Loch 1          |          |                       |                   |             | ✓               |            |            |                 |               |       |             |          |                 |               |       |                 | ✓                 | ✓              |              |                   |
| Dowalton Loch 3          |          |                       |                   |             |                 |            |            |                 |               |       |             | ✓        |                 |               |       |                 |                   |                |              |                   |
| Dowalton Loch 4          |          |                       |                   |             |                 |            |            |                 |               |       |             | ✓        | ✓               |               |       |                 |                   |                |              |                   |
| Dumbuck                  |          |                       |                   |             |                 |            |            |                 |               |       |             | ✓        |                 |               |       |                 |                   |                | ✓            |                   |
| Eadarloch                |          |                       |                   | ✓           | ✓               |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              |                   |
| Errol 2                  |          |                       |                   |             | ✓               | ✓          |            |                 |               |       |             |          |                 | ✓             |       |                 |                   |                | ✓            |                   |
| Erskine 1                |          |                       | ✓                 |             | ✓               |            |            |                 |               |       |             | ✓        |                 |               |       | ✓               |                   |                |              | ✓                 |
| Erskine 2                |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                | ✓            |                   |
| Erskine 6                |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   | ✓              |              |                   |
| Garmouth                 |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                | ✓            | ✓                 |
| Glasgow, Clydehaugh 1    |          |                       |                   |             |                 | ✓          |            | ✓               |               | ✓     |             | ✓        |                 |               |       |                 |                   |                |              | ✓                 |
| Glasgow, Clydehaugh 2    |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Glasgow, Clydehaugh 4    |          |                       |                   |             |                 | ✓          | ✓          |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Glasgow, Clydehaugh 5    |          |                       |                   |             |                 |            |            |                 |               |       |             | ✓        |                 |               |       |                 |                   |                |              | ✓                 |
| Glasgow, Hutcheson Br.   |          |                       |                   |             |                 | ✓          | ✓          |                 |               |       |             |          |                 | ✓             |       |                 |                   |                |              |                   |
| Glasgow, Point House     |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              |                   |
| Glasgow, Springfield 1   |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              |                   |
| Glasgow, Springfield 2   |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Glasgow, Springfield 3   |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 |                   |                | ✓            | ✓                 |
| Glasgow, Springfield 4   |          |                       |                   |             |                 |            |            |                 |               |       |             |          |                 |               |       |                 | ✓                 |                |              |                   |
| Glasgow, Springfield 5   |          |                       |                   |             |                 | ✓          |            |                 |               |       |             |          |                 |               |       |                 |                   |                |              | ✓                 |
| Kilbrinie Loch 1         |          |                       |                   |             |                 |            |            | ✓               |               |       |             | ✓        |                 |               |       |                 |                   |                |              |                   |

| Boat Name                   | C<br>a<br>u<br>l<br>k<br>i<br>n<br>g | Du<br>ck-<br>bil<br>l<br>P<br>r<br>o<br>j<br>e<br>c<br>t<br>i<br>o<br>n<br>s | Ex<br>t<br>e<br>n<br>s<br>i<br>o<br>n<br>s<br>-<br>S<br>i<br>d<br>e | F<br>a<br>l<br>s<br>e<br>K<br>e<br>y<br>s | F<br>i<br>t<br>t<br>e<br>d<br>T<br>r<br>a<br>n<br>s<br>o<br>m<br>s | F<br>o<br>o<br>t<br>R<br>e<br>s<br>t<br>s | M<br>a<br>s<br>t<br>S<br>t<br>e<br>p<br>s | M<br>e<br>t<br>a<br>l<br>F<br>i<br>x<br>t<br>u<br>r<br>e<br>s | M<br>o<br>o<br>r<br>i<br>n<br>g<br>H<br>o<br>l<br>e<br>s | N<br>a<br>i<br>l<br>s | R<br>a<br>i<br>s<br>e<br>d<br>B<br>o<br>w<br>s | R<br>e<br>p<br>a<br>i<br>r<br>s | R<br>i<br>b<br>s<br>-<br>I<br>n<br>t<br>e<br>g<br>r<br>a<br>l | R<br>i<br>b<br>s<br>-<br>F<br>i<br>t<br>t<br>e<br>d | S<br>e<br>a<br>t<br>s | S<br>t<br>r<br>a<br>k<br>e<br>s<br>-<br>W<br>a<br>s<br>h<br>.. | S<br>t<br>r<br>a<br>k<br>e<br>s<br>-<br>R<br>u<br>n<br>n<br>i<br>n<br>g | T<br>h<br>o<br>l<br>e<br>p<br>i<br>n<br>H<br>o<br>l<br>e<br>s | T<br>h<br>w<br>a<br>r<br>t<br>R<br>e<br>s<br>t<br>s | T<br>h<br>i<br>c<br>k<br>n<br>e<br>s<br>s-<br>g<br>a<br>u<br>g<br>e<br>s |   |
|-----------------------------|--------------------------------------|--|---|---|--|---|---|---|--|-----------------------|--|---------------------------------|---|---|-----------------------|--|---|---|---|--|---|
| Kilbrinie Loch 3            |                                      |  |   |   |  |   |   |   |  |                       |  |                                 |   |   |                       |  |   |   |   | ✓  |   |
| Kilbrinie Loch 4            |                                      |  |   |   |  |   |   |   |  |                       |  |                                 |   | ✓   |                       |  |   |   |   |  |   |
| Knaven                      |                                      |  |   |   |  |   |   |   | ✓  |                       |  |                                 |   |   |                       |  |   |   |   |  |   |
| Lea Shun                    |                                      |  |   |   |  |   |   |   |  | ✓                     |  | ✓                               |   |   |                       |  |   |   |   |  | ✓ |
| Linlithgow                  |                                      |  |   |   |  |   |   |   |  |                       |  |                                 |   | ✓   |                       |  |   |   |   |  |   |
| Loch Arthur 1               |                                      |  |   |   |  | ✓   |   |   | ✓  |                       |  |                                 |   |   | ✓                     |  |   |   |   |  | ✓ |
| Loch Doon 3                 |                                      |  |   |   |  | ✓   |   |   | ✓  |                       |  |                                 |   |   |                       |  |   |   |   | ✓  | ✓ |
| Loch Glashan 1              |                                      |  |   | ✓   |  | ✓   |   |   | ✓  |                       |  |                                 |   |   |                       |  |   |   |   | ✓  |   |
| Loch Kinord 1               |                                      |  |   |   |  |   |   |   |  |                       |  |                                 | ✓   |   |                       |  |   |   |   |  |   |
| Loch Kinord 2               |                                      |  |   |   |  |   |   |   |  |                       |  |                                 |   | ✓   |                       |  |   |   |   |  |   |
| Loch Kinord 3               |                                      |  |   |   |  |   |   |   |  |                       |  |                                 |   | ✓   |                       |  |   |   |   |  |   |
| Loch Laggan 6               |                                      |  |   |   |  |   |   |   |  |                       |  |                                 |   |   |                       |  |   |   |   |  | ✓ |
| Loch of Kinnordy            |                                      |  |   |   |  |   |   |   | ✓  |                       |  |                                 |   |   |                       |  |   |   |   |  |   |
| Lochlea 3                   |                                      |  |   |   |  |   |   |   | ✓  |                       |  |                                 |   |   |                       |  |   |   |   |  | ✓ |
| Lochmaben,<br>Castle Loch 2 |                                      |  | ✓   |   |  |   |   |   |  |                       |  |                                 |   |   |                       |  |   |   |   |  |   |
| 'Orkney'                    |                                      |  |   |   |  | ✓   |   |   |  |                       |  |                                 | ✓   |   |                       |  |   |   |   | ✓  | ✓ |
| River Clyde                 |                                      |  |   |   |  | ✓   |   |   |  | ✓                     |  | ✓                               |   |   |                       |  |   |   |   | ✓  | ✓ |

APPENDIX 5

LIST OF LOGBOAT FORMS

| Irish Box Logboats                 |                           |                          |
|------------------------------------|---------------------------|--------------------------|
| Cloonagalloon                      |                           |                          |
| Irish Barge Logboats               |                           |                          |
| Co. Tyrone                         | Kinnegoe                  |                          |
| Scottish Barge Logboats            |                           |                          |
| Loch Doon 1                        | Loch Doon 6               |                          |
| Irish Canoe Logboats               |                           |                          |
| Aughamullan                        | Corry 1-2                 | Eskragh 1                |
| Ballybeg                           | Creagh 3                  | Fossa More               |
| Ballynahinch 3                     | Derries Lower             | Glaslough                |
| Ballyscullion                      | Derrya 1                  | Glassaneeran Upper 2     |
| Bannmouth                          | Derrybroughas             | Kesh                     |
| Baronscourt                        | Derryco                   | Lagavooren               |
| Beltoy 2                           | Derrygally 1              | Lemonfield               |
| Black River                        | Doon 1                    | Levaghery                |
| Callow                             | Drinagh                   | Lough Ennell 1           |
| Carrick-on-Shannon                 | Drumbo 1                  | Mullan Lower 1           |
| Church Island 1                    | Dullaghan                 | Toome 5-6                |
| Clooncunny 1                       | Edencrannon 1             | West Ward 2              |
| Clowninny                          |                           |                          |
| Scottish Canoe Logboats            |                           |                          |
| Barnkirk                           | Forfar 1                  | Loch of Kinnordy         |
| Cambuskenneth                      | Kilbrinie Loch 4          | Lochlea 3                |
| Craigsglen                         | Lea Shun                  | Lochmaben, Castle Loch 1 |
| Erskine 6                          |                           |                          |
| Irish Dissimilar-Ended Logboats    |                           |                          |
| Bellarena                          | Derrya More               | North Ward               |
| Brockish                           | Eskragh 2                 | Portadown 2              |
| Bunduvowen                         | Illanee 1                 | Tumna                    |
| Cahore 1                           | Killygowan 1              | Unprovenanced 1-2        |
| Clooncoe 1                         | Legg 1                    | Whitewood 2              |
| Crevinish 1                        | Mullaghcloe               |                          |
| Scottish Dissimilar-Ended Logboats |                           |                          |
| Buston 3                           | Errol 2                   | Loch Kinord 1            |
| Closeburn                          | Erskine 1                 | Loch Laggan 2            |
| Craigsglen                         | Glasgow, Clydehaugh 2     | Lochmaben, Castle Loch 2 |
| Dalmuir                            | Glasgow, Springfield 1, 5 | Lochmaben, Kirk Loch 2   |
| Dernaglar Loch                     | Littlehill                | 'Orkney'                 |
| Dowalton Loch 1-3                  | Loch Arthur 1             | River Carron             |
| Dumbuck                            | Loch Doon 3               |                          |

| Irish Punt Logboats       |                         |                        |
|---------------------------|-------------------------|------------------------|
| Altdrumman                | Corrachuill             | Oldbridge              |
| Ballinderry 1             | Culleen More            | Portadown 1            |
| Beltoy 1                  | Derryalla 2             | Portnacloyduff         |
| Cahore 2                  | Derrycrew               | Summerville            |
| Castledargan              | Edencrannon 2           | Tamlaghtmore           |
| Castlefreke               | Hacknahay               | Templemoyle 1-2        |
| Claggarnagh               | Knockbrack              | Toome 4                |
| Clonascra                 | Moy                     | Unprovenanced 4-6      |
| Collinstown               |                         |                        |
| Scottish Punt Logboats    |                         |                        |
| Eadarloch                 | Glasgow, Rutherglen Br. | Lochmaben, Kirk Loch 1 |
| Irish Tapered Logboats    |                         |                        |
| Clooncunny 2              | Drumnacor 1-2           | Lurgan                 |
| Cuppanagh                 | Drumreask 3             | Mullynascarty          |
| Deerpark                  | Fahy                    | Portadown 3            |
| Derrya 2                  | Inch 2                  | Portmore               |
| Derryinver                | Kilturbid               | River Casheen          |
| Derryloiste               | Kingsland 1             | Rossfad 2              |
| Derrymore                 | Levallinree 3           | Srahenny               |
| Doon 2-3                  | Lisnagonnell 4          | Stradone 2             |
| Downpatrick               | Lough Ennell 2          | Whitewood 3-4          |
| Drummans Lower            |                         |                        |
| Scottish Tapered Logboats |                         |                        |
| Buston 1                  | Garmouth                | Kilbrinie Loch 3       |
| Dalmarnock                | Glasgow, Hutcheson Br.  | Loch Glashan 1         |
| Drumduan                  | Glasgow, Springfield 2  | River Clyde            |

**APPENDIX 6**

**LIST OF LOGBOAT LENGTH RANGES**

| Irish Logboats from 1 to 1.99m in length    |                             |                          |
|---|-----------------------------|--------------------------|
| Annamakiff                                  | Co. Tyrone                  | Lynn                     |
| Ballintober                                 | Derrygally 3                | Roo                      |
| Copney                                      | Killygowan 2                | Yardland                 |
| Scottish Logboats from 1 to 1.99m in length |                             |                          |
| Barhapple Loch 1                            | Kirkmahoe                   | Loch Leven               |
| Kilbrinie Loch 2                            | Loch Chaluum Chille 2       | Lochlea 5                |
| Kilbrinie Loch 4                            |                             |                          |
| Irish Logboats from 2 to 2.99m in length    |                             |                          |
| Ballybeg                                    | Co. Waterford               | Glassaneeran Lower       |
| Ballydoolagh 2                              | Currygrane                  | Inch 1-2                 |
| Belturbet 2                                 | Derrygarve                  | Knockbrack               |
| Black River                                 | Derryloiste                 | Lisnagonnell 2-3         |
| Claggarnagh                                 | Direen Lower                | Portadown 2-3            |
| Clenagh                                     | Doon 2                      | Rosclave                 |
| Clowinny                                    | Drumbo 1                    | Tamlaghtmore             |
| Scottish Logboats from 2 to 2.99m in length |                             |                          |
| Barnkirk                                    | Glasgow, Hutcheson Br.      | Loch of Leys 1           |
| Catherinefield                              | Glasgow, Springfield 3      | Lochmaben Kirk Loch 1-2  |
| Craigsglen                                  | Kilblain 1-2                | Monkshill                |
| Forfar 1                                    |                             |                          |
| Irish Logboats from 3 to 3.99m in length    |                             |                          |
| Ardsallagh                                  | Derryalla 1                 | Lemonfield               |
| Aughamullan                                 | Derrycrew                   | Levallinree 2            |
| Ballagh                                     | Drinagh                     | Maghery 2                |
| Ballinderry 2-3                             | Dullaghan                   | Meelick                  |
| Ballyscullion                               | Edencrannon 2               | Mohill                   |
| Bannmouth                                   | Glaslough                   | Pollacorragune           |
| Beltoy 1-2                                  | Gortnaminsha                | Portadown 1              |
| Castledargan                                | Hacknahay                   | Rochfort Demesne         |
| Clonlisk                                    | Inchiquin                   | Toome 5-6                |
| Cloonagalloon                               | Irishtown                   | Tullybeg                 |
| Clooncoe 3                                  | Kingsland 1                 | Unprovenanced 1-2 & 5    |
| Cloontarsna 1                               | Knocklofty                  | West Ward 1-2 & 5-6      |
| Creagh 1-3                                  | Legg 2                      | Whitewood 2              |
| Deerpark                                    |                             |                          |
| Scottish Logboats from 3 to 3.99m in length |                             |                          |
| Bowling 2                                   | Glasgow, Rutherglen Br.     | Loch Doon 1, 6           |
| Castlemilk                                  | Glasgow, Springfield 1, 4-5 | Loch Glashan 1           |
| Closeburn                                   | Kilbrinie Loch 3            | Loch Kinellan            |
| Dernaglar Loch                              | Knaven                      | Loch Kinord 4            |
| Friarton                                    | Larg                        | Lochlea 1-3              |
| Glasgow, Clydehaugh 1, 4-5                  | Littlehill                  | Lochmaben, Castle Loch 1 |
| Glasgow, Point House                        | Loch Ard                    |                          |

| Irish Logboats from 4 to 4.99m in length    |                        |                          |
|---|------------------------|--------------------------|
| Ballycally                                  | Derrygally 2           | Mullan lower 1           |
| Ballydoolagh 1                              | Derrykerrib            | North Ward               |
| Bellarena                                   | Doon 3                 | Portaliff                |
| Bunninubber                                 | Downpatrick            | Randalstown 1, 3         |
| Clontycoora                                 | Drumbo 2               | River Foyle              |
| Cloonagee 1                                 | Drumreask 1            | Summerville              |
| Coleraine                                   | Dysert Marshes 1       | Templemoyle 1            |
| Corrachuill                                 | Hillsborough           | Toome 4                  |
| Corradillar                                 | Inchacooley            | Town Parks               |
| Cranaghan                                   | Kilturbid              | Trinity Island 1         |
| Derrya 1 & 3                                | Lagavooren             | Tumna                    |
| Derryalla 2                                 | Lisnagonnell 1         | Unprovenanced 6          |
| Derrybroughas                               | Lissard                | West Ward 4, 6           |
| Scottish Logboats from 4 to 4.99m in length |                        |                          |
| Acharacle                                   | Erskine 5              | Loch of Kinnordy         |
| Black Loch                                  | Garmouth               | Lochmaben, Castle Loch 2 |
| Dalmarnock                                  | Glasgow, Clydehaugh 2  | Mabie Moss               |
| Dalmuir                                     | Lea Shun               | Milton Loch              |
| Dingwall                                    | Loch Chaluum Chille 1  | Portnellan Island        |
| Eadarloch                                   | Loch Laggan 5          | White Loch               |
| Irish Logboats from 5 to 5.99m in length    |                        |                          |
| Altdrumman                                  | Derrygally 1           | New Ross                 |
| Ardakillin 2                                | Drumnacor 2            | Oldbridge                |
| Ballinclemsig                               | Edencrannon 1          | River Barrow 1           |
| Ballinderry 1                               | Glassaneeran Upper 2   | River Casheen            |
| Baronscourt                                 | Heathlodge 1           | Rossfad 2                |
| Bunduvowen                                  | Leamore                | Termonbacca 1-2          |
| Church Island 1                             | Legg 1                 | Trillick 2               |
| Cornaseer 2                                 | Levallinree 3          | Unprovenanced 3          |
| Culleen More                                | Lough Gara 17          | West Ward 3              |
| Derrya More                                 | Moy                    | Whitewood 1, 3           |
| Derryco                                     |                        |                          |
| Scottish Logboats from 5 to 5.99m in length |                        |                          |
| Cambuskenneth                               | Glasgow, Springfield 2 | Loch nam Miol            |
| Dowalton Loch 3                             | Kilbrinie Loch 1       | 'Orkney'                 |
| Glasgow, London Road                        | Loch Laggan 6          |                          |
| Irish Logboats from 6 to 6.99m in length    |                        |                          |
| Annagh                                      | Derrycoagh             | Knockaville              |
| Ballydoolagh 3                              | Derryhollagh           | Lanesborough 2           |
| Ballyhaunis 2                               | Drumnacor 1            | Lough Ennell 1-2         |
| Brockish                                    | Eskragh 2              | Maghery 1                |
| Cahore 1-2                                  | Fahy                   | Muckanagh                |
| Cavan                                       | Garraunfadda           | Mullaghcloe              |
| Church Island                               | Gubbaroe 2             | Portanure                |
| Claddagh River                              | Heathlodge 2           | Randalstown 2            |
| Clonaslee 1                                 | Illanee 2              | Stradone 1               |
| Clooncoe 1                                  | Keshcarrigan           | Toome 1                  |
| Cornaseer 1                                 | Killygowan 1           |                          |

| Scottish Logboats from 6 to 6.99m in length   |                    |                  |
|---|--------------------|------------------|
| Buston 1                                      | Erskine 6          | Milton Island    |
| Carse Loch                                    | Glasgow, Stobcross | River Clyde      |
| Dowalton Loch 1                               | Loch Kinord 1      | Sleepless Inch   |
| Irish Logboats from 7 to 7.99m in length      |                    |                  |
| Ballyhaunis 3                                 | Derries Lower 4    | Lisnagonnell 4   |
| Ballynahinch 3                                | Derry 2            | Lough Corrib     |
| Callow  | Derryinver         | Monaltyduff      |
| Clonava                                       | Doogary            | Mullynascarty    |
| Clooncunny 1-2                                | Doon 1             | Portnacrinnaught |
| Co. Cavan                                     | Dunshaughlin 1     | Rossfad 1        |
| Co. Galway                                    | Erril Lough        | Stradone 2       |
| Collinstown                                   | Eskragh 1          | Templemoyle 2    |
| Corlummin 3                                   | Garrynphort        | Trinity Island 2 |
| Cormangan                                     | Illanee 1          | Unprovenanced    |
| Corry 1-2                                     | Levallinree 1      | Whitewood 4      |
| Scottish Logboats from 7 to 7.99m in length   |                    |                  |
| Bowling 1                                     | Dowalton Loch 2, 4 | Loch Doon 3      |
| Buston 3                                      |                    |                  |
| Irish Logboats from 8 to 8.99m in length      |                    |                  |
| Ballinphort                                   | Drummans Lower     | Gavary 2         |
| Castlefreke                                   | Fossa More         | Portnacloyduff   |
| Crevinish 2                                   |                    |                  |
| Scottish Logboats from 8 to 8.99m in length   |                    |                  |
| Errol 2                                       | Erskine 1          | Loch Kinord 3    |
| Irish Logboats from 9 to 9.99m in length      |                    |                  |
| Ardtonnagh                                    | Derryad 2          | Killygar 1       |
| Blackwater Town                               | Derrynabuntale     | Killykeen 4      |
| Clooncoe 1                                    |                    |                  |
| Scottish Logboats from 9 to 9.99m in length   |                    |                  |
| Dumbuck                                       | Loch Kinord 2      |                  |
| Irish Logboats from 10 to 10.99m in length    |                    |                  |
| Crevinish 1                                   | Headford           | Lough Elia       |
| Derryad 1                                     |                    |                  |
| Scottish Logboats from 10 to 10.99m in length |                    |                  |
| River Carron                                  |                    |                  |
| Irish Logboats from 11 to 11.99m in length    |                    |                  |
| Clonscra                                      | River Barrow 2     |                  |
| Scottish Logboats from 11 to 11.99m in length |                    |                  |
| Loch Laggan 2                                 |                    |                  |
| Irish Logboats from 14 to 17m in length       |                    |                  |
| Crevinish 3                                   | Kesh               | Lurgan           |
| Drumreask 3                                   | Killykeen 1        |                  |

APPENDIX 7

LIST OF LOGBOAT WIDTH RANGES

|  |                         |                          |
|--|-------------------------|--------------------------|
| Irish Logboats from 0.2 to 0.29m in width    |                         |                          |
| Dysert Marshes 1                             | West Ward 4             |                          |
| Irish Logboats from 0.3 to 0.39m in width    |                         |                          |
| Derrygally 2, 4                              | Glassaneeran Lower      | Toome 5                  |
| Doogary                                      |                         |                          |
| Irish Logboats from 0.4 to 0.49m in width    |                         |                          |
| Ballybeg                                     | Drumbo 2                | Portadown 3              |
| Bannmouth                                    | Inch 2                  | Roo                      |
| Cahore 2                                     | Lough Ennell 1          | Stradone 2               |
| Clonlisk                                     | Lynn                    | Tamlaghtmore             |
| Cloongee 1                                   | Maghery 2               | Trinity Island 1         |
| Copney                                       | North Ward              | West Ward 7              |
| Scottish Logboats from 0.4 to 0.49m in width |                         |                          |
| Barnkirk                                     | Kirkmahoe               | Loch Laggan 6            |
| Irish Logboats from 0.5 to 0.59m in width    |                         |                          |
| Ballyhaunis 2                                | Derrycrew               | Levallinree 2            |
| Ballyscullion                                | Derrygarve              | Moy                      |
| Black river                                  | Drumnacor 1-2           | Portadown 1              |
| Cloontarsna 1                                | Gortnaminsha            | River Foyle              |
| Clowninny                                    | Hacknahay               | Toome 1, 6               |
| Co. Tyrone                                   | Killygowan 1            | Tullybeg                 |
| Currygrane                                   | Lagavooren              | West Ward 2              |
| Scottish Logboats from 0.5 to 0.59m in width |                         |                          |
| Carse Loch                                   | Glasgow, Hutcheson Br.  | Lochmaben, Castle Loch 1 |
| Closeburn                                    | Glasgow, Springfield 1  | Lochmaben, Kirk Loch 1-2 |
| Craigsglen                                   | Littlehill              |                          |
| Irish Logboats from 0.6 to 0.69m in width    |                         |                          |
| Ardsallagh                                   | Deer Park               | Mohill                   |
| Ballagh                                      | Derrya 2                | Portaliff                |
| Ballinderry 1                                | Derrybroughas           | River Casheen            |
| Brockish                                     | Direen Lower            | Srahenny                 |
| Castledargan                                 | Edenacrannon 2          | Templemoyle 1-2          |
| Cavan  | Garraunfadda            | Termonbacca 2            |
| Claggarnagh                                  | Heathlodge 1            | Tirliffin 2              |
| Cloonfinlough 1-2                            | Hillsborough            | Toome 4                  |
| Cornaseer 2                                  | Illanee 1-2             | Town Parks               |
| Corrachuill                                  | Irishtown               | Tumna                    |
| Cranaghan                                    | Kesh                    | Unprovenanced 2-3        |
| Crevinish 1                                  | Kilturbid               | West Ward 1, 5           |
| Culleen More                                 | Legg 2                  |                          |
| Scottish Logboats from 0.6 to 0.69m in width |                         |                          |
| Cambuskenneth                                | Glasgow, Clydehaugh 2   | Kilblain 2               |
| Castlemilk                                   | Glasgow, Point House    | Loch Laggan 5            |
| Eadarloch                                    | Glasgow, Rutherglen Br. | Lochlea 3                |
| Erskine 6                                    | Glasgow, Springfield 4  | Portnellan Island        |
| Forfar 1                                     | Kilbrinie Loch 2, 4     |                          |



| Irish Logboats from 0.7 to 0.79m in width    |                           |                       |
|--|---------------------------|-----------------------|
| Headford                                     | Mullan lower 1            | Summerville           |
| Inch 1                                       | Mullynascarty             | Termonbacca 1         |
| Keshcarrigan                                 | Pollacorrugane            | Unprovenanced 1, 4    |
| Levallinree 1                                | Randalstown 3             | Whitewood 2, 4        |
| Lough Elia                                   | Rosclave                  | Yardland              |
| Lough Ennell 2                               | Rosfad 1-2                |                       |
| Scottish Logboats from 0.7 to 0.79m in width |                           |                       |
| Buston 3                                     | Dowalton Loch 3           | Loch Kinellan         |
| Catherinefield                               | Garmouth                  | Loch Kinord 4         |
| Dalmarnock                                   | Glasgow, Clydehaugh 1     | River Clyde           |
| Dernaglar Loch                               | Kilbrinie Loch 3          | White Loch            |
| Dingwall                                     | Loch Glashan 1            |                       |
| Irish Logboats from 0.8 to 0.89m in width    |                           |                       |
| Altdrumman                                   | Derryco                   | Gubbaroe 1            |
| Baronscourt                                  | Derrygally 1              | Heathlodge 2          |
| Bellarena                                    | Derryloiste               | Knockbrack            |
| Clenagh                                      | Doon 2                    | Lisnagonnell 4        |
| Cloonagalloon                                | Dullaghan                 | Oldbridge             |
| Clooncunny 2                                 | Edenacrannon 1            | Portnacloyduff        |
| Coleraine                                    | Erril Lough               | Stradone 1            |
| Corry 1-2                                    | Gavary 2                  | Unprovenanced 6       |
| Co. Waterford                                | Glassaneeran Upper 2      | West Ward 6           |
| Derryalla 2                                  |                           |                       |
| Scottish Logboats from 0.8 to 0.89m in width |                           |                       |
| Dumbuck                                      | Loch Doon 1, 6            | Milton Island         |
| Friarton                                     | Loch of Kinnordy          | 'Orkney'              |
| Loch Ard                                     | Lochmaben, Castle Loch 2  |                       |
| Irish Logboats from 0.9 to 0.99m in width    |                           |                       |
| Annagh                                       | Derrya More               | Levallinree 3         |
| Ballinclemsig                                | Derryinver                | Lough Corrib          |
| Ballinderry 2                                | Derrynabuntale            | Monaltyduff           |
| Ballyhaunis 3                                | Drummans lower            | Mullaghcloe           |
| Ballynahinch 3                               | Drumreask 1               | Portanure             |
| Claddagh River                               | Dunshaughlin 1            | Portmore              |
| Clontycoora                                  | Fahy                      | Tully                 |
| Cornaseer 1                                  | Killykeen 1               | Whitewood 1-2         |
| Creagh 1, 3                                  | Lemonfield                |                       |
| Scottish Logboats from 0.9 to 0.99m in width |                           |                       |
| Black loch                                   | Glasgow, Springfield 2, 5 | Loch Chaluum Chille 1 |
| Bowling 2                                    | Kilbrinie Loch 1          | Loch Kinord 1         |
| Dalmuir                                      | Larg                      | Lochlea 5             |
| Glasgow, Clydehaugh 5                        | Lea shun                  | Mabie Moss            |
| Irish Logboats from 1 to 1.09m in width      |                           |                       |
| Aughamullan                                  | Derryalla 1               | Randalstown 2         |
| Beltoy 2                                     | Doon 3                    | Unprovenanced 5       |
| Callow                                       | Lough Owel 1              |                       |
| Scottish Logboats from 1 to 1.09m in width   |                           |                       |
| Glasgow, Springfield 3                       | Loch Doon 3               | Loch Kinord 2         |

|  |                       |                  |
|--|-----------------------|------------------|
| Irish Logboats from 1.1 to 1.19m in width    |                       |                  |
| Church Island                                | Lurgan                | River Barrow 2   |
| Clonascra                                    | Maghery 1             | West Ward 3      |
| Lissard                                      | Portnacrinnaught      |                  |
| Scottish Logboats from 1.1 to 1.19m in width |                       |                  |
| Dowalton Loch 1                              | Loch Kinord 3         | Loch nam Miol    |
| Irish Logboats from 1.2 to 1.29m in width    |                       |                  |
| Ardakillin 1                                 | Derryad 1-2           | River Barrow 1   |
| Ballinphort                                  | New Ross              | Trinity Island 2 |
| Collinstown                                  |                       |                  |
| Scottish Logboats from 1.2 to 1.29m in width |                       |                  |
| Buston 1                                     | Errol 2               | Knaven           |
| Dowalton Loch 2                              | Glasgow, Clydehaugh 4 |                  |
| Irish Logboats from 1.3 to 1.39m in width    |                       |                  |
| Bunduvowen                                   | Crevinish 3           |                  |
| Scottish Logboats from 1.3 to 1.39m in width |                       |                  |
| River Carron                                 |                       |                  |
| Irish Logboats from 1.4 to 1.49m in width    |                       |                  |
| Castlefreke                                  | Derryhollagh          | Derrymore        |
| Scottish Logboats from 1.5 to 1.59m in width |                       |                  |
| Erskine 1                                    | Loch Arthur 1         |                  |

**APPENDIX 8**

**LIST OF LOGBOAT HEIGHT RANGES**

|   |                         |                   |
|---|-------------------------|-------------------|
| Irish Logboats from 0.1 to 0.19m in height    |                         |                   |
| Cavan   | Derrya 1-2              | Inchacooley       |
| Scottish Logboats from 0.1 to 0.19m in height |                         |                   |
| Garmouth                                      |                         |                   |
| Irish Logboats from 0.2 to 0.29m in height    |                         |                   |
| Altdrumman                                    | Co. Tyrone              | Inch 2            |
| Ballybeg                                      | Crevinish 1             | Lagavooren        |
| Bannmouth                                     | Derryco                 | Portadown 3       |
| Beltoy 1                                      | Drumnacor 1             | Unprovenanced 4-5 |
| Clontycoora                                   | Fossa More              | Whitewood 1       |
| Clowninny                                     |                         |                   |
| Scottish Logboats from 0.2 to 0.29m in height |                         |                   |
| Craigsglen                                    | Glasgow, Rutherglen Br. | Kilbrinie Loch 3  |
| Dumbuck                                       |                         |                   |
| Irish Logboats from 0.3 to 0.39m in height    |                         |                   |
| Castlefreke                                   | Derrycrew               | River Foyle       |
| Claggarnagh                                   | Doon 1                  | Summerville       |
| Clooncunny 1                                  | Glassaneeran Upper 2    | Toome 4           |
| Cloongee 1                                    | Hacknahay               | Unprovenanced 6   |
| Collinstown                                   | Lough Ennell 1          | Yardland          |
| Culleen More                                  | North Ward              |                   |
| Scottish Logboats from 0.3 to 0.39m in height |                         |                   |
| Glasgow, Hutcheson Br.                        | Loch Glashan 1          | Loch of Kinnordy  |
| Glasgow, Springfield 1-2                      | Loch Kinord 1           | Lochlea 3         |
| Irish Logboats from 0.4 to 0.49m in height    |                         |                   |
| Bunduvowen                                    | Creagh 2                | Fahy              |
| Coleraine                                     | Derrybroughas           | Heathlodge 2      |
| Corlummin 3                                   | Doon 3                  | Portnacloyduff    |
| Cornaseer 1                                   |                         |                   |
| Scottish Logboats from 0.4 to 0.49m in height |                         |                   |
| Lochlea 5                                     |                         |                   |
| Irish Logboats from 0.5 to 0.59m in height    |                         |                   |
| Cloonagalloon                                 | Moy                     | Toome 6           |
| Clooncunny 2                                  | Mullynascarty           | Town Parks        |
| Derryalla 1                                   | Oldbridge               |                   |
| Scottish Logboats from 0.5 to 0.59m in height |                         |                   |
| Errol 2                                       | Glasgow, Springfield 5  | Loch Doon 1       |
| Claddagh River                                |                         |                   |
| Scottish Logboats from 0.6 to 0.69m in height |                         |                   |
| Dingwall                                      | Loch Doon 6             | River Clyde       |
| Irish Logboats from 0.7 to 0.79m in height    |                         |                   |
| Lissard                                       |                         |                   |
| Scottish Logboats from 0.7 to 0.79m in height |                         |                   |
| Loch Doon 3                                   |                         |                   |

|   |  |  |
|---|--|--|
| Irish Logboats from 0.9 to 0.99m in height    |  |  |
| Creagh 3                                      |  |  |
| Scottish Logboats from 0.9 to 0.99m in height |  |  |
| Friarton                                      |  |  |
| Scottish Logboats from 1 to 1.09m in height   |  |  |
| Erskine 1                                     |  |  |

## APPENDIX 9

### LIST OF LOGBOAT SLENDERNESS RATIOS

|  |                        |                          |
|--|------------------------|--------------------------|
| Irish Logboat Slenderness Ratios from 1 to 1.9m    |                        |                          |
| Hacknahay  |                        |                          |
| Irish Logboat Slenderness Ratios from 2 to 2.9m    |                        |                          |
| Inch 1   | Knockbrack             | Yardland                 |
| Scottish Logboat Slenderness Ratios from 2 to 2.9m |                        |                          |
| Glasgow, Clydehaugh 1                              | Glasgow, Springfield 3 | Knaven                   |
| Irish Logboat Slenderness Ratios from 3 to 3.9m    |                        |                          |
| Aughamullan  | Co. Tyrone             | Drumbo 1                 |
| Ballinderry 2                                      | Co. Waterford          | Inch 1                   |
| Beltoy 2   | Creagh 1, 3            | Lemonfield               |
| Belturbet 2  | Derryalla 1            | Roo                      |
| Claggarnagh  | Derryloiste            | Rosclave                 |
| Clenagh  | Doon 2                 | Unprovenanced 5          |
| Cloonagalloon                                      |                        |                          |
| Scottish Logboat Slenderness Ratios from 3 to 3.9m |                        |                          |
| Catherinefield                                     | Glasgow, Clydehaugh 5  | Larg                     |
| Friarton   | Glasgow, Springfield 5 | Loch Glashan 1           |
| Irish Logboat Slenderness Ratios from 4 to 4.9m    |                        |                          |
| Ballybeg   | Derryhollagh           | Lynn                     |
| Bellarena  | Direen Lower           | New Ross                 |
| Bunduvowen   | Doon 3                 | Pollacorrage             |
| Castledargan                                       | Drumreask 1            | River Barrow 1           |
| Clontycoora  | Dullaghan              | Unprovenanced 1, 6       |
| Clowninny  | Edencrannon 2          | West Ward 3              |
| Copney   | Lissard                | Whitewood 2              |
| Derrygally 3                                       |                        |                          |
| Scottish Logboat Slenderness Ratios from 4 to 4.9m |                        |                          |
| Barnkirk   | Kilbrinie Loch 3       | Loch nam Miol            |
| Bowling 2  | Kilblain 2             | Lochlea 3                |
| Dernaglar Loch                                     | Lea Shun               | Lochmaben, Castle Loch 2 |
| Forfar 1   | Loch Ard               | Lochmaben, Kirk Loch 1   |
| Glasgow, Clydehaugh 1                              | Loch Doon 1, 6         | Mabie Moss               |
| Irish Logboat Slenderness Ratios from 5 to 5.9m    |                        |                          |
| Ardsallagh   | Currygrane             | Maghery 1                |
| Ballagh  | Deerpark               | Portadown 3              |
| Baronscourt  | Derryalla 2            | Randalstown 2            |
| Beltoy 1   | Derrya More            | Tamlaghtmore             |
| Black River  | Derrycrew              | Unprovenanced 2          |
| Castlefreke  | Derrygarve             | West Ward 2, 5-6         |
| Church Island                                      | Irishtown              | Whitewood 3              |
| Collinstown  | Legg 2                 |                          |
| Scottish Logboat Slenderness Ratios from 5 to 5.9m |                        |                          |
| Black Loch   | Dalmuir                | Glasgow, Springfield 1   |
| Buston 1   | Dowalton Loch 1-2      | Loch Kinord 4            |
| Castlemilk   | Erskine 1              | Loch of Kinnordy         |
| Craigsglen   | Glasgow, Hutcheson Br. | White Loch               |

|  |                           |                          |
|--|---------------------------|--------------------------|
| Dalmarnock   | Glasgow, Rutherglen Br.   |                          |
| Irish Logboat Slenderness Ratios from 6 to 6.9m    |                           |                          |
| Altdrumman   | Derrygally 1              | Portnacrinnaight         |
| Annagh   | Edencrannon 1             | Randalstown 3            |
| Ballinclemsgig                                     | Fahy                      | Rossfad 2                |
| Ballycally   | Glassaneeran Upper 2      | Summerville              |
| Church Island 1                                    | Gortnaminsa               | Termonbacca 1            |
| Clonlisk   | Kilturbid                 | Toome 4, 6               |
| Coleraine  | Mohill                    | Trinity Island 2         |
| Corradillar  | Mullaghcloe               | Tullybeg                 |
| Derrya 1   | Mullan Lower 1            | West Ward 1              |
| Derrybroughas                                      | Oldbridge                 | Whitewood 1              |
| Derryco  | Portadown 1               |                          |
| Scottish Logboat Slenderness Ratios from 6 to 6.9m |                           |                          |
| Closeburn  | Glasgow, Springfield 2, 4 | Loch Kinord 1            |
| Dingwall   | Kilbrinie Loch 1          | Lochmaben, Kirk Loch 2   |
| Garmouth   | Littlehill                | 'Orkney'                 |
| Glasgow, Point House                               | Loch Doon 3               |                          |
| Irish Logboat Slenderness Ratios from 7 to 7.9m    |                           |                          |
| Ballinderry 1                                      | Cranaghan                 | Portanure                |
| Ballinphort  | Derryad 2                 | River Casheen            |
| Ballyscullion                                      | Dunshaughlin 1            | Templemoyle 1            |
| Callow   | Glassaneeran Lower        | Town Parks               |
| Claddagh River                                     | Heathlodge 2              | Tumna                    |
| Cloontarsna 1                                      | Loch Corrib               | Unprovenanced 3          |
| Corrachuill  | Portaliff                 | West Ward 7              |
| Scottish Logboat Slenderness Ratios from 7 to 7.9m |                           |                          |
| Dowalton loch 3                                    | Glasgow, Clydehaugh 2     | Lochmaben, Castle Loch 1 |
| Eadarloch  | Loch Laggan 5             | Milton Island            |
| Errol 2  |                           |                          |
| Irish Logboat Slenderness Ratios from 8 to 8.9m    |                           |                          |
| Ballyhaunis 3                                      | Derryad 1                 | Lagavooren               |
| Ballynahinch 3                                     | Derrycoagh                | Lisnagonnell 4           |
| Bannmouth  | Derryinver                | Maghery 2                |
| Cahore 1   | Eskragh 2                 | Monaltyduff              |
| Clonaslee 1  | Hillsborough              | River Foyle              |
| Culleen More                                       | Keshcarrigan              | Stradone 1               |
| Scottish Logboat Slenderness Ratios from 8 to 8.9m |                           |                          |
| Cambuskenneth                                      | River Carron              | River Clyde              |
| Loch Kinord 3                                      |                           |                          |
| Irish Logboat Slenderness Ratios from 9 to 9.9m    |                           |                          |
| Ardakillin 1                                       | Derries Lower 4           | Eskragh 1                |
| Cavan  | Derrymore                 | Garraunfadda             |
| Clooncunny 1-2                                     | Derrynabuntale            | Heathlodge 1             |
| Co. Cavan  | Doon 1                    | Lough Ennell 2           |
| Corlumin 3   | Drumbo 2                  | Mullynascarty            |
| Cornaseer 2  | Drummans Lower            | Portnacloyduff           |
| Corry 1-2  | Erril Lough               | Termonbacca 2            |
| Scottish Logboat Slenderness Ratios from 9 to 9.9m |                           |                          |
| Loch Arthur 1                                      | Loch Kinellan             | Loch Kinord 2            |

|  |                |                  |
|--|----------------|------------------|
| Irish Logboat Slenderness Ratios from 10 to 10.9m    |                |                  |
| Brockish   | Illanee 2      | Rossfad 1        |
| Clonscra   | Moy            | Toome 5          |
| Co. Galway   | North Ward     | Trinity Island 1 |
| Drumnacor 2  | Portmore       | Unprovenanced 4  |
| Garrynphort  | River Barrow 2 |                  |
| Scottish Logboat Slenderness Ratios from 10 to 10.9m |                |                  |
| Erskine 6  |                |                  |
| Irish Logboat Slenderness Ratios from 11 to 11.9m    |                |                  |
| Cloonagee 1  | Illanee 1      | Templemoyle 2    |
| Crevinish 3  | Killygowan 1   | Whitewood 4      |
| Gavary 2   |                |                  |
| Scottish Logboat Slenderness Ratios from 11 to 11.9m |                |                  |
| Buston 3   | Drumduan       |                  |
| Irish Logboat Slenderness Ratios from 12 to 12.9m    |                |                  |
| Clooncoe 1   | Drumnacor 1    | Lough Owel 1     |
| Derrya 2   | Fossa More     | Toome 1          |
| Scottish Logboat Slenderness Ratios from 12 to 12.9m |                |                  |
| Carse Loch   |                |                  |
| Irish Logboat Slenderness Ratios from 13 to 13.9m    |                |                  |
| Ballyhaunis 2  | Derrygally 2   |                  |
| Scottish Logboat Slenderness Ratios from 13 to 13.9m |                |                  |
| Loch Laggan 6  |                |                  |
| Irish Logboat Slenderness Ratios from 14 to 14.9m    |                |                  |
| Cahore 2   | Lough Elia     | Lough Ennell 1   |
| Headford   |                |                  |
| Irish Logboat Slenderness Ratios from 15 to 15.9m    |                |                  |
| Crevinish 1  | Stradone 2     | Tully            |
| Irish Logboat Slenderness Ratios from 16 to 16.9m    |                |                  |
| Gubbaroe 1   | Killykeen 1    | West Ward 4      |
| Irish Logboat Slenderness Ratios from 17 to 17.9m    |                |                  |
| Dysert Marshes 1                                     | Tirliffin 2    |                  |
| Irish Logboat Slenderness Ratios from 19 to 19.9m    |                |                  |
| Drumreask 3  | Lurgan         |                  |
| Irish Logboat Slenderness Ratios from 21 to 21.9m    |                |                  |
| Srahenny   |                |                  |
| Irish Logboat Slenderness Ratios from 23 to 23.9m    |                |                  |
| Doogary  |                |                  |
| Irish Logboat Slenderness Ratios from 27 to 27.9m    |                |                  |
| Kesh 1   |                |                  |

**APPENDIX 10**

**LIST OF LOGBOAT BROADNESS RATIOS**

| Scottish Logboat Broadness Ratios up to 0.9     |                          |                   |
|---|--------------------------|-------------------|
| Friarton  |                          |                   |
| Irish Logboat Broadness Ratios from 1 to 1.9    |                          |                   |
| Ballybeg  | Derrybroughas            | Mullynascarty     |
| Beltoy 1  | Derrycrew                | North Ward        |
| Claddagh River                                  | Drumnacor 1              | Oldbridge         |
| Clooncunny 2                                    | Fossa More               | Portadown 3       |
| Cloongee 1                                      | Hacknahay                | River Foyle       |
| Coleraine                                       | Heathlodge 2             | Summerville       |
| Corlummin 3                                     | Lissard                  | Toome 6           |
| Cornaseer 1                                     | Lough Ennell 1           | Town Parks        |
| Creagh 3  | Moy                      | Yardland          |
| Scottish Logboat Broadness Ratios from 1 to 1.9 |                          |                   |
| Closeburn                                       | Glasgow, Clydehaugh 1    | Larg              |
| Dingwall  | Glasgow, Hutcheson Br.   | Loch Doon 1, 3, 6 |
| Erskine 1                                       | Glasgow, Springfield 5   | River Carron      |
| Irish Logboat Broadness Ratios from 2 to 2.9    |                          |                   |
| Brockish  | Culleen More             | Lagavooren        |
| Claggaranagh                                    | Derryalla 1              | Portnacloyduff    |
| Clooncunny 1                                    | Doon 1, 3                | Toome 4           |
| Co. Tyrone                                      | Fahy                     | Unprovenanced 6   |
| Crevinish 1                                     | Glassaneeran Upper 2     |                   |
| Scottish Logboat Broadness Ratios from 2 to 2.9 |                          |                   |
| Craigsglen                                      | Forfar 1                 | Loch Glashan 1    |
| Dowalton Loch 1                                 | Glasgow, Springfield 1-2 | Loch of Kinnordy  |
| Drumduan  | Kilbrinie Loch 3         | Lochlea 3         |
| Errol 2   |                          |                   |
| Irish Logboat Broadness Ratios from 3 to 3.9    |                          |                   |
| Collinstown                                     | Derryco                  |                   |
| Irish Logboat Broadness Ratios from 4 to 4.9    |                          |                   |
| Unprovenanced 5                                 |                          |                   |



**APPENDIX 11**

**LIST OF LOGBOAT THICKNESS RATIOS**

| Irish Logboat Thickness Ratios from 1 to 1.9    |                         |                        |
|---|-------------------------|------------------------|
| Altdrumman                                      | Derrya 2                | Lagavooren             |
| Ballinphort                                     | Derrybroughas           | Moy                    |
| Castlefreke                                     | Fahy                    | Portnacloyduff         |
| Claddagh River                                  | Heathlodge 2            | River Foyle            |
| Clowninny                                       | Irishtown               | Summerville            |
| Cornaseer 1                                     | Kilturbid               | Unprovenanced 5-6      |
| Scottish Logboat Thickness Ratios from 1 to 1.9 |                         |                        |
| Dumbuck   | Kilbrinie Loch 3        | Loch of Kinnordy       |
| Glasgow, Hutcheson Br.                          | Littlehill              | Lochmaben, Kirk Loch 2 |
| Glasgow, Springfield 1-2, 5                     |                         |                        |
| Irish Logboat Thickness Ratios from 2 to 2.9    |                         |                        |
| Ballinderry 1                                   | Derrya More             | Mullynascarty          |
| Bannmouth                                       | Derryco                 | Portadown 3            |
| Clenagh   | Derrycrew               | Toome 4                |
| Clooncunny 2                                    | Edencrannon 2           | Town Parks             |
| Co. Tyrone                                      | Illanee 2               | Unprovenanced 4        |
| Crevinish 1                                     | Lisnagonnell 4          | West Ward 2            |
| Derrya 1  | Lough Ennell 1          | Yardland               |
| Scottish Logboat Thickness Ratios from 2 to 2.9 |                         |                        |
| Buston 3  | Erskine 1               | Loch Glashan 1         |
| Closeburn                                       | Forfar 1                | Lochlea 3              |
| Craigsglen                                      | Glasgow, Rutherglen Br. | River Clyde            |
| Eadarloch                                       | Loch Doon 3             |                        |
| Irish Logboat Thickness Ratios from 3 to 3.9    |                         |                        |
| Ballybeg  | Cloonagalloon           | Cloongee 1             |
| Scottish Logboat Thickness Ratios from 3 to 3.9 |                         |                        |
| Catherinefield                                  | Friarton                | Loch Arthur 1          |
| Irish Logboat Thickness Ratios from 5 to 5.9    |                         |                        |
| Hacknahay                                       |                         |                        |

APPENDIX 12

LIST OF LOGBOATS AND THEIR REGIONS

| Irish Logboats from Region 1 |                          |                    |
|------------------------------|--------------------------|--------------------|
| Altdrumman                   | Co. Tyrone               | Termonbacca 1-3    |
| Ballyscullion                | Creagh 1-3               | Town Parks         |
| Baronscourt                  | Derrygarve               | Tullybeg           |
| Bellarena                    | North Ward               | Urney Glebe        |
| Church Island                | River Foyle              | West Ward 1-9      |
| Coleraine                    | South Ward               |                    |
| Irish Logboats from Region 2 |                          |                    |
| Ardbrin                      | Derryinver               | Levaghery          |
| Aughamullan                  | Derryloiste              | Lisnhunshin        |
| Ballykilbeg                  | Derrymore                | Lisnagonnell 1-4   |
| Bannmouth                    | Doogary                  | Lissaghmore        |
| Beltoy 1 & 2                 | Downpatrick              | Maghery 1 & 2      |
| Blackwater Town              | Dullaghan                | Meenan             |
| Brockish                     | Edencrannon 1 & 2        | Moy                |
| Copney                       | Eskragh 1 & 2            | Mullan Lower 1 & 2 |
| Deerpark                     | Glassaneeran Lower       | Portadown 1-3      |
| Derryalla 1-7                | Glassaneeran Upper 1 & 2 | Portmore           |
| Derrybroughas                | Hacknahay                | Randalstown 1-3    |
| Derrycrew                    | Hillsborough             | Tamlaghtmore       |
| Derrygally 1-3               | Inch 1-3                 | Toome 1-6          |
| Derryhollagh                 | Kilnock                  | Trillick 1 & 2     |
| Derryhubbert                 | Kinnegoe                 | Whitewood 1-5      |
| Irish Logboats from Region 3 |                          |                    |
| Ballindoon 1 & 2             | Cloonagalloon            | Knockbrack         |
| Ballintober                  | Clooncunny 1 & 2         | Lemonfield         |
| Ballycally                   | Cloongee 1-3             | Lough Corrib       |
| Ballydoogan                  | Co. Galway               | Lough Elia         |
| Ballyhaunis 1-3              | Corlummin 1-3            | Loughrea 1-4       |
| Black River                  | Doon 1-4                 | Pollacorrage       |
| Bunduvowen                   | Drinagh                  | Rosclave           |
| Castledargan                 | Headford                 | Summerville        |
| Church Island 1-3            | Illanee 1-4              | Templemoyle 1 & 2  |
| Claggarnagh                  | Inchiquin                |                    |
| Irish Logboats from Region 4 |                          |                    |
| Ahascragh                    | Belturbet 1 & 2          | Cloontarsna 1-6    |
| Annagh                       | Bunintubber              | Clowinny           |
| Annamakiff                   | Callow                   | Co. Cavan          |
| Ardakillin 1 & 2             | Carrick-on-Shannon       | Collinstown        |
| Ardsallagh                   | Cavan                    | Coolbuck 1-3       |
| Ardsoreen 1-3                | Clenagh                  | Cormongan          |
| Ardtonnagh                   | Clonava                  | Cornagall          |
| Ballagh                      | Cloncorick               | Cornaseer 1 & 2    |
| Ballaghaderren               | Clontycoora              | Corrachuill        |
| Ballinderry 1-3              | Cloonacolly 1 & 2        | Corradillar        |
| Ballinphort                  | Clooncoe 1-3             | Corry 1 & 2        |
| Ballydoolough 1-5            | Cloonfinlough            | Cranaghan          |

|                                 |                           |                    |
|---------------------------------|---------------------------|--------------------|
| Crevinish 1-3                   | Gaddaghanstown            | Lynn               |
| Cullenhugh                      | Garraunfadda              | Meelick            |
| Culleen More                    | Garrynphort               | Mohill             |
| Cuppanagh                       | Garvary                   | Monaltyduff        |
| Currygrane                      | Glaslough                 | Monea              |
| Derries Lower 1-4               | Gortnaminsa               | Moneynoe           |
| Derrya 1-3                      | Gubbaroe 1 & 2            | Muckanagh          |
| Derryad 1 & 2                   | Heathlodge 1 & 2          | Mullaghcloe        |
| Derrya More                     | Kesh                      | Mullynascarty      |
| Derryco                         | Keshcarrigan              | Portaliff          |
| Derrycoagh                      | Killygar 1 & 2            | Portanure          |
| Derrykerrib                     | Killygowan 1 & 2          | Portnacloyduff     |
| Derrynabuntale                  | Killykeen 1-5             | Portnacrinnaught   |
| Derrynagolliagh                 | Kilmore                   | Portumna           |
| Dromineer                       | Kilturbid                 | Red Island         |
| Drumbo 1 & 2                    | Kingsland 1-9             | River Casheen      |
| Drumconor                       | Knockaville               | Rochfort Demesne   |
| Drumgay                         | Lanesborough 1 & 2        | Roo                |
| Drumkeery                       | Leamore                   | Rosfad 1 & 2       |
| Drumleague                      | Legg 1 & 2                | Sleven             |
| Drummans Island                 | Levallinree 1-3           | Srahenny           |
| Drummans Lower                  | Lissard                   | Stradone 1 & 2     |
| Drumnacor 1 & 2                 | Lough Allen               | Strokestown        |
| Drumreask 1-3                   | Lough Ennell 1 & 2        | Tirliffin 1 & 2    |
| Dysert Marshes 1-3              | Lough Gara 1-17           | Trinity Island 1-7 |
| Erril Lough                     | Lough Owel 1-3            | Tully              |
| Fahy                            | Lough Ree                 | Tumna              |
| Fossa More                      | Lurgan                    |                    |
| Irish Logboats from Region 5    |                           |                    |
| Ballybeg                        | Coolcor                   | Knocklofty         |
| Ballynahinch 1-3                | Co. Waterford             | Lagavooren         |
| Bawnbreakey                     | Dunshaughlin 1 & 2        | New Ross           |
| Cahore 1 & 2                    | Huntington                | Oldbridge          |
| Clonscra                        | Inchacooley               | River Barrow 1-3   |
| Clonaslee 1-5                   | Irish Town                | Sutton             |
| Clonlisk                        | Killurin                  | Yardland           |
| Irish Logboats from Region 6    |                           |                    |
| Ballinclemsig                   | Castlefreke               | Direen Lower       |
| Scottish Logboats from Region 1 |                           |                    |
| Dingwall                        | Gordon Castle             | Loch of the Clans  |
| Garmouth                        | Loch Kinellan             |                    |
| Scottish Logboats from Region 2 |                           |                    |
| Acharacle                       | Lendrick Muir             | Loch Laggan 1-7    |
| Carn an Roin                    | Loch Chaluum Chille 1 & 2 | Loch nam Miol      |
| Eadarloch                       | Loch Glashan 1 & 2        |                    |
| Scottish Logboats from Region 3 |                           |                    |
| Craigsglen                      | Loch Kinord 1-4           | Lochlundie Moss    |
| Drumduan                        | Loch of Leys 1 & 2        | Monkshill          |
| Knaven                          |                           |                    |

| Scottish Logboats from Region 4 |                                |                              |
|---------------------------------|--------------------------------|------------------------------|
| Auchlishie                      | Flanders Moss                  | Port Laing 1 & 2             |
| Barry Links                     | Forfar 1 & 2                   | Portbane                     |
| Cambuskenneth                   | Friarton                       | Portnellan Island            |
| Clune Hill, Lochore             | Kinross                        | River Carron                 |
| Croft-na-Caber                  | Linlithgow                     | River Forth                  |
| Dalmarnock                      | Loch Ard                       | River Tay                    |
| Errol 1 & 2                     | Loch Leven                     | Sleepless Inch               |
| Falkirk                         | Loch of Kinnordy               | Stirling, King Street        |
| Scottish Logboats from Region 5 |                                |                              |
| Bowling 1 & 2                   | Glasgow, Drygate Street        | Glasgow, Stobcross           |
| Castle Semple Loch              | Glasgow, Hutcheson Br.         | Glasgow, Stockwell           |
| Castlemilk                      | Glasgow, London Road           | Glasgow, Tontine             |
| Dalmuir                         | Glasgow, Old St Enoch's Church | Glasgow, Yoker 1 & 2         |
| Dumbuck                         | Glasgow, Point House           | Kilbrinie Loch 1-4           |
| Finlaystone                     | Glasgow, Rutherglen Br.        | Parkfergus                   |
| Gartcosh House                  | Glasgow, Springfield 1-5       | River Clyde                  |
| Glasgow, Clydehaugh 1-5         |                                |                              |
| Scottish Logboats from Region 6 |                                |                              |
| Barhapple Loch 1 & 2            | Erskine 1-6                    | Lochmaben, Castle Loch 1 & 2 |
| Barnkirk                        | Kilblain 1 & 2                 | Lochmaben, Kirk Loch 1 & 2   |
| Black Loch                      | Kirkmahoe                      | Lochspouts                   |
| Buston 1-3                      | Larg                           | Mabie                        |
| Carlingwark Loch                | Littlehill                     | Milton Island                |
| Carse Loch                      | Loch Arthur 1 & 2              | Milton Loch                  |
| Catherinefield                  | Loch Doon 1-6                  | Morton                       |
| Closeburn                       | Loch Urr                       | Redkirk Point 1 & 2          |
| Dernaglar Loch                  | Lochar Moss                    | White Loch                   |
| Dowalton Loch 1-5               | Lochlea 1-5                    |                              |

## APPENDIX 13

### LIST OF SYMBOLS USED IN CHAPTER 13

#### Density:

|             |  |
|-------------|--|
| $\rho$      | Density  |
| $\rho_a$    | Official Seasoned Oak Density                        |
| $\rho_b$    | Official Fresh Oak Density                           |
| $\rho_c$    | Experimental Oak Density                             |
| $\rho_{ca}$ | Density of Cargo                                     |
| $\rho_d$    | Average Oak Density (between Seasoned and Fresh Oak) |
| $\rho_l$    | Logboat's Density                                    |
| $\rho_t$    | Theoretical Density                                  |
| $\rho_{tl}$ | Theoretical Logboat Density                          |
| $\rho_r$    | Actual Density                                       |
| $\rho_w$    | Density of Water                                     |

#### Dimensions:

|       |                                 |
|-------|---------------------------------|
| $H$   | External Height of Logboat      |
| $h$   | Internal Height of Logboat      |
| $Loa$ | Overall Length (of the Logboat) |
| $W$   | External Width of Logboat       |
| $w$   | Internal Width of Logboat       |

#### Displacement:

|          |                          |
|----------|--------------------------|
| $\Delta$ | Displacement             |
| $D$      | Displacement of the Hull |

#### Draught:

|       |                                      |
|-------|--------------------------------------|
| $T$   | Draught                              |
| $T_b$ | Draught applying Density of $\rho_b$ |
| $T_c$ | Draught applying Density of $\rho_c$ |
| $T_r$ | Actual Draught                       |

$T_t$  Test Draught

Resistance:

$f$  Coefficient of Friction  
 $K$  Speed Length Ratio  
 $R$  Resistance  
 $R_f$  Frictional Resistance  
 $S$  Total Wetted Surface Area  
 $V$  Speed (measured in Knots)

Stability:

$A$  Righting Arm  
 $B$  Centre of Buoyancy  
 $BM$  Metacentric Radius  
 $G$  Centre of Gravity  
 $GM$  Metacentric Height  
 $I$  Moment of Inertia of the cross-section of the Hull about the Waterline  
 $M$  Moment of Inertia through the Centre of Gravity

Volume:

$\nabla$  Volume  
 $\nabla_c$  Volume of Cargo  
 $\nabla_w$  Volume of Displaced Water

Waterline:

$WL$  Waterline (also  $wl$ )  
 $LWL$  Waterline Length  
 $WWL$  Waterline Width

Weight:

$W$  Weight  
 $W_a$  Actual Weight  
 $W_c$  Weight of Cargo  
 $W_l$  Weight of Logboat  
 $W_r$  Actual Weight

## APPENDIX 14

### GLOSSARY OF BOAT AND NAUTICAL TERMS

All definitions presented below are from Shuwall, 1981.

|                        |   |
|------------------------|---|
| <b>Aboard</b>          | See <b>On board</b> .   |
| <b>About</b>           | A boat goes about if, when changing direction, (tacking) its nose or bow crosses the wind. Opposite is <b>Gibe</b> .                        |
| <b>Adrift</b>          | Said of a water-going vessel whose movement is provided by tide and current rather than by its own source of power.                         |
| <b>Afloat</b>          | Resting, or suspended, on the surface of the water.   |
| <b>Aft</b>             | Something or someone is aft when positioned towards the rear or stern of the vessel.  |
| <b>Aground</b>         | Refers to a vessel that is touching or stuck on the bottom.   |
| <b>Ahead</b>           | Towards or in front of the bow of a vessel.   |
| <b>Amidships</b>       | Refers to the section of the boat which is midway between the stern and the bow.  |
| <b>Astern</b>          | Said of something or someone to the rear of the vessel's stern.   |
| <b>Awash</b>           | Refers to a vessel whose surface is being washed over by waves or tides but is not submerged; especially when heeling.                      |
| <b>Backwater</b>       | To push on the oars in a reverse action so as to make the boat go backwards.  |
| <b>Bail</b>            | To remove excess water from a boat by means of a bucket or pump.  |
| <b>Ballast</b>         | A heavy, weighted material used to stabilise or steady a boat, placed at the bottom of a vessel.  |
| <b>Beam</b>            | The widest part of the ship.  |
| <b>Bear away</b>       | To steer the boat away from the wind.   |
| <b>Beating</b>         | Going towards the wind, by way of a zig-zag course, or tacking.   |
| <b>Before the wind</b> | Descriptive of a boat that is going downwind.   |
| <b>Bilge</b>           | The open area, below the cabin floor and above the keel, where water collects. The curved exterior portion of the hull below the waterline. |
| <b>Blade</b>           | The part of the oar which is dipped into and pushes against the water.  |
| <b>Bow</b>             | The forward or pointed end of a boat.   |

|                     |  |
|---------------------|--|
| <b>Bulkhead</b>     | A strong upright wall or partition inside of a boat; a structure that divides the ships compartments.                                      |
| <b>Buoy</b>         | A floating navigational marker.  |
| <b>Capsize</b>      | To turn over.  |
| <b>Carvel build</b> | A type of boat whose planks are smooth rather than overlapping or clinker in build.  |
| <b>Catamaran</b>    | A boat with two hulls.   |
| <b>Caulk</b>        | To seal cracks and other vulnerable leakage spots on board a boat with waterproofing material. The sealing material itself.                |
| <b>Centreboard</b>  | A large metal plate or wooden board which is lowered so as to create lateral resistance.   |
| <b>Chine</b>        | The angle between the sides and bottom on the hull of a boat.  |
| <b>Cleats</b>       | Fittings to which lines are secured.   |
| <b>Course</b>       | The direction or path on which a vessel moves.   |
| <b>Displacement</b> | The weight of that water which is displaced by a boat.   |
| <b>Draught</b>      | The draught is the difference from the waterline to the tip of the hull or keel.   |
| <b>Drift</b>        | The action of a boat as it moves along in its course because of the force of winds, currents, or tides.                                    |
| <b>Ease</b>         | To decrease the pressure on a sail by letting out the sheet.   |
| <b>False keel</b>   | An additional extension keel used for stability and increased draught.   |
| <b>Fore</b>         | Refers to the front section of the boat.   |
| <b>Forward</b>      | The area towards the bow of the boat.  |
| <b>Freeboard</b>    | The section of a boat, between the hull's waterline and the boat's deck, which remains above water.  |
| <b>Furl</b>         | To roll up a sail.   |
| <b>Gibe</b>         | When a boat changes direction, its stern or back end crosses the wind, the boat gibes.   |
| <b>Go about</b>     | To tack, to change direction across the wind.  |
| <b>Head wind</b>    | A wind which is blowing in a direction that is opposite from that in which the boat is travelling.   |
| <b>Heel</b>         | The position of a boat when it leans over.   |
| <b>Keel</b>         | The main timber of foundation of a vessel; also the name of the protruding timber which extends lengthwise along the bottom of the vessel. |
| <b>Keelson</b>      | A timber which is bolted to the keel of the boat for additional support.   |



|                       |   |
|-----------------------|---|
| <b>Knot</b>           | A unit of speed equalling one nautical mile per hour, which equals 6080 feet or 1853.2 metres.      |
| <b>Leeward</b>        | Away from the wind.   |
| <b>LWL</b>            | Waterline length.   |
| <b>Mainsheet</b>      | A line which controls and is hitched to the mainsail.   |
| <b>Mast</b>           | A long vertical spar on a boat to which sails and rigging are attached.                             |
| <b>Midships</b>       | The widest part of a vessel.  |
| <b>On Board</b>       | On or in a vessel.  |
| <b>Outtrigger</b>     | A spar which extends outward from the boat, and functions in a variety of ways.                     |
| <b>Point up</b>       | To steer a boat closer to the wind.   |
| <b>Port</b>           | The left side; all parts of a vessel which are to the left of the centreline are on the port side.  |
| <b>Quarter</b>        | The section of a vessel, either on port or starboard, which is between midships and astern.         |
| <b>Reach</b>          | When a boat is sailing with the wind abeam it is sailing on a reach.                                |
| <b>Reef</b>           | To shorten or lessen a sail area.   |
| <b>Ribs</b>           | The timbers which form a vessel's frame.  |
| <b>Rigging</b>        | Refers to all cables, lines and ropes which are used on board a vessel.                             |
| <b>Run</b>            | A boat is sailing directly with the wind is on a run.   |
| <b>Running strake</b> | A board running fore to aft of a boat which protects the hull or acts to stabilise it.              |
| <b>Scull</b>          | To scull is to use the oar at the stern of a boat, moving it in sudden or swift, short sidestrokes. |
| <b>Sheet</b>          | Lines which control the sails and the motion of the boom.   |
| <b>Spars</b>          | Any poles used in support such as masts, booms, yards, sprits and gaffs.                            |
| <b>Starboard</b>      | The area to the right of the centreline of a boat is the starboard side.                            |
| <b>Stays</b>          | Cables which support the mast.  |
| <b>Stern</b>          | The section of a boat opposite the bow, or the after end of the vessel.                             |
| <b>Sternboard</b>     | See <b>Transom</b>  |
| <b>Strake</b>         | Planks or boards which run fore and aft in a boat rather than across it.                            |
| <b>Thwarts</b>        | Seats that go athwartships in an open boat.   |
| <b>Transom</b>        | Timbers placed across the stern forming the flat or slightly curved section of the boat's stern.    |
| <b>Tumblehome</b>     | The section of the side of a boat which curves upwards and inward towards the centreline.           |

|                   |  |
|-------------------|--|
| <b>Wash</b>       | Waves caused by a vessel's progress.   |
| <b>Washstrake</b> | A board above the gunwale of a boat whose function is to keep the sea and spray out of the boat. |
| <b>Windward</b>   | Towards the wind.  |
| <b>Yard</b>       | A spar that is attached at the centre of the mast and runs athwartships.                         |