

PALAEONTOLOGICAL RESOURCES IN ENGLAND  
AND SCOTLAND:  
ASSESSING THE REQUIREMENT FOR THE  
REGULATION OF COLLECTING ACTIVITIES

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# CONTENTS

Page No

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	SETTING THE SCENE.....	1
1.2	RESEARCH OBJECTIVES AND METHODOLOGIES .....	1
1.3	SOURCES OF INFORMATION .....	4
1.4	TIMELINESS OF RESEARCH.....	5
1.5	EMPHASIS UPON FOSSILS.....	5
	1.5.1 Commercial Value.....	6
	1.5.2 Scientific Importance.....	6
	1.5.3 Contemporary Interest and Appeal .....	7
1.6	OTHER COUNTRIES SELECTED FOR DISCUSSION .....	7
	1.6.1 United States of America .....	8
	1.6.2 Australia, Canada, and Germany .....	8
	1.6.3 Illegal Collecting Activities .....	8
1.7	NEED FOR REGULATION OF PALAEOLOGICAL RESOURCES.....	9
	1.7.1 Intrinsic Value of Fossil Specimens.....	9
	1.7.2 Accompanying Scientific Information .....	9
1.8	NATURE OF REGULATION .....	10
<b>2</b>	<b>USE AND CONSERVATION OF PALAEOLOGICAL RESOURCES IN ENGLAND &amp; SCOTLAND .....</b>	<b>12</b>
2.1	INTRODUCTION.....	12
2.2	COLLECTING ETHICS AND SITE CONSERVATION .....	12
	2.2.1 To Collect, or Not to Collect.....	12
	2.2.2 Old Localities.....	13
	2.2.3 Erosion.....	13
	2.2.4 Personal Value Judgments .....	14
	2.2.5 Preservation with Use .....	14
2.3	SITE VULNERABILITY .....	14
2.4	GEOLOGICAL SPECIMEN TYPES SOUGHT BY COLLECTORS .....	15
	2.4.1 Fossils.....	15
	2.4.2 Semi-Precious Stones and Minerals .....	15

2.4.3	Ornamental Stone .....	16
2.5	MAJOR THREATS FACING PALAEOLOGICAL SITES.....	16
2.5.1	Introduction .....	16
2.5.2	Excessive Collecting Pressure .....	17
2.5.3	Development.....	18
	2.5.3.1 Burial .....	18
	2.5.3.2 Quarrying.....	19
2.5.4	Other Threats .....	19
	2.5.4.1 'Misguided' Conservation.....	19
	2.5.4.2 Antagonised Landowners .....	20
	2.5.4.3 Visual Disamenity .....	20
2.6	IRRESPONSIBLE COLLECTING ACTIVITIES .....	20
2.6.1	Fossils.....	20
	2.6.1.1 Cheese Bay .....	21
	2.6.1.2 Lesmahagow .....	21
	2.6.1.3 Sandside .....	23
	2.6.1.4 Elgin .....	23
	2.6.1.5 Doniford Bay.....	24
	2.6.1.6 Clitheroe .....	25
2.6.2	Mineralogical Specimens and Other Rock Types.....	26
	2.6.2.1 Hope's Nose.....	26
	2.6.2.2 Caldbeck Commons.....	27
	2.6.2.3 Crackington Haven.....	27
2.7	USERS OF PALAEOLOGICAL RESOURCES.....	28
2.7.1	Scientific Researchers .....	28
2.7.2	Commercial Collectors .....	29
2.7.3	Amateur/Recreational Collectors.....	30
2.7.4	Students and School Children.....	31
2.8	COMMERCIAL MARKET FOR FOSSILS.....	32
2.8.1	Ethics and Issues .....	32
	2.8.1.1 Irresponsible Collecting Activities .....	32
	2.8.1.2 Museums versus Wealthy Private Collectors .....	33
2.8.2	Historical Perspective.....	35
2.8.3	Market 'Products'.....	35
	2.8.3.1 Common Fossils.....	35
	2.8.3.2 'Décor-Fossils' .....	36



2.8.4	Price.....	36
2.8.5	Commercial Outlets.....	37
2.8.5.1	Shops.....	37
2.8.5.2	The Internet.....	38
2.8.5.3	Natural History Auctions.....	40
2.9	CONCLUSIONS.....	41
2.9.1	Excessive Collecting Pressure.....	41
2.9.2	Role of the Commercial Collector.....	42
2.9.3	Commercial Market for Fossils.....	43
2.9.4	Fate of Commercially Collected Fossils.....	43
2.9.5	Preliminary Recommendations.....	44
<b>3</b>	<b>ENGLISH AND SCOTTISH LOCALITY-SPECIFIC CASE STUDIES.....</b>	<b>46</b>
3.1	WEST DORSET COAST.....	48
3.1.1	Introduction.....	48
3.1.2	Excessive Collecting Pressure.....	49
3.1.3	Management of Collecting Activities.....	50
3.1.3.1	Regulatory Measures.....	50
3.1.3.2	Voluntary Measures.....	50
3.1.4	Fossil Collecting Code of Conduct.....	51
3.1.4.1	Main Issues and Conflicts.....	51
3.1.4.2	Primary Objectives.....	54
3.1.4.3	Recording Scheme.....	54
3.1.4.4	Results to Date.....	55
3.1.5	Questionnaire Exercise.....	55
3.1.5.1	Value Judgments.....	56
3.1.5.2	Issues and Conflicts.....	57
3.1.5.3	Fossil Collecting Code of Conduct.....	58
3.1.5.4	Recording Scheme.....	60
3.1.5.5	Need for Additional Management Measures.....	60
3.1.5.6	World Heritage Status.....	61
3.1.5.7	Visitor Safety.....	62
3.1.5.8	Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities.....	62
3.2	NORTH YORKSHIRE COAST.....	62



3.2.1	Introduction .....	62
3.2.2	Excessive Collecting Pressure .....	64
3.2.3	Management of Collecting Activities .....	65
3.2.4	Yorkshire Dinosaur Coast Project .....	66
	3.2.4.1 Introduction .....	66
	3.2.4.2 Open Meeting.....	67
	3.2.4.3 Working Group Meetings .....	67
	3.2.4.4 The Future .....	69
3.2.5	Questionnaire Exercise .....	70
	3.2.5.1 Value Judgments .....	71
	3.2.5.2 Issues and Conflicts .....	72
	3.2.5.3 SSSI Notification .....	73
	3.2.5.4 Need for Additional Management Measures .....	74
	3.2.5.5 Legality of Collecting Activities.....	78
	3.2.5.6 Commercial Market for Fossils .....	78
	3.2.5.7 Visitor Safety.....	78
	3.2.5.8 Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities .....	79
3.3	NORTH-EAST SKYE COAST.....	80
	3.3.1 Introduction .....	80
	3.3.2 Irresponsible Collecting Activities .....	81
	3.3.2.1 Cetiosaur Limb Bone.....	81
	3.3.2.2 Stegosaur Elbow Bone.....	82
	3.3.3 Management of Collecting Activities .....	83
	3.3.4 Questionnaire Exercise .....	83
	3.3.4.1 Value Judgments .....	84
	3.3.4.2 Issues and Conflicts .....	85
	3.3.4.3 SSSI Notification .....	86
	3.3.4.4 Need for Additional Management Measures .....	87
	3.3.4.5 Legality of Collecting Activities .....	89
	3.3.4.6 Commercial Market for Fossils .....	89
	3.3.4.7 Visitor Safety .....	90
	3.3.4.8 Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities .....	90
3.4	DISCUSSION.....	90
	3.4.1 West Dorset Coast .....	90

3.4.2	North Yorkshire Coast .....	91
3.4.3	North-East Skye Coast .....	91
3.4.4	Analysis of Questionnaire Exercise Findings .....	91
3.4.4.1	Value Judgments .....	91
3.4.4.2	Issues and Conflicts .....	92
3.4.4.3	SSSI Notification .....	93
3.4.4.4	Need for Additional Management Measures .....	94
3.4.4.5	Commercial Market for Fossils .....	96
3.4.4.6	Visitor Safety .....	96
3.4.4.7	Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities .....	96

<b>4</b>	<b>REGULATION OF PALAEOLOGICAL RESOURCES IN ENGLAND AND SCOTLAND .....</b>	<b>98</b>
4.1	INTRODUCTION.....	98
4.2	OCCUPIERS' LIABILITIES .....	98
4.3	PUBLIC RIGHTS OF ACCESS.....	99
4.4	OWNERSHIP OF FOSSILS.....	100
4.4.1	<i>In Situ</i> .....	100
4.4.2	<i>Ex Situ</i> .....	100
	4.4.2.1 General .....	100
	4.4.2.2 Coastal Localities .....	101
4.4.3	Coastal Land Ownership.....	102
4.4.4	Implied Consent and Personal Bar.....	102
4.4.5	Finders' Rights and Duties .....	103
4.5	EXPORT AND IMPORT.....	103
4.5.1	'Lizzie' the Lizard.....	104
4.5.2	UNESCO Convention.....	105
4.6	SITE PROTECTION .....	107
4.6.1	Regulatory Framework.....	107
	4.6.1.1 <i>National Parks and Access to Countryside Act</i> 1949 .....	107
	4.6.1.2 <i>National Heritage (Scotland) Act 1991</i> .....	108
	4.6.1.3 <i>Wildlife and Countryside Act 1981</i> .....	108

4.6.1.4	Proposed Amendments to <i>Wildlife and Countryside Act 1981</i> .....	111
4.6.1.5	<i>Countryside and Rights of Way Act 2000</i> .....	112
4.6.2	Problems with Existing Regulatory Framework .....	113
4.6.2.1	Operations Liable to Cause Damage .....	113
4.6.2.2	Planning Process .....	113
4.6.2.3	Access and Goodwill of Landowners .....	113
4.6.2.4	Locally Important Sites .....	114
4.7	LOCAL GOVERNMENT .....	114
4.8	DISCUSSION.....	115
<b>5</b>	<b>REGULATION OF PALAEOLOGICAL RESOURCES IN THE UNITED STATES OF AMERICA</b> .....	<b>116</b>
5.1	INTRODUCTION.....	116
5.2	EXPORT AND IMPORT .....	117
5.3	CONTROL OF COLLECTING ACTIVITIES ON PRIVATELY OWNED LAND .....	118
5.4	CONTROL OF COLLECTING ACTIVITIES ON FEDERAL LAND .....	118
5.4.1	Current Regulatory Framework .....	119
5.4.1.1	<i>Antiquities Act 1906</i> .....	120
5.4.1.2	<i>Federal Land Policy and Management Act 1976</i> .....	121
5.4.2	Federal Enforcement of Regulations.....	122
5.4.2.1	Complexity and Inconsistency .....	122
5.4.2.2	Impracticalities .....	123
5.4.2.3	Illegal Fossil Collecting Activities .....	124
5.4.3	Discussion.....	125
5.4.4	Previous Attempts at Unified Regulation.....	126
5.4.4.1	<i>Palaeontological Resources Conservation Act 1983</i> .....	126
5.4.4.2	NAS Committee Group Report: <i>Palaeontological Collecting</i> .....	127
5.4.4.3	'Negotiated Rule-Making Process' .....	130
5.4.4.4	<i>Vertebrate Paleontological Resources Protection Act</i> .....	130
5.4.4.5	<i>Paleontological Resources Protection Act</i> .....	133



	5.4.4.6 US Forest Service 'Proposed Rules' .....	135
	5.4.4.7 <i>Fossil Protection Act</i> 1996: The 'Johnson Bill' Resurrected .....	135
	5.4.4.8 Discussion .....	139
5.5	SOUTH DAKOTA .....	142
	5.5.1 'Sue' the T.Rex.....	142
	5.5.1.1 FBI Seizure of 'Sue' .....	143
	5.5.1.2 Ownership of 'Sue' .....	143
	5.5.1.3 Court Action against the BHI .....	144
	5.5.1.4 Auction .....	145
	5.5.1.5 Issues Raised by the Sale of 'Sue' .....	146
	5.5.1.6 Discussion .....	147
	5.5.2 <i>South Dakota Act</i> .....	147
<b>6</b>	<b>REGULATION OF PALAEOLOGICAL RESOURCES IN AUSTRALIA.....</b>	<b>149</b>
6.1	INTRODUCTION.....	149
6.2	EXPORT AND IMPORT.....	149
	6.2.1 Commonwealth <i>Protection of Movable Cultural Heritage Act</i> 1986.....	149
	6.2.1.1 Control List .....	150
	6.2.1.2 Permission to Export and Import.....	150
	6.2.1.3 Determining an Object's Significance .....	151
	6.2.1.4 Some Recent Statistics.....	151
	6.2.1.5 Review of the Control List.....	152
	6.2.1.6 Holding Periods .....	153
	6.2.1.7 Discussion .....	154
6.3	COLLECTING ACTIVITIES.....	154
	6.3.1 Queensland.....	156
	6.3.1.1 <i>Queensland Fossicking Act</i> 1994 .....	156
	6.3.1.2 Riversleigh Fossil Area within Lawn Hill National Park .....	157
	6.3.1.3 Chinchilla .....	158
	6.3.1.4 Educational Reserves.....	159
	6.3.2 South Australia.....	160

6.3.2.1	Ediacara Fossil Reserve .....	160
6.3.2.2	<i>Heritage Act</i> .....	161
6.3.2.3	Local Initiatives .....	161
6.3.3	Victoria .....	162
6.4	<b>EFFICACY OR OTHERWISE OF CURRENT REGULATORY MEASURES.....</b>	<b>162</b>
6.4.1	Vaughan Case .....	162
6.4.1.1	Localities and Thefts.....	163
6.4.1.2	Apprehension of Vaughan and Confiscation of Fossils .....	164
6.4.1.3	Vaughan on Trial .....	165
6.4.2	Other Recent Instances of the Illegal Export and Collecting of Fossils .....	167
6.4.2.1	Stegosaurus Footprints .....	167
6.4.2.2	Haag's Meteorite.....	168
6.4.2.3	Stromatolite Fossils .....	168
6.4.2.4	Extinct Giant Elephant Bird Egg .....	169
6.4.3	Discussion.....	169
6.4.3.1	Non-Commercial Collectors .....	169
6.4.3.2	Control of the Illegal Export and Commercial Collecting of Fossils.....	170
6.4.3.3	Alternative Strategies for Site Protection .....	171
<b>7</b>	<b>REGULATION OF PALAEOLOGICAL RESOURCES IN THE CANADIAN PROVINCE OF ALBERTA.....</b>	<b>173</b>
7.1	INTRODUCTION.....	173
7.2	<i>CANADIAN CULTURAL PROPERTY EXPORT AND IMPORT ACT 1985</i> .....	174
7.2.1	Control List.....	175
7.2.1.1	Palaeontological Specimens .....	175
7.2.1.2	Mineralogical Specimens .....	175
7.2.2	Temporary Export .....	176
7.2.3	CPEIA in Practice.....	176
7.2.3.1	Some Recent Statistics.....	176
7.2.3.2	General Permits for Export .....	176

	7.2.3.3 Intent and Interpretation .....	177
	7.2.3.4 Enforcement.....	178
	7.2.3.5 Recent Prosecutions .....	178
	7.2.4 Discussion.....	179
7.3	<b>ALBERTA HISTORICAL RESOURCES ACT 1978</b> .....	179
	7.3.1 Definition of a Historical Resource .....	180
	7.3.2 Interpretation and Application .....	180
	7.3.3 Palaeontological Specimens .....	180
	7.3.3.1 Surface Collection of Fossils .....	180
	7.3.3.2 Excavation of Fossils for Research Purposes .....	181
	7.3.3.3 Excavation of Fossils for Commercial Purposes.....	181
	7.3.3.4 Ownership of Fossils in Alberta .....	181
	7.3.3.5 Removal of Fossils from Alberta.....	182
	7.3.4 Penalties for Breach.....	182
	7.3.5 Alberta Historic Resources Foundation.....	182
	7.3.6 Discussion.....	183
	7.3.6.1 Illegal Collecting Activities.....	183
	7.3.6.2 Research Activities .....	183
	7.3.6.3 'Coyote' Clause .....	184
	7.3.6.4 'Clogging' of Alberta's Public Collections.....	185
	7.3.6.5 Why so Rigorous? .....	185
7.4	<b>COMMERCIAL AMMONITE MINING IN ALBERTA</b> .....	185
	7.4.1 Resource.....	186
	7.4.2 Commercial Permits and Agreements.....	186

<b>8</b>	<b>REGULATION OF PALAEOLOGICAL RESOURCES IN GERMANY</b> .....	<b>188</b>
	8.1 INTRODUCTION.....	188
	8.2 EXPORT AND IMPORT.....	188
	8.3 COLLECTING ACTIVITIES.....	188
	8.3.1 Baden-Württemberg.....	190
	8.3.1.1 Scientific and/or Cultural Importance .....	190
	8.3.1.2 Holzmaden Protected Excavation Area.....	191
	8.3.2 Bayern.....	192
8.4	DISCUSSION.....	193



AND SCOTLAND .....	195
9.1	ARCHAEOLOGICALLY IMPORTANT SITES AND AREAS..... 195
9.1.1	Individual Archaeological Sites..... 195
9.1.2	Areas of Archaeological Importance ..... 196
9.1.2.1	Planning Policy Guidance Note No. 16..... 196
9.1.3	Criminal Offences under the AMAAA ..... 196
9.1.4	Problems with the AMAAA ..... 197
9.1.4.1	Irresponsible Metal-detectorists..... 197
9.1.4.2	Effect of PPG16 ..... 198
9.1.4.3	Definition of an Ancient Monument ..... 198
9.1.4.4	Works Adjacent to Ancient Monuments ..... 198
9.1.4.5	Recording of Finds ..... 198
9.1.4.6	Co-operation and Public Participation ..... 199
9.2	ARCHAEOLOGICAL ARTEFACTS ..... 199
9.2.1	Scottish Law of Treasure Trove ..... 200
9.2.2	<i>Treasure Act</i> 1996..... 202
9.2.2.1	Principal Aims ..... 203
9.2.2.2	Definition of Treasure..... 203
9.2.2.3	Ownership of Treasure..... 204
9.2.2.4	Jurisdiction and Reporting of Finds ..... 205
9.2.2.5	Public Rights of Way..... 205
9.2.2.6	Rewards ..... 205
9.2.2.7	Accompanying Information and Careful Recovery ..... 206
9.2.2.8	Results ..... 206
9.2.3	Portable Antiquities Scheme ..... 208
9.2.3.1	Background and Aims ..... 208
9.2.3.2	Funding ..... 208
9.2.3.3	Results ..... 209
9.3	ARCHAEOLOGICAL-STYLE PROTECTION FOR FOSSILS?..... 211
9.3.1	<i>Ancient Monuments and Archaeological Areas Act</i> 1979..... 211
9.3.2	Scottish Law of Treasure Trove ..... 212
9.3.3	<i>Treasure Act</i> 1996..... 213
9.3.3.1	Controls upon Collecting ..... 213
9.3.3.2	Definition of Treasure..... 214

	9.3.3.3 Ownership Rights of Landowners and Occupiers .....	214
	9.3.3.4 Public Rights of Way.....	215
	9.3.3.5 Rewards .....	215
	9.3.4 Portable Antiquities Scheme .....	216
<b>10</b>	<b>CONCLUSIONS .....</b>	<b>217</b>
10.1	CURRENT UK SITUATION.....	217
	10.1.1 Export and Import.....	217
	10.1.2 Collecting Activities .....	217
10.2	OVERSEAS APPROACHES TO REGULATION .....	218
	10.2.1 Strategic Differences.....	218
	10.2.2 Stakeholder Involvement in Policy Formulation.....	219
	10.2.3 Export and Import.....	220
	10.2.3.1 Limitations of UNESCO Convention.....	220
	10.2.3.2 Historical Perspective.....	221
	10.2.3.3 Paradox of Regulation .....	221
	10.2.3.4 Problems of Over-Zealous Regulation .....	222
	10.2.3.5 Regulation as a Last Resort and the Requirement for Funding .....	222
	10.2.4 Collecting Activities .....	222
10.3	ARCHAEOLOGICAL RESOURCE PROTECTION IN ENGLAND AND SCOTLAND .....	224
10.4	WIDER ISSUES.....	225
	10.4.1 National or World Resource Ownership and the Meaning of Culture .....	225
	10.4.2 Need for Collecting.....	226
	10.4.3 Supply and Demand.....	227
	10.4.4 Site-by-Site Basis.....	228
	10.4.5 Need for Public Awareness and Political Support.....	229
	<b>REFERENCES .....</b>	<b>230</b>
	<b>LIST OF ABBREVIATIONS AND ACRONYMS .....</b>	<b>242</b>

<b>APPENDICES</b> .....	<b>243</b>
Appendix I 'Fossils under the Hammer: Recent US Natural History Auctions.' (A published paper presented at a conference entitled 'A Future for Fossils' held on 14 <sup>th</sup> and 15 <sup>th</sup> October 1998 at the National Museum and Gallery, Cardiff, Wales.).....	243
Appendix II West Dorset Coast Questionnaire (Case Study).....	255
Appendix III Yorkshire Dinosaur Coast Project. (Aims, objectives, general principles, project partners etc.) .....	259
Appendix IV Guidance for Fossil Collectors (Draft) (North Yorkshire Coast) .....	260
Appendix V North Yorkshire Coast Questionnaire (Case Study).....	264
Appendix VI North-East Skye Coast Questionnaire (Case Study).....	268

## **TABLES & FIGURES**

Table 2.1 Some interesting UK fossil specimens offered for sale via fossil dealers' Internet web-sites during 1999... ..	39
Figure 9.1.1 Value judgments (West Dorset Coast case study).....	56
Figure 9.1.2 Issues and conflicts (West Dorset Coast case study) .....	58
Figure 9.1.3 Fossil Collecting Code of Conduct (West Dorset Coast case study).....	58
Figure 9.2.1 Value judgments (North Yorkshire Coast case study).....	71
Figure 9.2.2 Issues and conflicts (North Yorkshire Coast case study) .....	72
Figure 9.2.3 Perceptions as to collecting restrictions on SSSIs (North Yorkshire Coast case study) .....	73
Figure 9.2.4 Regulatory management measures required (North Yorkshire Coast case study) .....	75
Figure 9.2.5 Voluntary management measures required (North Yorkshire Coast case study) .....	75
Figure 9.2.6 Commercial market for fossils (North Yorkshire Coast case study).....	78
Figure 9.2.7 Who to alert to illegal/irresponsible collecting activities (North Yorkshire Coast case study).....	79
Figure 9.3.1 Value judgments (North-East Skye Coast case study).....	84



Figure 9.3.2 Issues and conflicts (North-East Skye Coast case study) ..... 85

Figure 9.3.3 Regulatory management measures required (North-East Skye Coast case study) ..... 87

Figure 9.3.4 Voluntary management measures required (North-East Skye Coast case study) ..... 88

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## ABSTRACT OF THESIS

Given the challenging and often conflicting issues which surround the use and conservation of palaeontological resources, it is perhaps surprising that the UK has little in the way of specific legislation affording any real degree of regulatory control over either the collection, ownership, and export/import of fossil specimens. This situation exists in stark contrast to that encountered in many other parts of the world where administrations have instead opted to tightly regulate such activities with a variety of measures more often than not founded upon the principle of the state ownership of fossil resources. Whilst this thesis does not refute the argument championed by many within the scientific and conservation communities that a similarly rigorous regulatory approach is also required here in the UK, its investigations reveal that the implementation of the same would arguably create more problems than it would solve. It furthermore transpires that the *majority* of UK palaeontological sites are both spatially extensive and resource-rich, with it accordingly being only that relatively small number of vulnerable integrity sites that in fact require strict *site-specific* conservation measures. Whilst analysis suggests that *some* aspects of archaeological resource management in England and Scotland could usefully be similarly applied to palaeontological resources, this thesis otherwise concludes that the current combination of SSSI protection and voluntary management measures comprises a satisfactory framework for ensuring the best use and conservation of UK fossil resources at the present time.



# **1     INTRODUCTION**

## **1.1    SETTING THE SCENE**

England and Scotland offer all those stakeholder groups with an interest in geological Earth heritage an astonishingly diverse wealth of palaeontological sites and specimens for what is, in a global context, a relatively small geographical area of land. A great many of these sites are of national scientific significance, with a surprisingly considerable number furthermore also being of international importance.

The vast majority of English and Scottish geological sites are utilised to varying degrees by collectors seeking fossils and, to a lesser extent in terms of numbers of collectors, semi-precious stones and other rare and/or aesthetically attractive mineral specimens. The motives for collecting, which range from scientific research through educational and recreational pursuits to outright commercial gain, present all those stakeholder groups having an interest in the use and conservation of Earth heritage sites with a variety of challenging and all too often conflicting issues. It is therefore perhaps somewhat surprising that the UK continues today to have very little in the way of specific legislation affording any real degree of regulatory control over either the export and import of fossil and mineral specimens, or the actual collection and ownership of the specimens themselves. This situation exists in stark contrast to that encountered both in some other parts of the world - where certain federal states (and provinces in the case of Canada) have opted to tightly regulate such activities with measures including the outright prohibition of non-scientific collecting, the export of all specimens by permit only, and all specimens being regarded as being owned by the state (or province) - as well as here in the UK as regards the collection and ownership of archaeological artefacts.

## **1.2    RESEARCH OBJECTIVES AND METHODOLOGIES**

The overriding aims of this thesis are twofold. First, to ascertain the extent to which available evidence suggests that additional regulatory controls are required to more stringently control both the export and import of palaeontological specimens out of and into the UK, and the collecting of the same in England and Scotland. Secondly, to investigate and discuss the suitability or otherwise of contemporary overseas regulatory approaches as models upon which to formulate new management measures aimed at better protecting UK fossil resources, should the introduction of such measures either now or at some point in the future be deemed necessary. Relatively little investigative research has to date been conducted in this regard, and

it is accordingly anticipated and hoped that the findings of this thesis will better assist both English Nature and Scottish Natural Heritage in formulating appropriate policy and management strategies with which to secure the best use and conservation of England and Scotland's rich palaeontological heritage. In more specific terms, this thesis accordingly sets out to add to the existing body of knowledge relating to the use and conservation of palaeontological resources by:

- 1) Updating, further developing, and clarifying the major areas of debate surrounding the collection, ownership, and conservation of palaeontological resources including an overview of the current UK (English and Scottish) legal position in this context.
- 2) Presenting three up-to-date location-specific case studies - two in England and one in Scotland.
- 3) Introducing a comparative analysis of various international regulatory approaches to the use and conservation of palaeontological resources.
- 4) Discussing the current English and Scottish legal approaches to archaeological resource conservation and their suitability for application to fossil resources.
- 5) Providing a series of conclusions drawing together the findings of 1) to 4) above, and suggesting some ideas as to the best way ahead for palaeontological site conservation and use in England and Scotland in the future.

The above five major aims and the methodologies adopted in achieving them can be summarised in more detail as follows.

- a) *To provide an up-to-date and detailed appraisal of the issues pertaining to the use and conservation of fossil resources in England and Scotland, and also to provide a comprehensive and easily understood review of the current legal basis relating thereto.*

First, the multiplicity of issues connected with the present-day use and conservation of English and Scottish palaeontological sites are introduced and discussed. Particular emphasis is placed upon investigating the extent to which irresponsible collecting activities have been undertaken in recent years, and which collector groups appear to have been responsible. Secondly, the prevailing UK regulatory framework regulating the use and conservation of palaeontological resources is discussed in some detail.



- b) *To attempt to 'shake out' the views and opinions of those stakeholder groups who use and conserve palaeontological resources in England and Scotland.*

Three locations in particular were targeted for investigation in this regard; these comprising the West Dorset coast, the North Yorkshire coast, and the northeast coast of the Isle of Skye. The rationale for selecting three coastal localities for case study purposes - other than the obvious fact that England and Scotland are entirely bounded by the sea - is as follows:

- i) The UK has recently seen collecting activities become increasingly concentrated in coastal localities as the plethora of inland excavations connected with the extensive quarrying, building and railway construction activities of the Victorian era have steadily become worked-out, filled in, disused, overgrown, or simply forgotten. Similar developmentally active exposures are currently only available to collectors on an infrequent basis as a result of new road construction or other often comparatively small civil engineering projects: even then, site-owners/managers are today invariably reluctant to accommodate visiting collectors owing to modern-day health and safety requirements.
- ii) Recreational use of the English and Scottish coastline has increased dramatically in recent decades as growing levels of disposable income and leisure time have afforded more and more of the population access to private transport and evermore frequent holidays.
- iii) Coastal localities are particularly vulnerable to excessive levels of collecting since they are usually open to public access. This is in stark contrast to the vast majority of inland sites where express permission needs to be sought in order to gain legitimate access.
- iv) Coastal sites are typically subject to particularly rapid erosion which ensures a constant supply of newly exposed specimens.

The findings of the three case studies are in any event believed in many ways to be equally applicable to inland sites.

The chief analytical tool used in the three investigative case studies comprises a questionnaire exercise in which representatives of all key stakeholder groups were approached to gain their value judgements and opinions relating to the major issues connected with the use and conservation of fossil resources in England and Scotland. Many of the responses to the questionnaires have where appropriate been presented in a quickly understood visual format - i.e. bar charts - as well as by discussion alone. The primary aim of this Chapter of the thesis is to obtain the views

of those parties most closely involved with the use and conservation of the resource in order to better assess whether additional management measures - both regulatory *and voluntary* - are required to ensure adequate resource protection, and if so, of what type/s.

c) *To assess whether or not any of those protection measures currently practiced overseas in connection with fossil resources could be used as models upon which to base new regulatory control measures for the more effective protection of fossil resources in England and Scotland.*

A substantial portion of this thesis is accordingly given over to introducing and discussing the various regulatory approaches - typically founded upon state-ownership of all or certain categories of fossil resources - utilised by certain administrations throughout the world over recent years in an attempt to more effectively protect their own palaeontological heritage. The discussion focuses especially upon the degree of success, or otherwise, achieved by such measures.

d) *To examine the current regulatory framework in England and Scotland relating to the use and conservation of archaeological resources.*

First, the law governing the protection of archaeological sites and artefacts here in England and Scotland is introduced and discussed in some detail. The discussion then moves on to examine both the extent to which archaeological and palaeontological resources and their collectors can be considered analogous with each other, and, in so far as they are, whether or not the law or part/s thereof pertaining to the use and conservation of the former could be similarly and beneficially applied to better protect the latter.

e) *To draw together all the various strands of the discussions comprising this thesis in the form of a series of conclusions and recommendations for the future.*

This concluding Chapter of the thesis presents a summary of the findings of the investigative discussion as detailed in a) to d) above.

### **1.3 SOURCES OF INFORMATION**

This thesis draws heavily upon four main sources of information which can be summarised as follows:



- 1) During the course of this research, all available literature - both published and unpublished - was extensively reviewed, all of which is referenced throughout the text and itemised in the reference section given at the end of the thesis.
- 2) A considerable proportion of the evidence presented in this thesis has been based upon information derived from personal correspondence with various individuals and authorities - both in the UK and elsewhere in the world - all such occurrences of which are again referenced throughout the text and itemised in the reference section given at the end of the thesis. Full copies of all such correspondence are held by the writer.
- 3) The third significant source of information drawn upon during the compilation of this thesis has been the Internet via the World Wide Web. The use of such source material is once again fully referenced throughout the text and itemised in the reference section given at the end of the thesis, with full copies of all Internet derived documents again being held by the writer.
- 4) The fourth and final major source of information utilised in achieving the objectives of this thesis comprised gaining the views of stakeholder group representatives by way of three location-specific questionnaire exercises.

#### **1.4 TIMELINESS OF RESEARCH**

An up-to-date and exhaustive examination of the issues connected with regulating the use and conservation of palaeontological resources is considered to be particularly timely in view of the recent shift in conservation emphasis from seeking to protect not only living fauna and flora such as birds and butterflies, but also non-living Earth heritage resources such as, for example, limestone pavements, rural barns, and dry-stone walls. Palaeontological collecting is continuing to grow in popularity (Ellis *et al.* 1996), this perhaps not being so surprising given the modern-day illegality of collecting many other natural history objects such as birds eggs, moths, wild flowers etc. Recent media interest in dinosaurs and fossils has also led to a significant increase in geotourism, and after years of living in the shadow of biological conservation, earth science conservation is today considered by most observers to be finally 'coming of age' as fossils and other rock-types become more widely recognised as comprising important national and international resources.

#### **1.5 EMPHASIS UPON FOSSILS**

A fossil may be defined as the remains of a once-living organism, including its physical remains as well as evidence of its activities such as, for example, tracks,

burrows, and eggs that have usually been preserved for an extended period (usually being accepted as 100 years or more).

Whilst semi-precious stones, rare minerals, and ornamental rocks are still today keenly targeted by certain groups, it is the export, import, and collection of *palaeontological specimens* that is the focus of this thesis owing to the fact that fossils are generally more widely sought-after than other collectible geological specimens for several important reasons.

### **1.5.1 Commercial Value**

Fossils have for centuries been widely collected on a commercial basis in England and Scotland, particularly from spatially extensive and naturally eroding coastal exposures. The contemporary popularity of fossils in a commercial context is well evidenced by the large number of dealers offering specimens for sale over the Internet (see 2.8.5.2 below), as well as by their extensive inclusion in recent natural history auctions held in the US (see 2.8.5.3 below).

The widespread commercial collection of mineralogical specimens has, on the other hand, dwindled over recent decades owing largely to the decline of the lead, tin, copper, zinc, and iron mining industries (although it is worth noting that some of those few exposures still available today can on occasion face severe collecting pressure from a small but well-organised group of dedicated mineral aficionados (e.g. see 2.6.2.1/2 below)).

As regards semi-precious stones, the days of intensive commercial gemstone collecting came to an end in Scotland when far cheaper material began to be imported from Europe and South America in the early-1900s (Nimlin 1974 and see 2.4.2 below).

### **1.5.2 Scientific Importance**

Fossils are of particular scientific and educational importance in that they provide a geological record of the evolution of life on earth; can be used to help explain the nature of ancient environments and ecosystems, and provide an important means of determining the relative ages of rocks around the world (Ellis *et al.* 1996).



### 1.5.3 Contemporary Interest and Appeal

Fossils offer almost endless aesthetic variety in terms of shape, form, and colour, and appeal to a wide variety of people comprising, as they do, a vivid and compelling glimpse into our ancient past. As such, fossils appeal to a far wider audience than do mineralogical specimens which, although often aesthetically appealing, tend to appeal to a smaller - though often fanatical - proportion of the general public. Recent media interest in dinosaurs - including the films *Jurassic Park I* and *Jurassic Park II* - has served to further heighten public curiosity as regards our ancient living past. Such an elevated level of contemporary interest in fossils has in turn not surprisingly led to greater collecting pressure being focused upon English and Scottish palaeontological sites by both recreational and commercial collectors alike.

Although this thesis accordingly focuses primarily upon assessing whether or not there is a need to - as well as the efficacy of a variety of measures with which to - regulate the use and conservation of fossil resources, other popularly collected geological materials are also be discussed as and where appropriate. Even accepting the primary focus here being upon fossils, the broader findings of this thesis are similarly applicable to other collectible geological materials of a mineralogical, semi-precious, or ornamental nature.

## 1.6 OTHER COUNTRIES SELECTED FOR DISCUSSION

Palaeontological resource protection can range from being draconian to non-existent in nature. Whilst both extremes and many approaches in between can be encountered in different parts of the world today, those regulatory measures implemented - where a substantial degree of protection is desired - invariably comprise the control of the export/import, collection, and ownership of palaeontological specimens. Those countries choosing to so regulate typically comprise federal states - or provinces in the case of Canada - which do so on a *state-wide basis* - as opposed to a site-specific basis - with such measures furthermore being invariably founded upon the ideology whereby all or certain palaeontological specimens comprise state-owned resources.

Whilst the list of countries discussed in this thesis is by no means exhaustive, those selected for discussion (3 of the 4 being English-speaking thereby avoiding literary and communicative linguistic barriers/difficulties) can nevertheless be considered satisfactorily representative of the *whole range of regulatory management approaches* currently deployed throughout the world today - having, as they do,



differing types and levels of control over the export, import, collecting, and ownership of palaeontological resources.

### **1.6.1 United States of America**

It is perhaps no surprise to discover that it is the United States of America (US) which here receives the most rigorous investigation and analysis. The US represents something of an interesting ethical paradox in that whilst its popular culture is founded upon the freedom of the individual, approximately one third of lands comprising the US are federally - i.e. publicly as opposed to privately - owned and administered. US federal lands contain a rich and vast fossil heritage, and in view of the US's modern economic supremacy and wealth, it is arguable that the US comprises that country in the world most able to allocate the necessary resources to addressing the many and often contentious issues connected with the regulation of fossil resources.

### **1.6.2 Australia, Canada, and Germany**

Additional countries selected for detailed discussion are the federal nation states of Australia (and more specifically the states of Queensland, South Australia and Victoria), Canada (predominantly focusing upon the province of Alberta), and Germany.

The frequently remote and uninhabited palaeontological sites of Australia (and the US) are in some ways physically and demographically analogous with many similarly remote and extensive coastal sites in Western Scotland. Likewise, Germany's numerous and typically small quarry sites are similarly analogous with many UK inland sites, as epitomised by Connesby Quarry near Scunthorpe in North Lincolnshire. It is accordingly useful to assess the degree to which regulatory initiatives and approaches implemented in these selected federal nation states are successful in ensuring the proper use and conservation of fossil resources, on the assumption that some of the more effective and practicable of the regulatory approaches discussed may either now or at some point in the future be appropriate for introduction in some modified form here in the UK.

### **1.6.3 Illegal Collecting Activities**

Recent evidence points to the US and Australia as being those countries currently experiencing the highest incidence of known fossil thefts in the world. Whilst it is arguable that both China and Russia currently face even more severe problems as

regards the illegal collection and export of specimens, the volatile and rapidly changing socio-economic climate prevailing in these two countries, as well as linguistic barriers and a general lack - at least up until very recently - of wider mainstream contact with the West, render a valid appraisal of the situation in these two vast geographical regions of the world near impossible to achieve for the purposes of this thesis.

## **1.7 NEED FOR REGULATION OF PALAEOLOGICAL RESOURCES**

### **1.7.1 Intrinsic Value of Fossil Specimens**

The rationale for the requirement that some or all categories of palaeontological sites and specimens be protected is that they possess important scientific, educational, and cultural value. It is furthermore arguable that regulatory mechanisms should be put into place to ensure that *society as a whole* receives the benefits arising from, and attributable to, the aforementioned values of fossil resources, with society's right to benefit from such values transcending the rights of any private individual to collect and/or trade in such specimens 'merely' for personal gratification *viz. a viz.* recreational, aesthetic, and commercial/financial gain.

### **1.7.2 Accompanying Scientific Information**

The proper scientific study of palaeontological specimens also requires that they be carefully collected complete with all necessary accompanying scientific information, such as details pertaining to the precise locality and stratigraphic beds where found. Regulatory frameworks can accordingly be designed to *ensure* or in the worst case scenario at least *encourage* correct methods of collection, which itself should furthermore be preferably undertaken by properly qualified and/or experienced individuals.

It is beyond doubt that many important fossils are damaged, or even destroyed altogether, by the inexperienced and ineffectual extraction techniques practised by uninformed recreational collectors who are oblivious to the scientific significance of certain specimens which may be encountered in the field (Forster 1999). Additionally, specimens illegally collected solely for financial gain are often hastily excavated or simply robbed of their most commercially valuable parts such as skulls and individual teeth. Any specimens collected in this manner are, even if subsequently recovered, often of little or no scientific value since most or all of their vitally important scientific context is absent.



## 1.8 NATURE OF REGULATION

Ostensibly, regulation seeks to achieve at least some measure of protection for all palaeontological sites, as well as more specific and stringent protection for certain important categories of sites and/or specimens (see 2.3 below). This is typically achieved in two ways. First - in so far as regulation is economically and politically practicable and/or desirable - by safeguarding palaeontological sites from adverse development and usage. Secondly - and more particularly, especially in the context of this thesis - by controlling the collection of palaeontological specimens from those sites holding them, as well as their fate once collected and prepared i.e. placement in public collections or disposal to private collectors via the national and international commercial markets for specimens. In reality, regulation of the collection of fossils is frequently undertaken on an area or site-specific basis, as is occasionally the case here in the UK (see 4.6 below), or can alternatively be implemented by way of wider regulatory controls founded upon the principle of state-ownership of all or part of the resource. Since the former is achieved by similar means the world over i.e. via control mechanisms invariably comprising outright bans on collecting, collecting limits, and/or permit systems, this thesis instead focuses primarily upon the latter. Current examples of the regulation of collecting activities via specific legislation include state-ownership of the resource on all lands (as is the case in the Canadian province of Alberta - see 7.3.3.4 below - and the Australian state of Queensland - see 6.3.1 below), or state/public ownership of a certain resource category (typically associated with particular scientific significance) either on *all* lands, or on publicly administered land *only* (as is the case in the Federal state of Baden-Württemberg in Germany - see 8.3.1 below - and the US state of South Dakota - see 5.5.2 below - respectively).

Restrictions upon collecting can also include more indirect measures linked to controlling the export and import of specimens out of and into the UK. Indeed, it should perhaps at this early stage be emphasised that the regulation of the export and import of fossils is in fact inextricably linked with the regulation of those collecting activities which give rise to excessive collecting pressure being placed upon those sites actually holding specimens. For example, assuming a steady world demand for specimens, if country A enacts regulations restricting the export of specimens collected within its boundaries, greater collecting pressure will be placed upon sites holding similar specimens in those other countries having no such export controls. Regulation of the export and import of palaeontological specimens ranges from the control of both the export and import of specimens (e.g. Australia - see 6.2 below -



and Canada - see 7.2 below) to control of neither (e.g. the US - see 5.2 below - and the UK - see 4.5 below).

## **2 USE AND CONSERVATION OF PALAEOLOGICAL RESOURCES IN ENGLAND AND SCOTLAND**

### **2.1 INTRODUCTION**

This Chapter of the thesis introduces, investigates, discusses, and attempts to clarify the multiplicity of issues surrounding the use and conservation of palaeontological sites in England and Scotland. Particular reference is made to the exploitation of collectible geological specimens (with the emphasis, as stated previously, being predominantly upon fossils) located in or on geological sites (including Sites of Special Scientific Interest (SSSIs) - see 4.6.1.3 below), whether such procurement of specimens be for sale via the domestic and/or export commercial markets, for recreational pursuits, or in connection with scientific research. The ethics of collecting, site conservation, site vulnerability, and recent instances of irresponsible collecting activities are also examined in detail. The discussion then moves on to arrive at a series of conclusions as to the extent of the current threat to the resource from collecting, the role of commercial collectors, the commercial market for specimens, and the fate of commercially collected specimens. Having drawn these conclusions, the overall aim of this Chapter can then be realised, this being ostensibly to arrive at a set of preliminary recommendations both as to whether or not more stringent regulation of collecting activities is required in England and Scotland, and how those stakeholder groups involved can play a more positive role as regards ensuring the best use and conservation of palaeontological resources.

This Chapter also includes taxonomies of:

- 1) The types of specimens typically targeted by collectors.
- 2) The other major threats facing palaeontological sites.
- 3) The major stakeholder groups having an interest in the use and conservation of the English and Scottish fossil resources.
- 4) The various markets for those fossils collected for predominantly commercial purposes.

### **2.2 COLLECTING ETHICS AND SITE CONSERVATION**

#### **2.2.1 To Collect, or Not To Collect.....**

In broad conservational terms, fossils sought by collectors can be viewed in two distinct contexts as regards intrinsic scientific value; these being the value when collected i.e. *ex situ*, or uncollected i.e. *in situ* (Besterman 1988). Whilst it is beyond

question that maximum scientific information exists with a specimen *in situ*, it is also obvious that a relatively small proportion of this information must be lost in the process of extraction (to at least procure the bulk of the available information, as opposed to gaining no information at all by *not* collecting the specimen - i.e. by leaving it *in situ* (Besterman 1988)). Indeed, the same can also be said for recreational and/or aesthetic pleasure. (In this respect geological site conservation is very different from, for example, archaeological site conservation, where the removal of material invariably detracts from the appearance, form, and structural integrity of the resource (Wimbledon 1988).) Despite this logical reasoning, many observers still hold the view that fossils in particular should be left undisturbed *in situ*, thus remaining available for the attentions of the better-informed and equipped palaeontologists of the future - although such an argument can obviously continue *ad infinitum*.

### 2.2.2 Old Localities

That old localities can often yield totally new finds when re-investigated using more modern scientific techniques is well evidenced. For example, one south Wiltshire quarry cut in Jurassic marine strata which had between 1816 and 1983 yielded ammonite, bivalve, and gastropod fauna, has since produced a unique *terrestrial* fauna including dinosaurs, pterosaurs, and crocodylians (Wimbledon 1988). It is not unreasonable to surmise that had this site been a small integrity site which had been totally worked out many decades ago, then its crucial scientific significance might possibly have been missed and therefore lost. On the other hand, no excavation whatsoever would have produced no scientific information. Based upon this evidence, the sensible compromise approach would appear to be the implementation of suitably cautious excavations of materials from spatially impersistent, vulnerable, and genuinely scientifically important palaeontological sites in order to gain information, whilst at the same time preserving as much of the resource as possible *in situ* for further investigation at later stages throughout the ongoing development of the science of palaeontology itself.

### 2.2.3 Erosion

Although palaeontological resources are by definition finite in nature, it should be remembered that those most extensive of fossiliferous exposures i.e. sections of coastline are typically subject to rapid natural erosion, with specimens often being damaged and/or lost if not collected *in situ*, or at least quickly removed once having eroded out of strata into an *ex situ* state (Norman 1992, Taylor 1988).



#### **2.2.4 Personal Value Judgements**

It is additionally interesting to note that some satisfaction or value exists for many members of the wider public i.e. those not having any vested reason to extract or otherwise collect specimens, in just *knowing* that the resource exists in an unexploited form (e.g. see 3.2.5.1 below), *especially* from a commercial point of view. It has to be said, however, that the majority of those people involved in the use and conservation of palaeontological sites and therefore by implication the collection of specimens - be it for scientific, recreational or commercial gain - believe (not surprisingly) that specimens' best use is *ex situ*, or in other words collected (and see 3.4.4.1 below). This line of thinking of course raises issues both as to who should and should not collect, as well as to doubts over the sustainability of certain palaeontological resources.

#### **2.2.5 Preservation with Use**

Geological site conservation can therefore be broadly defined as preservation coupled with *use*, and it is this *use* which raises the question of collecting ethics. It should furthermore be borne in mind that whilst in itself an undoubtedly desirable social aim, conservation is just one amongst several competing land-use priorities, and as such arguably has no greater claim on society than any other land use. Within the confines of this constraint, sites should ideally be conserved so that they may be visited, *used* i.e. collected from, studied, interpreted and re-interpreted for as far into the future as practicable (Wimbledon 1988).

### **2.3 SITE VULNERABILITY**

It is also vital from a conservation point of view to distinguish between integrity sites (Ellis *et al.* 1996) and exposure sites (Norman 1992).

Integrity sites are relatively few in number, geographically small, are more often than not spatially or otherwise limited in nature, and contain a resource that is rare and/or of great scientific importance. Integrity sites include cave deposits, small intertidal reefs (e.g. see 2.6.1.1 below) and fissure-fills of sedimentary material (e.g. see 2.6.1.5 below). Integrity sites are accordingly by implication particularly vulnerable to excessive and/or irresponsible collecting, and can in rare circumstances be considered to be so at risk from such activities that the only way to preserve them is to excavate their contents for placement in a museum where they can be studied at a later date (e.g. see 2.6.1.4 below and Taylor 1988).

Exposure sites are, on the other hand, numerically the more common type, almost always being spatially extensive in nature accounting, for example, for the vast majority (though not all - e.g. see 2.6.2.1 below) of English and Scottish coastal collecting localities. The North Yorkshire coast (see 3.2 below) provides a fine example of a specimen-rich exposure site: some 40 miles of fossiliferous cliffs are exposed along this stretch of coast, with the vast majority of the fossil-bearing strata extending well back inland beneath a total area covering approximately 500 square miles.

Within the above broad parameters, it is also important to distinguish between high and low erosion sites, with marl-clay deposits typically eroding much more rapidly than hard shale or limestone exposures.

## **2.4 GEOLOGICAL SPECIMEN TYPES SOUGHT BY COLLECTORS**

### **2.4.1 Fossils**

Whilst the history of fossil collecting can be traced back some considerable distance into antiquity, it was not until the late-1800s that it assumed high importance following the awakenings of scientific interest in palaeontology (see Rudwick 1976). Following a relative lull in the early-1900s - not least owing to the demands of two World Wars - the science of, and particularly the wider public interest in (see 1.5.3 above), palaeontology has in recent decades undergone something of a revival, with recreational collecting being more popular today than ever before. The existence of a keen commercial market for specimens both at home and abroad - particularly in the US, Germany, and Japan - means that rare and exotic specimens frequently change hands for four, five, six, and even on occasion seven figure sums (Forster 2001 - see Appendix I).

### **2.4.2 Semi-precious Stones and Minerals**

Semi-precious gemstones such as agates (traditionally known as 'Scotch Pebbles'), smoky quartz, and amethyst have long been sought-after in Scotland for use in jewellery-making, owing to their attractive coloration and durability when mounted as jewellery (Nimlin 1974). Although such materials were commercially excavated up until the 1920s - such as smoky quartz from Ben Avon in the Cairngorms, and vein agate from Burn Anne in Ayrshire - collection today is carried out predominantly for hobbyist purposes with specimens such as agates typically being sought from beach deposits and ploughed fields.



Brightly coloured and exotic minerals, whilst of interest to a smaller and typically more specialised group of collectors than is the case with fossils, are nevertheless keenly sought from certain localities. Although primarily sought on a recreational basis for private cabinet and/or display purposes, specimens are also collected for profit, with specimens - particularly from areas with a rich mining heritage such as Devon and the Lake District (e.g. see 2.6.2.1/2 below) - occasionally seen commanding high prices at rock and mineral fairs held around the UK. Specimens can also occasionally be found for sale over the Internet, and whilst almost always being described as originating from old collections, it nevertheless remains a distinct possibility that some pieces offered for sale may in fact have instead been more recently collected.

### **2.4.3 Ornamental Stone**

Certain attractively coloured rocks including fossilised coral, marble, and rounded and coloured sandstone beach cobbles are sought either by the general public for use in garden rockeries here in the UK, or by the occasional commercial collector/dealer for export to cheap labour markets such as Taiwan where they are sawn and carved into ornaments for export to Western markets (George 1996 pers. comm.).

Although such rocks are typically relatively unimportant in terms of scientific significance, their collection can nevertheless become problematic, particularly from an environmental impact perspective. When surveyed in 1996, a number of Scottish Unitary Local Government Authorities expressed varying degrees of concern that the geoheritage value of SSSI sites at Barn's Nest and Aberlady Bay in East Lothian and at Sango Bay in Sutherland was being detracted from owing to the over-collecting of such materials (Forster 1996).

## **2.5 MAJOR THREATS FACING PALAEOLOGICAL SITES**

### **2.5.1 Introduction**

It is often argued that the major task facing palaeontological conservationists is the prevention of either damage to, and/or destruction or obscuration of, Earth heritage sites (Kermack 1988). The major threats in this regard can be broadly categorised (although not in order of priority) as excessive collecting pressure, development, and perhaps to a lesser extent 'misguided' conservation, the alienation of landowners, and visual disamenity.



## 2.5.2 Excessive Collecting Pressure

The activities of recreational, educational, and particularly commercial (i.e. those who collect and sell specimens for financial gain) collectors have been the subject of animated and often acrimonious debate for almost thirty years, with many claims of palaeontological site damage and loss having resulted from excessive collecting and/or indiscriminate hammering (Norman 1992). This widespread and growing concern - fuelled not least by a series of particularly distressing financially-motivated raids upon several internationally important Scottish fossil localities in the 1970s and 80s (e.g. see Rolfe 1984, 1977, Saxon 1979 and see 2.6.1.1 to 2.6.1.4 below) - culminated in a meeting in London in 1987 on 'The Use and Conservation of Palaeontological Sites' organised by the Palaeontological Association, and sponsored by the Geological Society, the Geological Curators Group, and the Nature Conservancy Council (Crowther & Wimbledon 1988). Perhaps somewhat surprisingly, the 1987 meeting reached a broad consensus view that *responsible* collecting is essential to the use and longer-term conservation of *most* sites (Knell 1991, Taylor 1988, Besterman 1988).

Nevertheless, collecting activities - both for commercial purposes and otherwise - still continue to be at the centre of heated debate today, not least owing to the usually locally or regionally-held (and often intensely fearful - though frequently also irrational) belief that many 'favourite' sites holding valuable specimens will become rapidly exhausted if over-exploited by collectors. Whilst commercial collectors have borne the brunt of criticism regarding site damage and depletion in the past (Norman 1992), one has to consider the hypothesis that such collectors are simply the most convenient and even favoured targets for criticism. Whilst - and as is discussed in 2.6 below - a small number of commercial collectors have doubtless caused extensive site damage in the recent past, it is nevertheless arguable that far more damage is done to sites by large parties of over-enthusiastic educational and recreational collectors, and even by research scientists themselves who typically (and in contrast to most commercial collectors) have little practical experience of collecting in the field (Wimbledon 1988).

Whilst most observers - some albeit reluctantly given the 'spectre' of hammer-wielding collectors - today acknowledge the scientific necessity that specimens be collected in the field, debate will doubtless continue over which group should, and should not, actually undertake collecting activities (see 2.7 below). Notwithstanding such issues, it is arguable that the problems associated with collecting at many

localities are in fact insignificant in comparison to the difficulties of saving sites from the damage and loss that result from development (Wimbledon 1988).

### **2.5.3 Development**

Whilst construction projects and forestry planting can doubtless on occasion constitute very real threats to palaeontological sites, the two principal categories of threats to sites resulting from development comprise burial and quarrying.

#### **2.5.3.1 Burial**

The burial of sites, or at least the creation of some degree of inaccessibility thereto, typically results from the activities of local authority planners and landowners and/or developers. At inland sites, waste-disposal strategies and landscaping schemes often result in the infilling of quarries and/or the battering, grading, and planting of vegetation on scientifically important rock faces.

At coastal localities, the construction of coastal defence schemes, and cliff-top and shore-line development all constitute frequently undertaken activities which every year result in damage to, and the loss of, nationally and internationally important sites (Wimbledon 1988). By way of example, in 1997 an important Middle Eocene SSSI at Lee-on the-Solent in Hampshire was totally lost as a result of coastal defence works undertaken by Gosport Borough Council. The coastal defence works (which cost approximately £4m) resulted in the complete and permanent obscuration of the site by gravel (dredged from the Solent) which was pumped onto the site further to large limestone blocks having been placed to form a retaining wall seaward of the site. The SSSI, which had only been notified as such by EN 4 years earlier, had prior to its loss yielded - in addition to a wide range of fossil shark species - the first UK mid-Eocene avifauna, a unique species of cartilaginous fish, and part of the as yet undescribed rare early mammal *Anchelophus* sp. (Morse 1997). It should also be noted that the undertaking of coastal defence works can not only result in the loss of sites in the immediate locality, but can also/alternatively result in the loss of sites slightly further down coast as erosion and deposition effects are displaced and/or transferred.

Notwithstanding the fact that economic and other competing issues connected with the greater public good should often quite justifiably take precedence over matters of geological site conservation, it is nevertheless vital that English Nature (EN) and Scottish Natural Heritage (SNH) allocate the necessary time and resources to the cultivation of close co-operation between themselves, local authority planners,



developers, and landowners in order to develop mutually agreed action plans that minimise damage to, and loss of, important palaeontological sites.

### **2.5.3.2 Quarrying**

It is not difficult to see that active commercial quarrying comprises an effective way of removing and/or destroying important fossils, particularly where - as in the vast majority of cases today - excavation works are undertaken by remote-controlled heavy machinery (e.g. see Thompson 2001). Whilst localised loss is not critical where the resource is spatially extensive, the entire exposure may be lost in the case of impersistent beds such as fissure-fills, channel-fills, and vertically disposed or steeply dipping deposits (e.g. see 2.6.1.5 below).

Conversely, it should also be noted that active quarrying, in common with natural erosion, is extremely valuable to site users as it constantly reveals new exposures for scientific investigation, providing, of course, that occasional access is granted to responsible collectors. Better still, where quarrying still by necessity depends upon more traditional manual skills, it may be possible for EN/SNH to seek to establish a code of practice with the quarry-owners, whereby a percentage of specimens are recovered and saved by (preferably at least partially-trained in correct collection techniques) quarry-workers during day-to-day quarrying operations (e.g. see 8.3.1.2 below).

## **2.5.4 Other Threats**

### **2.5.4.1 'Misguided Conservation'**

Conflicts of conservation interest can occur on certain sites where, for example, biologists on one hand may wish to restore a specific fauna and flora species mix to a sloping cliff exposure by encouraging the growth of vegetation, whilst geologists on the other hand will obviously prefer to keep the exposure open to erosion.

Attempts to clear what might appear to local council officers (and indeed to those local residents oblivious to geological site conservation issues who vote council officials into power) to be 'untidy' rubble and scree from coastal areas can also be damaging to palaeontological sites, such a phenomenon having previously been called by some observers the 'civic tidiness effect' (Norman 1992).



#### **2.5.4.2 Antagonised Landowners**

Protecting the interests of landowners is arguably as important as protecting the sites themselves, as aggrieved landowners are liable to make their sites inaccessible, even for scientific research purposes. Common complaints voiced by site-owners include damage to fences, gates, and crops (Kermack 1988), as well as the undermining of cliff sections by excessive collecting activities (see 3.1.2 below). Furthermore, site conservators need the co-operation of landowners when trying to manage sites, and over-zealous attempts to interfere with landowners' use of their own land can deter them from co-operating at all (and see 4.6.2.3 below).

#### **2.5.4.3 Visual Disamenity**

Many palaeontological sites - particularly those situated along the coast - are invariably utilised for a wide variety of recreational uses owing not least to their invigorating atmosphere and compelling scenery. Whilst collecting activities can often litter beaches and scaurs with significant amounts of debris comprising discarded rock fragments, these cause only very temporary visual disamenity as they are in the vast majority of cases rapidly removed and/or worn smooth by subsequent tidal movements. Of more serious concern are the cut-marks and holes left in fossiliferous and mineral-bearing strata where commercial and/or keen amateur collectors have removed specimens with Stihl-saws. Whilst many users of the localities concerned are understandably aggrieved by the visual impact of such activities, it is also argued by many commercial collectors that many fine and/or scientifically important specimens would otherwise be either lost to the sea or destroyed by inadequate collecting methods if not for the use power tools (Marshall 1999 pers. comm.).

### **2.6 IRRESPONSIBLE COLLECTING ACTIVITIES**

#### **2.6.1 Fossils**

Substantial evidence exists that fossil collecting and the commercial sale of fossils in particular are becoming increasingly divisive issues (Norman 1994). Such debate has not escaped the attentions of the media in recent years, as evidenced, for example, by a number of newspaper articles accusing commercial fossil collectors of 'raping' the nation's geological heritage for purely financial gain with a blatant disregard for the interests of other site users (e.g. see Robertson & Leake 1996). Indeed, there is ample evidence that a number of important UK fossil localities have throughout the 1990s been subjected to the ravages of irresponsible collectors, with such acts

invariably detracting from the scientific and educational value of the national fossil resource as a whole.

Specific details relating to instances of excessive collecting pressure and irresponsible collecting which have been evidenced at sites located on the West Dorset and North Yorkshire coasts in England and the northeast coast of the Isle of Skye in Scotland are discussed in the three case studies undertaken for the purposes of this thesis (see 3.1.2, 3.2.2 & 3.3.2 below).

Other contemporary notable examples of irresponsible collecting have occurred at sites in Scotland at Cheese Bay in East Lothian, Lesmahagow in Lanarkshire, Sandside in Caithness, and at Elgin on the Moray Coast, and in England at Doniford Bay in Somerset and Clitheroe in Lancashire.

#### **2.6.1.1 Cheese Bay**

The Cheese Bay locality comprises an integrity site (see 2.3 above) which falls within the Gullane to Broad Sands SSSI situated in East Lothian. In 1992, virtually the whole of a unique foreshore outcrop of early Carboniferous strata containing *inter alia* the fossilised shrimp *Teallicaris* sp. was removed by collectors of unknown identity. Subsequent investigation of the site revealed that overlying strata had been systematically removed and discarded, with tyre tracks at the rear of the site suggesting that a mechanical excavator had been utilised to expose and remove the targeted bed of strata, the material having then been led off site with a tractor and trailer. It later transpired that a small fossilised amphibian had been discovered at the site prior to the incident by an amateur collector. It is believed that the perpetrators of the removal of the outcrop had learnt of this discovery, and had carried out the theft in the hope of discovering more of the rare and commercially valuable fossilised amphibian specimens. Whilst it still today remains unconfirmed whether those responsible were over-enthusiastic amateurs or unscrupulous commercial fossil dealers, whoever it was certainly knew exactly where to excavate and how to clear the site effectively (Clark 1993).

#### **2.6.1.2 Lesmahagow**

The Lesmahagow-Hagshaw Hill inliers - situated along Shiel Burn and Birkenhead Burn and at Birk Knowes, Dun Side, and Logan Water in Lanarkshire - include several internationally important SSSIs which typically comprise naturally-eroding strata exposed along the banks of small burns. These sites contain rare and



commercially valuable Silurian fossil fauna, are finite in extent, and are accordingly particularly vulnerable to over-exploitation by collectors (thereby comprising classic integrity sites - see 2.3 above). A number of the sites have been subjected to severe over-collecting - predominantly by German collectors - during recent years, the most recent known example of which occurred during the early to mid-1990s when one of two German collectors involved was apprehended by SNH officials in connection with illegal collecting activities. Over a period of six days, the two men had used crowbars, sledgehammers, and chisels to process an estimated ten tonnes of relatively loose and fissile strata in order to recover 430m year-old Silurian fossils including several specimens of the world's oldest known vertebrate, the 225mm-long jaw-less fish *Jamoytius kerwoodi*. - each of which is believed to have a commercial value today of some £10,000. The man apprehended was regrettably never successfully charged in connection with his activities (McKirdy 1996 pers. comm. and see 2.6.2.1 below). SNH personnel are currently endeavouring to have at least some of the illegally collected fossils returned from Berlin's Humboldt University museum. Whilst acknowledging that the museum acquired the fossils in good faith, SNH nevertheless consider it important to establish that the specimens had originally been collected illegally without the permission of the landowner and without a permit (English 2000).

It is noteworthy that German collectors in particular have over the years acquired a reputation for accepting only the very best specimens, and abandoning, and even sometimes wilfully destroying, the rest (Saxon 1996 pers. comm.). Any incomplete specimens thus discarded in a random manner are only of limited scientific use, their taphonomic associations having been irretrievably destroyed (Besterman 1988 - but see 2.8.1.2 Scientific Requirement for Specimens below).

Up until the mid-1990s, SNH operated a scheme requiring that any collector obtain a permit - specifying limits upon types and quantities of specimens to be taken - prior to collecting from Lesmahagow localities. The permit system was later suspended following the revelation that the voluntary site warden - actually appointed not by SNH but by the Hunterian Museum at Glasgow - was frequently neglecting to accompany collectors to sites as obviously required for the scheme's effective operation (MacFadyen 1999 pers. comm.). Four of the sites are now managed by way of legally binding management agreements (implemented under the provisions of Section 15 of the *Wildlife and Countryside Act* 1981 - see 4.5.1.3 below) that authorise SNH to manage the sites in partnership with the owners. Whilst such agreements stipulate that collecting is permissible by licence, the fact that financial constraints preclude a permanent official SNH on-site presence effectively results in the sites nevertheless



continuing to remain at risk. Birk Knowes - arguably the most important of the Lesmahagow sites - is, however, now afforded an additional measure of protection in that fencing has been erected along with notice boards advertising an anti-collecting message (MacFadyen 1999 pers. comm.).

#### **2.6.1.3 Sandside**

In early-1990, two French collectors were instructed by the landowner concerned to leave a private foreshore site at Sandside situated on the north Caithness coast. The nature of the two collectors' activities had been relayed to both the landowner and the local police by a concerned ornithologist who had been observing from a distance. It transpired that the collectors were seeking examples of the Devonian fossil fish *Thursius pholidotus*. Their endeavours had entailed the spading away of a shallow overburden of sand in order to reveal an area of rocky intertidal reef; the uppermost fossiliferous layer of which had then being removed and split using sledgehammers and chisels. Despite the fact that the two perpetrators were understood to have obtained some 100 fossil fish specimens - a reasonable example of which was at the time worth around £100 - no fossils were confiscated nor any charges brought (Saxon 1996 pers. comm.).

#### **2.6.1.4 Elgin**

In 1997, an *in situ* reptile track way exposed on the foreshore near Elgin in Morayshire (and previously used as an educational aid by local schools) was damaged by a collector using a rock-saw. Belonging to the Permo-Triassic Hopeman Sandstone Formation, this particular track way was unique in that it was left by an animal crossing a water-rippled surface between desert dunes; virtually all other discovered track ways having instead been imprinted in relatively dry desert sand. One of the footprints comprising the track - doubtless chosen for its aesthetic appeal - was removed completely, and another was readied for later removal. Also at additional risk from the erosive forces of the North Sea, the remainder of the track way was subsequently removed in a joint operation involving SNH and the Royal Scottish Museum. The track way is now displayed - complete with the vandalised section and an appropriate accompanying conservation message - in the Royal Scottish Museum in Edinburgh (Clark *et al.* 1997). (A similar rescue operation involving complete resource removal had already been previously undertaken by the then Nature Conservancy Council (now the Joint Nature Conservancy Council (JNCC)) in 1985, when some 30 square metres of a Lower Carboniferous 'shrimp bed' were removed from a foreshore site at Granton near Edinburgh, further to an

English fossil collector and dealer having illicitly removed several square metres of the bed during the previous year (see Clarkson 1985).

#### 2.6.1.5 Doniford Bay

Doniford Bay comprises a privately owned stretch of North Somerset coastline in the south-west of England which is openly accessible to the general public. The site includes a diagonally-dipping fissure-fill beds of sedimentary material which constitutes the oldest Jurassic Lias found anywhere in the UK, and is accordingly notified by English Nature as a SSSI. The site also falls within Bridgwater Bay National Nature Reserve (and see 4.6.1.1 below). The beds contain numerous examples of the ammonites *Caloceras* sp. and *Psiloceras* sp., the shells of which are preserved in attractive multi-coloured iridescent aragonite. These ammonites can be extracted in multiple groups on large slabs of shale and are popular with fossil enthusiasts all over the world (e.g. see 2.8.5.3 below). The resource is accordingly of particular interest to commercial collectors, with especially intensive profit-motivated collecting having been undertaken over recent years. Although the fossiliferous beds are reasonably extensive, the resource can for practical purposes be regarded as being vulnerable (see 2.3 above) in nature since the steeply-dipping beds become revealed only very slowly as a result of natural erosion processes. It has recently been estimated by volumetric analysis that almost two thirds of the presently available *Caloceras* sp. ammonites have now been removed, although, and in stark contrast, that part of the bed containing *Psiloceras* sp. ammonites appears to be largely intact (Webber 2001).

The owner of the foreshore site has over recent years become increasingly concerned over instances of aggressive commercial collecting. Ongoing problems with unauthorised collecting recently led to legal action being considered by EN in co-operation with the Environment Agency and local police. Although legal action was not ultimately pursued, a five year ban was imposed upon the several collectors involved, and a number of scientifically important specimens were recovered for placement in Somerset County Museum (Larwood, King & Bassett 2001).

Although English Nature have the power under the provisions of the *Wildlife and Countryside Act* 1981 to specify that the SSSI designation of the site be upgraded to include restrictions on collecting (see 4.6.1.3 Operations Likely to Cause Damage below), such a restriction has not yet been considered by EN as appropriate for a coastal locality with open public access. In any event, and as is the case with the



most other relatively remote integrity sites, restrictions are only realistically practicable if funds are made available for their effective enforcement.

#### **2.6.1.6 Clitheroe**

Salthill SSSI (and Local Nature Reserve - see 4.6.1.1 below) near Clitheroe in Lancashire in the north of England comprises a disused quarry that comes under the jurisdiction of Ribble Valley Borough Council who share stewardship of the site with Lancashire Wildlife Trust. The quarry was originally cut into an isolated knoll to extract high quality limestone. After almost 300 years of commercial extraction, the quarry was closed in 1959. The disused quarry site is today of national scientific significance owing to the presence of a densely fossiliferous capping limestone dating from the Lower Carboniferous, some isolated pockets of which - owing to particularly rapid sediment deposition - contains particularly well-preserved fossilised echinoderms.

In Easter 1994, several Germans equipped with two transit vans and power tools removed a number of large slabs of material which were extracted from an excavated trench some four metres long, one metre wide, and one metre deep. The perpetrators were not apprehended, or even paid any particular attention at the time, largely owing to the fact that local people were neither aware of the site's importance or its vulnerability. When the damage was later discovered by museum personnel, the site was fenced off in an attempt to prevent further future incursions by collectors utilising heavy equipment (Bowden 2000 pers. comm.).

In Easter 1995, the German collectors returned. Despite finding the site fenced off, they nevertheless succeeded in excavating several more trenches of a similar size to that dug the previous year, this time adopting a more labour-intensive approach utilising picks and spades. (That the collectors had travelled to the UK specifically to collect fossils was evidenced by the littering of the site with foods and beverages labelled in German.) Once again, their activities attracted no significant local attention or concern, and the collectors successfully made off back to Germany with their haul of material. This second, and more extensive, incidence of irresponsible collecting led not only to renewed concern from local museum personnel and local officials from Ribble Valley Council and the Lancashire Wildlife Trust, but also to the involvement of the local Police 'Wildlife Liaison Officer' and English Nature. Further to investigations at local caravan sites having produced an address in Germany connected to the perpetrators, correspondence was sent to the British Consulate in Germany stressing the unacceptability of such collecting practices (Bowden 2000 pers. comm.).



Although no appropriate legal foundation upon which to bring any charges existed (owing to the fact that no-one had - as is legally required - actually properly witnessed the collecting activities in question), the regional furore aroused by the ensuing press and television coverage at least served to heighten local awareness as regards the vulnerability and importance of the site. This not to be underestimated conservation benefit (and also see 6.3.1.3 & 6.3.2.3 below) proved its worth in 1997 when a legitimate visit to the site by German museum personnel resulted in telephone calls by concerned locals to local police and council officers (Bowden 2000 pers. comm.). (Readers seeking further information about managing collecting activities at the Salthill site should refer to Bowden (2001).)

## **2.6.2 Mineralogical Specimens and Other Rock Types**

Neither are geological specimens other than fossils immune from irresponsible collecting activities, two recent examples of which concerning mineralogical specimens having occurred at Hope's Nose in Devon, and Caldbeck Commons in the Lake District. Furthermore, even more mundane rock-types can be vulnerable to over-collecting with many beaches such as Crackington Haven in Cornwall having over recent years been significantly depleted of pebbles for use in garden landscaping.

### **2.6.2.1 Hope's Nose**

The Hope's Nose locality in Devon comprises a rocky foreshore promontory comprising Devonian limestone strata with mineralised carbonate veins. These veins contain inclusions of native gold, which although generally small, can on occasion comprise highly attractive 'feathery dendritic growths' up to seven centimetres long. Site access is relatively difficult from land, and in an attempt to retrieve these understandably highly prized gold specimens, certain well-organised collectors have over recent years used boats with which to transport pneumatic drill-hammers and petrol-driven saws to the site, having also in 1998 even resorted to blasting the exposure with dynamite (Anon. 1998).

It is even arguable that collecting activities have to some limited degree been inadvertently encouraged by the museum community, with the BMNH having in the 1980s purchased a fine specimen from a commercial collector who had previously been denied permission to collect (Page 1999 pers. comm.).

It is today believed that the resource is perilously close to becoming totally depleted, with an estimated six tonnes of gold-bearing rock having been removed since the site was rediscovered by collectors in the early-1980s (Tudor 1998).

#### **2.6.2.2 Caldbeck Commons**

In the July 1999 issue of *Earth Heritage* - the bi-annual publication of the UK Earth heritage bodies - it was reported that mineral collecting at the 1,000 acre Caldbeck Commons site in the Lake District National Park was irreparably damaging the historic landscape. Collectors from all over the world are attracted not only by a wide variety of naturally occurring minerals, including lead, copper, zinc, borite, and wolframite - some of which are unique to the area - but also by the presence of manmade minerals created by the smelting processes linked with the area's rich mining heritage.

A previous policy statement seeking restraint and non-interference having largely being ignored, the Lake District National Park Authority have now issued a new policy prohibiting both vehicular access to the area and underground and surface mineral collecting unless otherwise authorised.

Whilst commercial collectors appear to have been removing large quantities of material by exploiting the area methodically, it is also asserted that recreational collectors are causing significant damage to the area in their search for rare minerals and micro-minerals (JNCC 1999). This accordingly constitutes further evidence of the need to investigate not only the activities of commercial collectors, but also those of other collector groups.

#### **2.6.2.3 Crackington Haven**

Crackington Haven is a small horseshoe shaped cove situated near Boscastle on the north Cornwall coast in south-west England. The site comprises part of a SSSI. The tiny beach's egg-shaped dark grey pebbles are shot through with veins of white quartz, and as such have proved highly attractive to many members of the general public wishing to incorporate the stones into their domestic garden designs. In mid-1999, for example, one weekend visitor was observed filling his car boot with nine sacks of the pebbles; the individual becoming abusive when asked by staff from a nearby beachside shop to return the pebbles to the beach. By mid-1999, so many stones have been removed that the pebble ridge at the back of the beach had almost disappeared. The owners of the beach - St. Genny's parish council - responded by



launching a 'Save our Stones' campaign backed by leaflets targeting an appropriate conservation message at the general public (de Bruxelles 1999).

Crackington Haven is just one of many English beaches to suffer in this manner. Another noteworthy example is Porth Nanven Cove near St. Just in Cornwall, where the National Trust as owners of the beach were recently compelled to erect warning signs informing the public that any removal of the beach's granite pebbles constituted an offence which could lead to prosecution (Kennedy 1999).

## **2.7 USERS OF PALAEOLOGICAL RESOURCES**

Palaeontological resources are utilised by several key stakeholder groups, with collecting activities typically being undertaken for scientific, commercial, recreational, and educational purposes.

### **2.7.1 Scientific Researchers**

For the palaeontologist in particular, it is only in the field that the full scientific importance (see 1.7.2 above) of a fossil occurrence - i.e. the palaeo-ecology, taphonomy, and the stratigraphic correlation - can be properly ascertained and studied (Ellis *et al.* 1996, Besterman 1988). However well their discovery and extraction may be documented, specimens alone are not enough for the purposes of many aspects of palaeontological research. Without precise details pertaining to locality and stratigraphy, it is arguable that any fossil find new to science may be rendered virtually worthless from a strictly scientific point of view.

Whilst research scientists doubtless possess the necessary knowledge to interpret strata, locate, and identify specimens, they nevertheless do not have the necessary time or financial support to undertake extended collecting trips. Neither in many instances do research scientists have the highly-developed prospecting and extraction skills of many responsible commercial collectors (see 2.7.2 below), the livelihoods of whom depend on the development of such expertise over many years of full-time prospecting and preparation. It is for such reasons that researchers occasionally - albeit often reluctantly - undertake collaborative ventures with responsible commercial collectors, as exemplified by the research work undertaken at the Fouldon Burn SSSI in Berwickshire in the 1980s where a commercial collector was contracted to excavate the site (see Wood & Rolfe 1985). Sometimes lacking the finely-honed skills of commercial preparators, museums also use commercial collector/preparators to prepare their own specimens, both new and old, as was



recently the case when North Yorkshire commercial collector Mike Marshall was chosen to prepare a unique sauropod vertebra belonging to the Yorkshire Museum (Manning 2001). Curators should also remember that commercial collectors have an impressive grapevine of practical/field information as regards localities and horizons (Taylor 1989).

### **2.7.2 Commercial Collectors**

These site users have, in most cases, a vested financial interest in collecting localities, and thus to some extent in the management of the resource, since the sale of those specimens collected provides them with their livelihood (Kneil 1991, Taylor 1988). Since fossils can attract high prices, these collectors have typically developed considerable expertise in both finding and preparing fossils. As a consequence, commercial collecting activities have in recent years resulted in the discovery of many rare and scientifically important fossils - including large vertebrates. It is further notable that between 1915 and 1975 hardly any new large fossil vertebrate remains were found, this period nearly matching that during which neither the commercial collector nor the traditional quarryman were active (Taylor 1989), the concept of the 'décor-fossil' (see 2.8.2.2 below) having not evolved as a commercial phenomenon until the late-1970s. The fact that commercial collectors still continue today to find truly exceptional specimens was recently well illustrated when in June 2000 commercial collector Tony Gill found and collected what is perhaps the largest ichthyosaur specimen yet recovered from the Dorset coast (Edmonds 2000 pers. comm.). Furthermore, recent experience at Connesby Quarry and during the construction of the Charmouth Bypass demonstrates that commercial collectors can work well with museum curators and conservationists to ensure that temporary exposures provide mutual benefits for both of these traditionally ideologically opposed groups (e.g. see Sole 2001).

Since fossils destined for private display are generally considered to be more impressive and more contextually satisfying when surrounded/set in some of the rock - also known as matrix - in which they occur, commercial collectors typically endeavour to retrieve such specimens complete with some accompanying matrix wherever possible (Marshall 1999 pers. comm.). (This practice also results in less damage to specimens in the field, as opposed to the efforts of many recreational collectors who are not prepared to expend the required levels of effort to carry large chunks of rock back to their cars, choosing instead to try to hack the fossil out of its rock encasement on site. Furthermore, the majority of recreational collectors - again

in contrast to commercial collectors - lack the necessary skills and equipment to properly viz. a viz. carefully and precisely remove any surplus rock from the specimen upon their return home.)

Most users of sites are, however, also well aware of the consequences of the over-zealous and scientifically irresponsible commercial collecting of rare and valuable 'décor-fossils' from vulnerable sites (Rolfe *et al.* 1988 and see 2.3 & 2.6.1 above). Commercial collectors have accordingly been viewed by many as pillagers at worst, and useful colleagues at best (Brunton *et al.* 1985, Doughty 1985, Duff 1979).

### 2.7.3 Amateur/Recreational Collectors

This stakeholder group comprises individuals of all ages, collecting both as individuals and groups. Levels of experience are extremely variable, ranging from the inexperience of a curious child to the specialist knowledge of the lifelong dedicated amateur enthusiast. It is beyond doubt that many museum curators owe a debt to the efforts of the latter, as exemplified by the well-publicised discovery and retrieval of the first specimen of the fish-eating dinosaur *Baronyx walkeri* from a Surrey clay pit by amateur collector William Walker in 1983 (see Charig & Milner 1986).

Since some amateur collectors can - like commercial collectors - spend *all* of their time in the field, they can occasionally develop truly outstanding expertise in spotting and recovering specimens. Self-confessed obsessive US amateur collector Ray Stanford who has in recent years amassed a collection of Cretaceous dinosaur footprints from Maryland streambeds is one such collector. US palaeontological experts were in 1998 amazed to discover that Stanford's collection included prints from several totally new dinosaurs, with dinosaur track expert Robert Weems of the US Geological Survey commenting that "There is nothing remotely comparable to it (Stanford's collection) for the Cretaceous anywhere in eastern North America" (Roynance 1998).

It is also arguable that an inexperienced amateur collector's 'eye' is of particular value to field palaeontology since it (the 'eye') will be alert to a wider range of objects than will that of the typical researcher who will invariably be specialised in one area of palaeontology, and whose 'eye' will accordingly be especially attuned to searching for one particular shape or 'search-image'. A case can therefore be argued that the more pairs of 'fresh amateur eyes' in the field, the greater the likelihood that new and/or unusual specimens will be discovered.

On the other hand, it must also be remembered that inexperienced amateur collectors can inadvertently cause substantial damage both to sites and specimens through indiscriminate hammering and inexperienced attempts at extraction - albeit in a gradual and thus not so dramatic manner. Further concerns for the curator and research scientist regarding the activities of the inexperienced amateur collector are that specimens are gathered excessively and/or without vital locality and horizon information (Norman 1992 and see 1.7.2 above).

Whatever one's views on the plusses and minuses of amateur collecting, it is nevertheless arguable that recreational collecting *must* be encouraged, albeit in a properly channelled manner, since increased public awareness of Earth heritage issues has a vital role to play in helping secure increased political and financial support for geological site conservation in the future (Norman 1992). In addition, educating the general public as to the 'do's and don'ts' of collecting can often assist in the reduction of irresponsible and careless collecting, this philosophy having led the Geological Curators' Group, for example, to produce their first 'Thumbs-Up' leaflet for children some 13 years ago (see GCG 1985).

#### **2.7.4 Students and School Children**

Fieldwork undertaken by university and college students typically involves extensive collecting of specimens from fossiliferous horizons and mineral-bearing strata. Large quantities of duplicate specimens are often taken, the vast majority of which are, along with attached field notes, invariably lost at a later date. Whilst to some extent justifiable, such over-exploitation and eventual loss can pose a serious threat to certain sites. Although some degree of collecting is arguably necessary, it is important that the ever-increasing number of students - and particularly their tutors - utilising sites be made more keenly aware of the finite nature of site resources, as well as the heritage value of materials themselves once collected (Kneil 1991).

Large parties of school children frequently visit and make collections from geological formations in accordance with the requirements of the National Curriculum. This activity can obviously have a deleterious impact on sites and, as a result, continues to cause considerable anxiety within the geological site conservation community (Norman 1992).



## **2.8 COMMERCIAL MARKET FOR FOSSILS**

People have over recent years become increasingly fascinated by fossils, and many of them not unsurprisingly wish to possess specimens of their own. The commercial trade in palaeontological specimens has accordingly over the years grown into a well-established international business worth tens of millions of pounds per annum (Chure 1994). Whatever one's views regarding the desirability or otherwise of the existence of a commercial market for fossils, it is indisputable that such a market is a well-established reality - legitimate or otherwise - both here in the UK and throughout the rest of the world. It is therefore vital in accordance with the remit of this thesis to examine in detail the nature of the commercial market for fossils in terms of ethics and issues, 'product', price, commercial outlets/media, and purchasers/end-users.

### **2.8.1 Ethics and Issues**

Some observers opine that commercial collecting is in itself unethical, believing that *real* fossil specimens comprise a heritage resource which already fundamentally belongs to society as a whole, and as such should not be subject of any commercial dealings whatsoever (Page 1999 pers. comm.). Other observers furthermore argue that any private or educational demand for fossils can be adequately satisfied with casts and replicas rather than the real thing (e.g. see Williams 2001). Whilst the latter hypothesis may have a degree of theoretical merit, it is doubtful that replicas can, no matter how well crafted, ever imbue an owner with the same degree of awe and fascination as the genuine article. Indeed, a recent albeit limited survey undertaken by the Hunterian Museum in Glasgow revealed that visitors invariably preferred real objects to copies (Clark 2001a). Notwithstanding the pertinence or otherwise of what is largely a philosophical debate, the fact remains that the commercial market exists, and is likely to continue to do so for the foreseeable future. It is therefore important to consider those salient issues and areas of conflict which surround the existence and operation of the commercial market for specimens, rather than to here give further and more detailed consideration to whether or not such a market should exist *per se*.

#### **2.8.1.1 Irresponsible Collecting Activities**

Commercial collectors are obviously anxious to service the demand for genuine fossil specimens. In endeavouring to do so, the more unscrupulous members of the commercial collecting community sometimes undertake irresponsible collecting activities. Such incidences understandably cause much consternation within the scientific and conservation communities. Important and vulnerable sites can rapidly

be depleted of important (and commensurately commercially valuable) specimens (e.g. see 2.6.1.1 above). Specimens are also obviously at risk from damage resulting from scientifically incorrect, hurried, and covert collecting practices, particularly when solely profit-motivated collectors are knowingly undertaking illegal and/or unauthorised collecting activities, especially at night (e.g. see 5.4.2.3 Wyoming below).

### 2.8.1.2 Museums versus Wealthy Private Collectors

From the museum's perspective, the contemporary aspirations of wealthy private collectors to own fine and rare fossils all too often results in important specimens disappearing unstudied and undocumented into private collections (Shelton 1997). However, it is perhaps the disparity between the commercial aspirations of full-time professional collectors and the limitations on funds faced by museum curators which gives rise to the most fierce conflicts of opinion over the *price* of important fossils (Rolfe *et al.* 1988).

#### Investment Demand

This situation has been further exacerbated by the introduction of an element of *investment* demand for such items (Rolfe *et al.* 1988). Indeed, fine fossils as investments showed higher growth in price (15 times) between 1970 and 1990 than did English antique furniture and classic automobiles (Chure 1994). It is, however, unlikely that investment value will ever increase to levels which will effectively prevent museums from collecting and displaying fossils - in much the same way as the art market long ago destroyed many museums' abilities to collect art history (Taylor 1989) - since fossil prices are typically several orders of magnitude lower than rare works of art, in addition to which, and perhaps more importantly (and in contrast with art treasures), far more specimens remain undisturbed in the ground than have already been discovered and collected.

#### Scientific Requirement for Specimens

Whilst certain isolated incidents such as the loss of one of only eight *Archaeopteryx* fossils found to date into a private collection are quite rightly considered lamentable by most observers (Wild 1988), many of the rarer and more expensive fossils available via the commercial market for fossils are in reality already well studied and represented in museum collections. Furthermore, even museum staff themselves acknowledge the fact that a vast amount of existing museum collection material today

remains as yet undescribed or unreported in the scientific literature (Clark 2001a). This line of reasoning was succinctly encapsulated by Nicholson (1986) when he observed that: "Museum collections of today, properly maintained, documented, and conserved for long term use, will be the jewels of scientific research in the 21<sup>st</sup> century".

The asking prices of many commercially available specimens are in any event typically determined according to their aesthetic appeal as opposed to their scientific significance. It is also arguable that a typical museum only requires a handful of such specimens for display, partial specimens left behind at sites by commercial collectors often being of equal or higher scientific value for research purposes (Manning 1999 pers. comm. but see 2.6.1.2 above).

### Problems with Curation of Museum Collections

Museums are often accused of putting too smaller proportion of their financial resources into caring for fossils, with only the largest of museums having a specialist palaeontological curator. This not surprisingly often results in the quality of specimen storage, conservation, and display to the public frequently leaving much to be desired, especially when compared to the museum resources lavished on fine art (Taylor 1988). It is therefore argued by some observers that fine fossils being doted upon in private collections are being afforded more care and respect than those secreted away (and often deteriorating) in museum basements (Taylor 1991).

Spiralling values not only serve to render museum acquisition budgets increasingly inadequate, but also put those commercially valuable specimens successfully accessioned into public collections at greater risk from theft (e.g. see 5.4.2.3 Theft from Museums & 8.1 below), with the commensurately increased costs incurred to secure and insure museum collections also serving to yet further strain already tight museum budgets.

### 'Rights' to Specimens

It can furthermore be argued from a philosophical viewpoint that a scientific researcher has no more of a prior 'right' to use specimens for study than a private collector has to enhance the aesthetic, cultural, and educational environment within his or her home. It is also arguable that very few individuals outside the scientific community either have access to, or gain any significant benefit from, the academic papers written by researchers (who after all - and ironically in common with their off



perceived nemesis, commercial collectors - are simply trying first and foremost to make a living by doing that about which they are passionately enthusiastic).

## **2.8.2 Historical Perspective**

Whatever one's views, it also remains a fact that the activities of commercially motivated collectors have provided many of the major exhibit pieces on show in UK museums today (Taylor 1989).

It is furthermore important to remember that the commercial market for specimens has existed in the UK for at least two hundred years, with the activities of notable commercial collectors/historic figures such as Mary Anning (see 3.1.2 below) having actually imbued the commercial market for fossils with a degree of cultural heritage significance.

## **2.8.3 Market 'Products'**

A vast range of fossils and associated products are available for sale today - both legitimately and via the 'black market' - ranging from small cut and polished ammonites and associated jewellery products (e.g. see 7.4.1 below) to entire vertebrate skeletons - Australian examples of which are on occasion even to be found almost perfectly preserved in opal (see 6.4.3.2 & 6.4.3.3 below). Whilst the price of a fossil specimen can range from £0.50 to several millions of pounds, the vast majority of fossils are sold for sums at or near the lower end of such a price range. In order to simplify and clarify the discussion here, it is appropriate to split the commercial market into two distinct facets which can in general terms be categorised as common fossils and 'décor-fossils'.

### **2.8.3.1 Common Fossils**

Common fossils include smaller and more abundant duplicate specimens such as ammonites, bivalves, and belemnites, as well as small cut and polished sections of matrix displaying partial/crushed/badly disarticulated fossilised remains. Such material comprises the bulk of commercial collectors' day-to-day income via sales into and out of UK shops (and see 2.8.5.1 below), with surplus material typically being 'wholesaled' to UK fossil and mineral dealers who in turn export the specimens to foreign wholesale markets from where the specimens make their way into shops all over the world (Marshall 1999 pers. comm.). By way of example, many thousands of imprints or 'negatives' of the abundant Whitby ammonite *Dactylioceras commune*

were sold at Disney World Parks in Paris, France and Orlando in the US during the 1990s (George 1996 pers. comm.).

Common fossils appeal to the large numbers of tourists and non-collectors who are unwilling to pay more than a nominal price for a fossil, with size not quality usually being uppermost in such customers' minds when deliberating over what to buy and how much to pay.

#### **2.8.3.2 'Décor-Fossils'**

'Décor-fossils' comprise those more expensive fossils which are bought, as the name suggests, predominantly for prominent display as conversation/coffee-table pieces in the home or office. Such specimens are also - albeit less frequently - purchased by museums for display purposes. At the lower end of the price range, fish, crustaceans, crinoids, ammonites, trilobites, large leaves, and dinosaur teeth are currently amongst the most sought-after specimens, whilst at the upper end of the price range, partial dinosaur skeletons, whole marine reptile skeletons, and mammalian skeletons are considered particularly impressive and desirable by wealthy private purchasers. Prices for all of the aforementioned are invariably linked with aesthetic criteria such as size, colour, and quality of preservation.

#### **2.8.4 Price**

The fact that fossils can in the UK be owned by individuals (see 4.4 below) naturally leads to the buying and selling of specimens. It is the price at which many specimens are sold that lies at the heart of much heated debate between certain stakeholder groups. For the purposes of this sub-section, price is discussed only in the broadest terms, with more detailed examples of prices both asked and achieved for specimens being provided in 2.8.5.2 and 2.8.5.3 below.

Whilst most observers concur that the commercial collection and sale of abundant duplicate fossils constitutes little in the way of a significant threat to the use and conservation of spatially extensive palaeontological sites, it is the increasingly high prices commanded by larger and rarer specimens - particularly vertebrates - which causes particular concern within the academic and conservation communities (e.g. see 8.3.2 below).

As the majority of UK dealers' finer specimens are purchased by private foreign buyers (Rolfe *et al.* 1988), it is this market that tends to set the price for which such pieces are sold. A significant proportion of the final selling price reflects the time

taken in discovering, preparing and/or mounting the specimen (Powell 1987), a specimen on trimmed matrix generally commanding a higher price than a similarly sized matrix-free example, despite the higher preparation costs of the latter. This is largely attributable to the fact that a specimen can be presented and displayed far more dramatically when set in native matrix (and see 2.7.2 above).

Proponents of responsible commercial collecting activities also argue that the seemingly high price of a museum centre-piece display fossil is usually far less than that of another 'second-rate' objet d'art or 'third-rate' old master (Taylor 1989), and this notwithstanding the fact that the latter can frequently appear far less interesting and dramatic than the former to a large proportion of the general public. This disparity is further exacerbated by the time, labour, and capital and/or overheads component inherent within a fossil specimen's price, as opposed to the substantial 'unearned' capital gain component in the price of the majority of historical manmade works of art (Taylor 1988, Powell 1987).

## **2.8.5 Commercial Outlets**

The majority of fossils commercially collected in the UK are sold via a number of commercial outlets which in themselves comprise a visible interface between commercial collectors and/or dealers and the buying private collector, museum, or member of the general public. Whilst it is certain that a minority of specimens - invariably comprising rarer and finer pieces - are also sold more covertly by unscrupulous commercial collectors and dealers straight into the hands of wealthy private collectors (with such specimens remaining unknown, unstudied, and unseen in the wider academic and public arenas), the discussion here instead by necessity principally focuses upon visible outlets such as shops, dealers' Internet web-sites, and natural history auctions.

### **2.8.5.1 Shops**

Rock and fossil shops are the usual 'port of call' for any member of the general public wishing to procure UK fossil (and mineral) specimens for aesthetic and/or educational purposes. In certain well-known type localities such as Whitby in North Yorkshire and Lyme Regis in Dorset, local souvenir shops will also sell fossils typically priced at the cheaper end of the market.

The vast majority of UK-sourced fossils sold through shops comprise relatively small and abundant specimens such as the ammonite *Dactylioceras commune* from the



North Yorkshire coast, although certain more specialised shops also sell much larger and rarer pieces such as complete/partial ichthyosaurs and multiple and/or large examples of the ammonites *Asteroceras obtusum* and *Caloceras johnstoni* from the West Dorset and Somerset coasts respectively (and see 2.8.5.2/3 below). Prices can range from as little as 50p for a 'negative' or imprint of a *Dactyloceras commune* through £50-1,000 for a 75-225mm diameter *Asteroceras obtusum* to £10-30,000 for a complete and well-preserved one to four metre-long ichthyosaur specimen.

It is arguable that many people gain immense satisfaction from owning a genuine fossil specimen acquired from a shop, whether or not it leads to further interest in palaeontology (Fowles 1986). After all, shops provide the public with pleasing specimens that they themselves typically neither have the time nor the skills to both find and, more importantly, properly collect (and see 2.7.3 above). Shops also afford the education market an opportunity to acquire *real* fossils for use in the classroom. Since many teachers lack a geological background, it is perhaps preferable that they and their pupils obtain fossils by this means rather than inadvertently causing damage to sites (see 2.7.4 above). Other commentators go further, arguing that shops offer a more relaxed and interactive interface between palaeontology and the general public than do museums with their sometimes poorly publicised and presented collections (Wood 1988). Perhaps museums should give renewed consideration to earning extra income from the sale of more common fossils, particularly since museums would, on the face of it, appear to comprise ideal retail outlets with many in any case already selling mineral specimens and fine art prints (Taylor 1989).

#### **2.8.5.2 The Internet**

The contemporary emergence of the World Wide Web as a retail opportunity has spawned an ever-increasing number of fossil dealers' Internet web-sites offering a bewildering array of fossils and associated 'products' from all over the world. Some dealers' Internet web-sites now even offer fossil specimens for sale by auction, with prospective purchasers being invited to electronically tender bids by e-mail. An Internet web-site offers a fossil dealer access to millions of potential customers without the financial burden of having to either own/rent and run built retail premises. Fossils offered for sale via the Internet range from small ammonites priced at several pounds all the way up to whole dinosaur skeletons available for up to several million pounds.

UK fossils appear for sale on Internet web sites all over the world, with a general 'rule-of-thumb' being that a UK fossil specimen will tend to become ever more expensive the further away from the UK the dealer is located who is offering the specimen for sale. By way of example, the writer has during the time of writing seen albeit good examples of the abundant Whitby ammonite *Dactylioceras commune* for sale on an Australian fossil dealer's Internet web-site for AUS\$380 each (equivalent to some £150 Sterling). The same ammonite would typically cost £15 in a rock and fossil shop in Whitby.

<u>Specimen</u>	<u>Location</u>	<u>Asking Price</u>	<u>Dealer/Nationality</u>
Complete 50mm fish <i>Mesocanthus mitcheli</i>	Forfarshire	US\$635	PaleoSearch/US
Complete 275mm fish <i>Cocosteus</i> sp.	Orkney	N/A (sold)	PaleoSearch/US
Complete 175mm fish <i>Thursius pholidotus</i>	Orkney	£359	Famous Fossils/UK
Complete 75mm fish <i>Millerosteus minor</i>	Caithness	US\$1,155 (!)	PaleoSearch/US
Vertebra (138mm dia.) <i>Iguanodon</i> sp.	Isle of Wight	£240	Ken Mannion Fossils/ UK
Complete 175 x 130mm paddle bone <i>Ichth.</i> <i>stenopterygius</i>	England	US\$195	PaleoSearch/US
Ammonite (50mm dia.) <i>Psilorbis</i> sp.	Somerset	£30	Bone Room/US
Ammonite (100mm dia.) <i>Asteroceras obtusum</i>	Dorset	£345	PaleoPlace/US
Ammonite (65mm dia.) <i>Ludwigia murhinsonae</i>	Skye	£29	Famous Fossils/UK
Ammonite (60mm dia.) <i>Harpoceras elegans</i> in polished 'pyrite-skinned canon-ball' nodule.	North Yorkshire	US\$350-800	Bone Room/US
Ammonite (50mm dia.) <i>Dactylioceras commune</i>	North Yorkshire	£30	Extinctions/US

Table 2.1 Some interesting UK fossil specimens offered for sale via fossil dealers' Internet web-sites during 1999. (Note: none of the specimens listed above were claimed (as is often the case) as having come from 'old' collections.)

Whilst available evidence (Table 2.1) suggests that a significant proportion of UK specimens currently appearing on dealers' Internet web-sites originate from Scotland, the vast majority of UK specimens offered for sale via the Internet in actual fact comprise ammonites collected predominantly from the West Dorset, and, to a lesser extent, the North Yorkshire and North Somerset coasts. What is of particular interest about those Scottish specimens appearing on Internet web sites is that they are invariably of a relatively rare and interesting nature, hence their apparent pre-eminence in Table 2.1. English specimens, on the other hand, more often than not comprise the relatively abundant ammonites *Asteroceras obtusum* and *Promicoseras planicosta* from the West Dorset coast and the ammonite *Dactylioceras commune* from the North Yorkshire coast. As regards the North Somerset coast, relatively few *Psilorbis* sp., ammonites appear for sale on dealers' Internet web-sites, with even fewer specimens of the iridescent ammonite *Caloceras johnstoni* being offered for sale via the Internet during the time of writing.

### 2.8.5.3 Natural History Auctions

The intent here is simply to briefly discuss the relatively recent emergence of the natural history auction as means by which to sell 'décor-fossils' (see 2.8.3.2 above), and to assess the degree to which UK fossils are actually being entered into such auctions. A far more detailed appraisal of Phillips' recent natural history auctions is available elsewhere (see Appendix I).

#### Background

Over the last decade, increasing numbers of fine and rare 'décor-fossils' have been sold via high-profile natural history auctions, with the US perhaps not surprisingly having witnessed by far the greatest activity in this relatively new commercial arena. Whilst Phillips auction house was the major player in this regard between 1995 and 1998, major natural history catalogue auction sales held since 1998 have been conducted solely by Phillips' competitor Butterfield & Butterfield.

Phillips have never held any natural history catalogue auction sales here in the UK. The last such UK sale was held by Bonhams auctioneers in 1994, and other than having auctioned 'Sue' the T.Rex in New York in 1997 (see 5.5.1.4 below), they have not since that time auctioned any other natural history specimens in either the US or the UK.



Whilst comprehensive information was kindly made available by Phillips as regards their four natural history auctions held in the US between June 1996 and May 1998, information pertaining to the three more recent US auctions held by Butterfield & Butterfield was not. The writer is, however, aware that the catalogued lots included in the Butterfield & Butterfield auctions were extremely similar in all respects to those entered in the four natural history auctions conducted by Phillips between 1996 and 1998. The information which follows accordingly draws upon the latter; the results of which can be reasonably viewed as comprising satisfactorily accurate and up-to-date evidence as regards ascertaining which UK specimens are being sold in such sales and for what price.

### UK Specimens

Of the 549 palaeontological lots entered into the four auctions, just six originated from the UK comprising a 'double' *Caloceras johnstoni* ammonite specimen from North Somerset (and see 2.6.1.5 above), three small *Asteroceras obtusum* ammonites from West Dorset, a 'multiple block' of 20 *Amioceras cruciform* ammonites from the North Yorkshire coast, a group of *Promicoseras planicosta* and small *Asteroceras obtusum* ammonites from West Dorset, a large polished Mesozoic nautilid from Humberside - likely from Connesby Quarry at Scunthorpe - (not sold), and a partial ichthyosaur snout from West Dorset.

Five of these six lots were successfully sold for a total of US\$3,200 (averaging US\$645 each) equating to just 0.33% of the total combined sale value of fossils for the four auctions. It is therefore apparent on the basis of this evidence that relatively few UK fossils are being entered into US natural history auctions. Given that the UK both undoubtedly possesses a variety of commercially valuable palaeontological specimens and has little or nothing in the way of measures effectively restricting the export of such material (see 4.5 below), this apparent dearth of UK fossils in US auctions is somewhat surprising. The reasons underlying this finding are not readily apparent, with Phillips themselves being unsure why this should be the case (Uddo 1998 pers. comm.).

## **2.9 CONCLUSIONS**

### **2.9.1 Excessive Collecting Pressure**

Responsible collecting activities comprise an essential part of the proper scientific use and conservation of the vast majority of UK palaeontological sites. Whilst minerals

and semi-precious stones still continue to be targeted by small numbers of dedicated collectors, it is fossils which are today most widely sought-after - particularly by the general public for recreational purposes.

Although the major threat to UK palaeontological sites comprises development and insensitive changes of land-use, collecting activities can also have a deleterious effect, especially where excessive and/or irresponsibly carried out. Whilst the infrequent and often sensationalised irresponsible collecting exploits of a handful of commercially collectors cause the greatest consternation within the scientific community (and see 3.1.5.2 below), perhaps arguably of greater concern is the widespread and continual damage being inflicted on openly accessible sites by uninformed and inexperienced recreational collectors, student groups, and school parties (and see 3.4.4.2 below).

### **2.9.2 Role of the Commercial Collector**

There can be little doubt that the responsible commercial collector has a vital role to play in the advancement of earth sciences, with the majority of fine and/or rare specimens entering museum collections continuing to be found by such collectors (see 2.7.2 above), as indeed are many sites themselves. (Neither should the important contribution made by the experienced amateur collector go unrecognised in this regard.)

Responsible commercial collectors are a strange and often misunderstood breed. That they will diligently and determinedly search day and night all year round whatever the weather has in the writer's experience at least as much to do with compulsion and obsession as it does with financial gain. This collector group therefore provides palaeontology with an often undervalued service by rescuing specimens which would almost certainly otherwise be often quickly damaged or even destroyed altogether by erosion and/or the ruinous extraction attempts of inexperienced collectors.

Given that the majority of commercial collectors undertake their activities in a dedicated and responsible manner, and perform a useful service towards the furtherance of palaeontology, it is all the more regrettable that the occasional activities of the irresponsible minority (e.g. see 2.6.1.1 above) will always so quickly tarnish the image of the commercial collecting fraternity as a whole.



### **2.9.3 Commercial Market for Fossils**

The existence of a commercial market for fossil specimens does not ostensibly appear to have any significant adverse impact on the use and conservation of palaeontological sites (and see 3.4.4.6 below), except of course where vulnerable integrity sites are emptied of specimens by irresponsible collectors. The vast majority of commercially collected specimens are duplicates with little or no scientific value. The availability of such specimens through shops brings a great deal of interest and pleasure to the general public, the majority of whom do not have the time or necessary skills to obtain the specimens themselves. More importantly, shops can in this way help to raise public interest in Earth heritage issues; heightened public awareness perhaps ultimately constituting the only way of securing increased political and financial support for both site conservation and museums. In the absence of such support, the price of exceptional specimens will continue to cause concern in under-funded museum and university earth science departments. Although the high value of extremely rare specimens may often to some extent be arbitrary, such values do at least serve to raise political awareness about an otherwise much unappreciated part of our natural heritage.

The commercial fossil market is, as we have seen, still somewhat controversial, as a result of which it is still to some extent shrouded in secrecy. This often enables vendors to manipulate prices as buyers are invariably operating without complete 'product' information. It is arguable that if all those involved in the use and conservation of sites were to accept the reality of the market for specimens, then information pertaining to transactions would be more widely available than is presently the case. Typically financially challenged museum curators would accordingly then have more complete information with which to procure a better 'deal', be it for research or public display purposes.

### **2.9.4 Fate of Commercially Collected Fossils**

The vast majority of specimens which change hands in the commercial market are purchased for their aesthetic appeal and curiosity value, the bulk of such specimens furthermore not being of any significant scientific importance. Those particularly large, fine, and rare specimens (not being sold for curation into museum collections) go mainly to specialised private collectors, whilst the more abundant and smaller specimens are purchased as souvenirs and gifts by the general public from small shops, with the latter arguably comprising just as valuable an interface between palaeontology and the voting public as does a museum.



### **2.9.5 Preliminary Recommendations**

Upon preliminary assessment, the stringent regulation of collecting activities would appear to be neither practicable nor desirable. Furthermore, any forced reduction in collecting effort would surely result in more specimens being instead sacrificed to erosion.

Since not everybody has the time, expertise, or inclination to properly collect specimens, some form of compromise is clearly necessary whereby all those actually or potentially having an interest in sites and/or specimens can derive at least some benefit from the activities of those actually exploiting the sites. This already appears to happen to at least some extent:

- 1) Scientists undertake research to increase our collective knowledge of earth sciences.
- 2) The general public derives benefit both directly from recreational collecting, and indirectly from commercial collecting (shops) and scientific collecting (museums).
- 3) Responsible commercial collectors make a living whilst in many cases also making a valuable contribution to science.

Since all parties clearly have a role to play, and sites are there to be used, it appears that the best use and conservation of the UK's palaeontological sites can only be accomplished if all those involved see their collective usage of such sites as a form of site 'husbandry' (Wimbledon 1988). The fundamental requirement of such an approach is that all users must, so far as is practicable, communicate and co-operate with each other so that each user can gain the maximum possible benefit within the constraints of having due respect and consideration for the requirements of all others:

- a) Scientists ought to remember that they, in common with everyone else, do not *own* sites, neither should they view their own use of sites as necessarily being of paramount importance.
- b) Commercial (and amateur) collectors must be encouraged to obtain and retain as much detailed information as possible when extracting and/or preparing important specimens, and must furthermore respectfully avert their attentions from vulnerable integrity sites, except where excavations are undertaken on a joint basis with EN and SNH and/or museum personnel.
- c) Geological Earth heritage ultimately belongs to everyone, and much more still remains to be done by EN/SNH and local government as regards properly presenting palaeontological sites to the public at large, as opposed to just those who are *already* interested. Active public support and funding for palaeontological

site conservation are unlikely to grow if earth sciences continue to remain a minor public interest. Perhaps even more importantly, it is surely desirable that as many people as possible be afforded the opportunity to discover for themselves a humble but nevertheless fascinating piece of Earth's ancient past.

In order to more accurately establish whether or not additional regulatory - and/or voluntary - management measures are required to ensure at least adequate protection of fossil resources in England and/or Scotland at the present time, three principal classic fossil localities were selected for specific investigation and discussion - these being the West Dorset and North Yorkshire coasts in England, and the northeast coast of the Isle of Skye in Scotland (the northeast Skye coast). Of the three, the West Dorset coast is undoubtedly the best known in palaeontological terms and is accordingly subjected to the greatest collecting pressure, as a result of which certain *voluntary* management initiatives have recently been introduced in an attempt to encourage more responsible use of the resource. Although perhaps not quite as well known as a fossil collecting locality, the North Yorkshire coast is nevertheless also subject to significant collecting pressure, as a result of which *voluntary* management measures are soon to be introduced in order to promote both responsible collecting practice and increased contact and co-operation between collectors and museum personnel. Whilst the northeast Skye coast is both less well known as a fossil collecting locality and far more remote than either of its aforementioned English counterparts, it is nevertheless visited by a significant number of collectors since the locality produces internationally important dinosaur fossil material, some specimens of which have in latter years been inadvertently damaged and lost as a result of indiscriminate hammering and/or irresponsible collecting.

Each of the three localities is discussed separately in terms of its character, special interest, recent problems involving excessive collecting pressure, and where applicable those voluntary management measures which have recently been/are being put in place in an attempt to control such collecting pressure. The discussion then moves on to investigate and discuss the views and opinions of representatives from all those major stakeholder groups most closely involved with the use and conservation of fossil resources in each of the three localities. Such views and opinions were obtained by way of three questionnaire exercises, and it will be noted that the three locality-specific questionnaires (see Appendices II, V & VI) used in this connection differ slightly in both length and format. This partly reflects the geographic and demographic differences between the three locations themselves, as well as reflecting the extent to which such issues have already been previously investigated in the three localities. Questions asked related to value judgements, issues and conflicts, *the perceived need for additional management measures*, and several other more general issues. Those approached included national and/or local English



Nature/Scottish Natural Heritage officials, local authority officials, National Park officials, Heritage Coast Rangers, national and/or local museum curators, landowners/land-agents, commercial collectors, experienced amateur collectors, local geological/palaeontological groups, and local fossil-shop proprietors. Throughout the discussion in this Chapter pertaining to questionnaire responses, the nature of the respondents in terms of their stakeholder affiliation will for brevity be abbreviated as follows:

- English Nature officials (both national and local) - EN.
- Scottish Natural Heritage officials (both national and local) - SNH.
- Representatives of geological/palaeontological conservation groups (such as RIGS) - geol.gp.
- Landowners and their agents - LO.
- Local experienced amateur collectors - am.coll.
- Local commercial collectors/preparators - comm.coll.
- Local fossil-shop proprietors - foss.sh.
- Museum curators - MUS.
- Heritage Coast Rangers - HCRanger.
- National Park officials - NP
- Local authority officials - LA.
- British Geological Survey official - BGS.

It should be noted that some individuals from certain stakeholder/collector groups responding to the questionnaires in West Dorset and North Yorkshire only agreed to complete and return questionnaires on the understanding that their identity and *stakeholder group affiliation* remained anonymous. Such tension has largely been precipitated by the recent development and implementation of the West Dorset Collecting Code of Conduct, as well as the formulation and planned introduction of Guidance for Fossil Collectors in North Yorkshire (with many stakeholder group representatives in any case being closely-knit despite being 300 miles apart). Certain stakeholder group representatives already polarised *before* the introduction of such measures became even more so when confronted with the *possibility* of new collecting controls. (This situation has currently been exacerbated by fears of certain collector groups over the proposal that the West Dorset coast be included as part of the West Dorset and East Devon World Heritage Site.) In view of the aforementioned, the writer has had to tread carefully in terms of honouring demands for anonymity, and the views and opinions of respondents from West Dorset and North Yorkshire have therefore by necessity been aggregated together for the purposes of

some areas of discussion. The Isle of Skye case study has been similarly treated not only for consistency of approach, but also owing to the fact that the relatively small responding sample of just five individuals did not fully represent all stakeholder groups typically having an interest in the use and conservation of fossil resources. Although somewhat undesirably precluding a complete and rigorous *stakeholder group-specific* analysis, the findings of the three questionnaire exercises nevertheless - so far as is possible within the afore-mentioned constraints of anonymity - afford a most useful insight as to the broad body of opinion subsisting in the minds of those individuals who responded. Once all stakeholder groups have had time to properly digest and become more comfortable with recent developments in both West Dorset and North Yorkshire, it is the writer's intention to contact those individuals who requested anonymity to reconsider their position. An unqualified response will at some stage in the near future enable a more rigorous stakeholder group-specific analysis to be undertaken - especially as regards the extent to which each stakeholder group's value judgements influence that group's responses to subsequent questions relating, for example, to the perceived need for additional regulatory and/or voluntary management measures.

This Chapter concludes with a summary comprising a brief recap of the inherent characteristics of, and differences between, the three localities, along with a discussion of the views and opinions of all those stakeholder group representatives who responded to the three questionnaire exercises.

## **3.1 WEST DORSET COAST**

### **3.1.1 Introduction**

The West Dorset coast in southern England is of international importance owing to its magnificently scenic and richly fossiliferous exposures of Lower and Middle Jurassic rocks (Edmonds 2001). Furthermore, the coast provides some of the finest geomorphological features to be found in Europe including the remains of the huge Black Ven rotational landslide that occurred in the winter of 1958/9. As a consequence virtually the whole of the West Dorset coast has been designated by English Nature (EN) as a Site of Special Scientific Interest (SSSI). The coast also lies with an Area of Outstanding Natural Beauty, and is also designated both as a Heritage Coast and a Special Area of Conservation (under the European Habitats Directive). Notwithstanding this array of designations, the West Dorset coast was also in 1997 put forward for nomination as a World Heritage Site owing to the unique scientific interest displayed in its cliffs and foreshore (Edmonds 2001). The coast's

relatively soft cliffs erode rapidly with annual cliff-top recession of over one metre not being unusual. As a consequence, a wide range of often superbly preserved marine fossils are constantly being revealed on an almost day-to-day basis, with the coast's many beaches accordingly being of great interest to all collectors alike - whether their interest be for scientific, educational, commercial, or recreational reasons. Fossil types occurring along the coast range from abundant ammonites, belemnites, and bivalves through less common starfish, fish, and ichthyosaurs to more rare material including most excitingly the occasional pterosaur and dinosaur specimen.

### **3.1.2 Excessive Collecting Pressure**

The West Dorset coast - or more specifically that part of it around Lyme Regis and Charmouth - was first made famous in palaeontological terms by the activities both of leading academics (who visited the area in the 18<sup>th</sup> and 19<sup>th</sup> centuries) and local commercial fossil collectors, with the most noted of the latter being the celebrated Mary Anning (Torrens 1995). Indeed, the tradition of both collecting for financial gain and communicating new and important finds to leading academic researchers first established by Mary Anning in the 1820s still continues today. However, what has changed during recent decades is the increasing number of commercial collectors attracted to the proliferation of fossiliferous material supplied by the Black Ven landslip in 1958/9. These collectors have since that time been evermore vigorously pursuing an ever smaller number of available fossils, as the rich pickings provided by the Black Ven slip have slowly dwindled as the slip has steadily eroded away (Edmonds 2001). In the 1970s, this growing imbalance of supply and demand led to commercial collectors digging for specimens in cliffs rather than waiting for nature to expose the fossils instead. Further to local cliff-top residents becoming increasingly concerned that such digging activities were undermining the stability of the cliffs, a Public Inquiry was held in 1982 to investigate the threat actually posed by this unnatural 'erosion'. Although the Inquiry held that any damage caused to the cliffs by digging for fossils was virtually negligible when compared with that caused by natural erosive processes, the activities of commercial (and recreational and educational) collectors continue to this day to cause concern amongst local residents and palaeontological researchers alike.



### **3.1.3 Management of Collecting Activities**

#### **3.1.3.1 Regulatory Measures**

That part of the West Dorset coast situated between Lyme Regis and immediately east of Burton Bradstock is designated under the provisions of *the Wildlife and Countryside Act 1981* (see 4.6.1.3 below) as a Site of Special Scientific Interest by English Nature, with such designation comprising the only legal mechanism via which English Nature can regulate collecting activities. However, owing to the spatially extensive nature of the fossil resource, collecting is neither controlled by English Nature by virtue of imposing OLD25 (see 4.6.1.3 below) nor regulated by a permit system. Whilst the West Dorset coast also has Heritage Coast status and furthermore falls within an Area of Outstanding Natural Beauty, these forms of recognition offer nothing in the way of potential mechanisms via which to in any way specifically regulate collecting activities. Notwithstanding such a lack of mandatory *viz. a viz. regulatory* controls upon collecting, certain *voluntary* management measures have recently been developed and introduced to encourage more responsible use and conservation of the West Dorset coast's fossil resources.

#### **3.1.3.2 Voluntary Measures**

In recognition of the ongoing concerns surrounding the collection of fossils, the Charmouth Heritage Coast Centre was established at Charmouth in 1985, with its remit being to provide information and direction to those individuals and groups wishing to undertake fossil collecting activities along the West Dorset coast. However, some ten years later - and set against the growing realisation that the West Dorset coast's Lower Jurassic Period sequence of rocks was quite possibly the finest of its kind in the world - Dorset County Council in 1995 established the Dorset Coast Forum. The Forum's principal aim was and is to provide a partnership approach to the long-term protection and economic development of the West Dorset coast - particularly in the context of geotourism. Two years later in the autumn of 1997, a three-year feasibility study called the Jurassic Coast Project was jointly developed and initiated by Dorset County Council, English Nature, and other local authorities to promote *sustainable* geotourism in the West Dorset coast area for public and educational groups. The Project was funded not only by local government and English Nature, but also by the Single Regeneration Budget, the Rural Development Commission, and the European Union KONVER II Fund. The Project's most notable accomplishment to date in the context of this discussion has been its involvement (along with the Charmouth Heritage Coast Centre) with the recent development of a

Fossil Collecting Code of Conduct for the West Dorset coast. The new Fossil Collecting Code of Conduct continues EN's established policy of seeking to secure effective use and conservation of England's SSSIs by building upon many of the principles set out in EN's 1996 Position Statement on Fossil Collecting (EN 1996 and also see Larwood & King 1996).

### **3.1.4 Fossil Collecting Code of Conduct**

The Fossil Collecting Code of Conduct (the Code) was developed during a number of often confrontational meetings held in 1997/8 by a Working Group comprising landowners (principally the National Trust and Charmouth Parish Council), Charmouth Heritage Coast Centre, the Jurassic Coast Project, English Nature, West Dorset Heritage Coast, Dorset and Somerset Museums Services, the British Geological Survey, Charmouth Parish Council, and local commercial and experienced amateur fossil collectors. The Working Group was established in order to address growing conflicts of interest between the various stakeholder groups actively involved in the use and conservation of the fossil resource - particularly between commercial collectors and the scientific community.

#### **3.1.4.1 Main Issues and Conflicts**

The main concerns and issues considered and debated by the Working Group over a series of often 'heated' and consequently protracted meetings, as well as the major conclusions reached, can be summarised as follows.

##### **Need for Greater Communication and Co-operation**

The museum community expressed concern that owing to the nature of the commercial market for specimens and limited museum acquisition budgets, key scientifically important specimens all too frequently end up in private collections and as such are effectively removed from publishable scientific research (and see Appendix I Table 5). Given that museum personnel do not have the time and resources to undertake collecting and preparatory activities themselves (and see 2.7.1, 2.7.2, and 2.8.1 above.), the Working Group accordingly recognised the need for greater communication and co-operation between collectors, museum curators, and other academic researchers to ensure that scientifically significant specimens are recovered with the maximum associated scientific information, prepared to agreed standards, and recorded via an agreed recording scheme.

### Ownership of Fossils

Concerns were expressed over the perceived lack of clarity as to who actually owns the specimens once they have been collected - or rather 'recovered' since this invariably involves considerable time, expertise, and even money (and see 4.4.5 below).

The Working Group acknowledged the vital role to be played by landowners in this regard, and it was subsequently decided by the National Trust - in its capacity as by far the major landowner along the West Dorset coast - that the ownership of specimens collected in a *responsible* manner would be automatically transferred to the finder upon two provisos. First, that all key scientifically important finds be recorded via a Recording Scheme, and secondly that museums be given the first opportunity to purchase such specimens.

### Excessive Digging Within Cliffs

Although a Public Inquiry held in 1982 found that the commercially motivated digging for fossils posed little in the way of a real threat to cliff stability (see 3.1.2 above), it nevertheless remains the case that important scientific contextual information can be lost where specimens are hurriedly removed from cliffs (and see 2.7.1 & 2.7.2 above). Furthermore, it was noted that such activities could encourage less experienced members of the general public to put themselves in considerable danger by similarly scaling the typically unstable cliffs with their attendant and often-deep mudflows. (Many members of the general public might well argue that such collecting activities are in any event simply unacceptable upon National Trust property that is also designated as a Heritage Coast.)

It was, however, also noted that many fragile and important *in situ* specimens simply fall into the sea and are accordingly lost to everyone if not quickly recovered from the cliffs. The Working Group accordingly concluded that digging for specimens should be restricted to the rescue of important (typically vertebrate) specimens, with such collecting only to be undertaken with the express permission of the landowner concerned, and where members of the palaeontological community have been first consulted. It was furthermore agreed that whilst prior permission to excavate should always be obtained where practical, any key scientifically important specimens in *immediate* threat of damage and destruction could be recovered *without* such prior express permission where excavation can be carried out both rapidly and responsibly.



## Health and Safety

Health and safety considerations are becoming increasingly important in today's increasingly litigious society, with all parties becoming understandably more cautious and keen to abrogate their responsibilities in this regard wherever possible. Although the principal responsibility for health and safety lies with both landowners and collectors, *all* those using and conserving coastal fossil resources have an important role to play in promoting safe collecting practice. The Working Group accordingly concluded that all those visiting the coastline for its fossil interest should be made aware of the risks involved, and also of their duty of care both to themselves and to others.

Furthermore, it was felt that commercial fossil collectors should adhere to a code of safe working practice addressing the dangers of cliff-falls and mudflows, and should also take out their own personal insurance cover. The Working Group also agreed that it might become necessary for landowners to deny access to any individuals demonstrating blatant disregard for health and safety considerations.

## Regulation of Collecting Activities

Interestingly, and of particular relevance in the context of the aims of this thesis, the Working Group concluded that the successful adoption of a *voluntary* Fossil Collecting Code of Conduct acceptable to all parties was infinitely preferable to the introduction and imposition of any new mandatory restrictions upon collecting. It should, however, be pointed out that the West Dorset coast's commercial collectors made particularly strong representation within the Working Group, as it was obviously they who would ostensibly have the most to lose - i.e. their livelihoods - were new regulatory controls upon collecting to be agreed and implemented. Furthermore, the Working Group's overall rejection of regulation can arguably be regarded as a pragmatic acceptance of the fact that it is extremely difficult to enforce rules and regulations along open coastline. It is also arguable that experienced and responsible commercial collectors comprise those individuals best placed to both find and recover key scientific fossils, owing to the fact that they are out patrolling the cliffs and beaches at all hours and whatever the weather. Any attempt to remove commercial collectors' financial motivation would simply result either in fossils being lost to erosion and/or (and more likely) collecting activities being undertaken secretly, with specimens being sold via the 'black market' and as such never becoming available for scientific study (and see 3.1.5.5 below). Notwithstanding the aforementioned, it should also be noted that any collector choosing to work outside the Code could well

be regarded as stealing fossils from the landowner, and as such may be liable to legal action (Edmonds 2001).

#### **3.1.4.2 Primary Objectives**

Although primarily aimed at commercial and experienced amateur collectors, the Code equally applies to all those who visit the coast to collect fossils whether for educational or recreational purposes. The Code recognises that regular fossil collecting is essential in order both to provide specimens for study and to prevent important specimens being damaged or destroyed by the sea. However, and most importantly, the Code at the same time advocates that all collecting activities should be carried out in a responsible and safe manner. After having been initially ran as a pilot scheme between the winter of 1998 to the spring of 2000, the Code has - further to a recent review by the Working Group - now been adopted on a permanent basis (Edmonds 2000 pers. comm.).

The stated principal aims of the Code are as follows:

- 1) "Promote responsible and safe fossil collecting."
- 2) "Restrict the excessive digging or 'prospecting' for fossils along fossil-rich strata."
- 3) "Clarify ownership of the fossils."
- 4) "Promote better communication between all those with an interest in fossils from the West Dorset coast."
- 5) "Promote the acquisition of key scientifically important fossils within recognised museum collections."

#### **3.1.4.3 Recording Scheme**

The Code in the widest sense is a two-tiered initiative comprising a Fossil Collecting Code of Conduct *per se* in conjunction with a Recording Scheme via which the finding and recovery of key scientifically important fossils can be recorded to best serve research interests (Edmonds 2001). The Recording Scheme also aims to promote communication between interest groups: collectors can record their important finds; academics can communicate their research interests, and museums and landowners can monitor new finds (Edmonds 2001). Two specific categories of fossil are recognised within the Recording Scheme; these being Category I fossils comprising new or extremely rare species and exceptionally well-preserved fossils, and Category II fossils that, although of more abundant species such as ammonites, are nevertheless still of significant scientific importance. The actual record of each find

includes a description and photograph of the specimen, location details, stratigraphic horizon, and other associated scientific information.

#### **3.1.4.4 Results to Date**

Many of the objectives of the Code appear to have so far been successfully met. Both the Code and the formal discussion process that led to its development and adoption have certainly served to increase communication and co-operation between researchers and commercial collectors. By early August 2000, 27 specimens had been recorded via the Recording Scheme comprising five Category I and eight Category II vertebrate specimens, five Category I and eight Category II invertebrate specimens, and one Category I plant specimen. However, there has in this regard been something of a disappointing response from palaeontological researchers, in that only four research interests had been logged onto the scheme by August 2000 (and see 3.1.5.4 below).

There has also been a marked decrease in digging activities with, for the first time in several years, no complaints in such regard having been received by Charmouth Parish Council since the adoption of the Code in the autumn of 1998 (Edmonds 2000 pers. comm.).

The success or otherwise of the Code to date has for the purposes of this thesis been assessed by way of a questionnaire exercise, the nature and results of which are discussed below.

#### **3.1.5 Questionnaire Exercise**

As a vital part of this investigative case study, a questionnaire exercise was undertaken during the summer of 2000 to obtain the views and opinions of those individuals most actively involved with the use and conservation of the West Dorset coast's fossil resources. Questions asked (see Appendix II) related specifically to value judgements, issues and conflicts, the Fossil Collecting Code of Conduct, the Fossil Recording Scheme, *the perceived need for additional management measures*, and several other more general issues.

Of the 20 individual stakeholder representatives approached, questionnaires were returned by just ten individuals comprising a national EN official, a West Dorset Heritage Coast Ranger, the Dorset County Council co-ordinator of the locally-based Jurassic Coast Project (see 3.1.3.2 above), three experienced local amateur collectors, one local commercial collector, one full-time commercial fossil preparator,

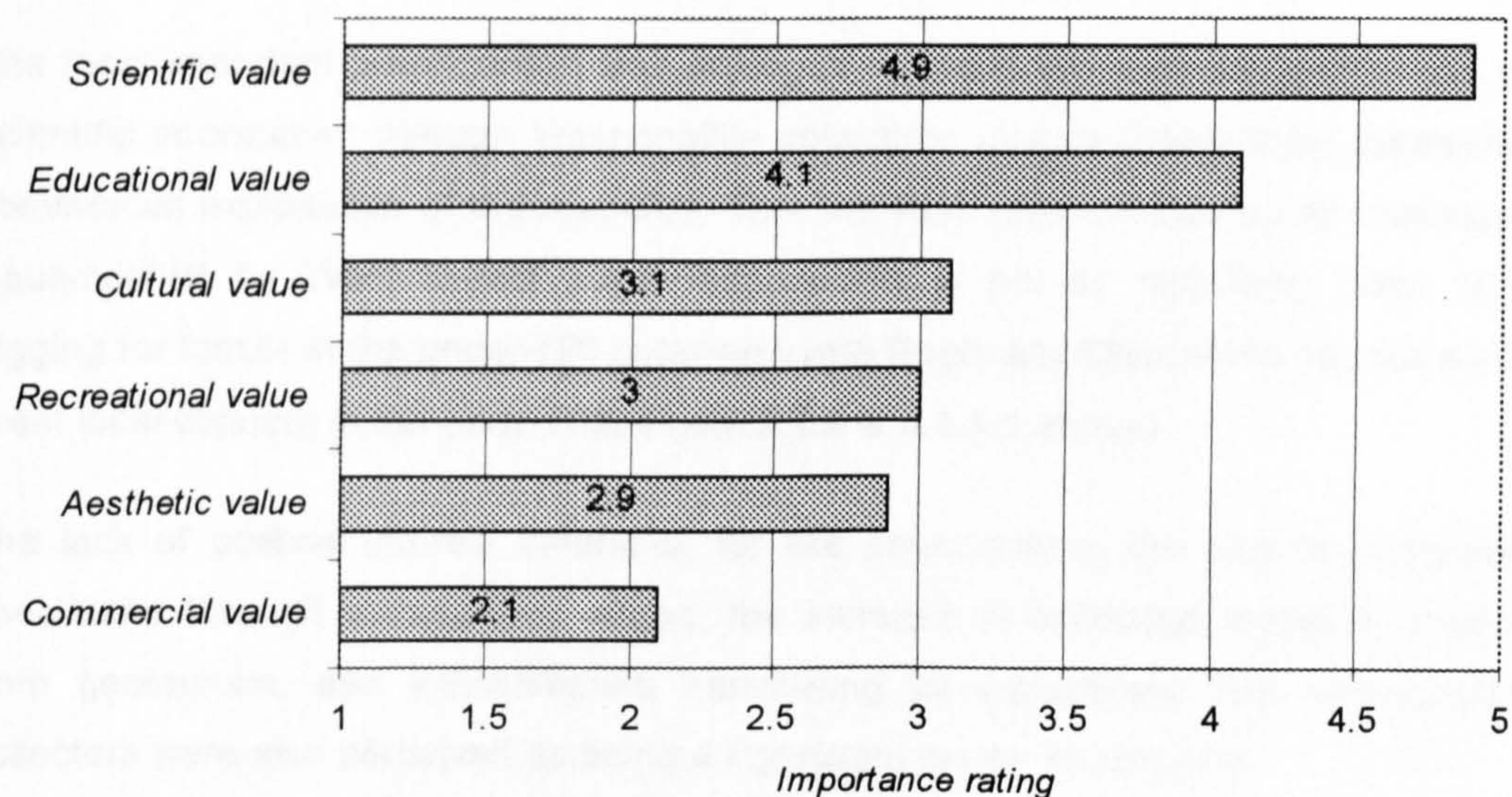


a British Geological Survey geologist, and a National Trust land-agent (the National Trust being by far the major landowner along the West Dorset coast - readers requiring in-depth information regarding the views of the National Trust and other institutional landowners as regards issues connected with fossil collecting should refer to Harvey (2001)).

It is arguable that the ten individuals contacted who did not respond had become wearisome of investigative questioning and discussion, having as they had, already been involved in the extensive consultation process which had preceded the introduction of the Fossil Collecting Code of Conduct (Edmonds 2000 pers. comm. and see 3.1.4 above). Furthermore, and as discussed in 3 above, a significant number of West Dorset respondents only agreed to provide responses upon condition of anonymity as regards their identities and *stakeholder group affiliation*. Notwithstanding this, the following analytical discussion of questionnaire responses refers to respondent stakeholder affiliation so far as is possible (although obviously not where responses have been aggregated and presented as figures (bar-charts)) within the constraints of respecting the wishes for anonymity of those individuals concerned.

### 3.1.5.1 Value Judgements

Figure 3.1.1 Value judgements



Respondents first rated in terms of importance each of six given values intrinsic to the West Dorset coast's fossil resources (Figure 3.1.1). Scientific value received almost the maximum possible importance rating, with educational value being considered second in importance. Commercial value was deemed to be the least important (even



with two of the ten respondents comprising commercial entities), with recreational, cultural, and aesthetic value occupying the 'middle ground' in respondents' minds.

(It is, of course, arguable that commercial value is in the strictest sense non-existent in the absence of *other* more intrinsic values such as aesthetic and educational value. However, 'commercial value' can for the purposes of this Chapter be regarded as monetary value *per se* to those wishing to sell specimens on the commercial market for fossils.)

Respondents were furthermore afforded an opportunity to comment as to whether they considered fossils to have intrinsic values other than those pre-selected by the writer. Two individuals responded in the positive with the values put forward being 'rarity *per se*' (am.coll.) and 'tourism value' (HCRanger) (the latter actually comprising an indirect form of commercial value since the term presumably refers to local economical benefits resulting from increased visitor numbers and associated spending). As regards whether fossil specimens are of greater value when *ex situ*, *in situ*, or both, four, four, and two respondents replied in the positive respectively.

### **3.1.5.2 Issues and Conflicts**

Respondents next rated in terms of importance each of a number of given issues and conflicts that it widely argued have adversely impacted upon the use and conservation of UK fossil resources over recent years (Figure 3.1.2).

The most important issue/conflict was adjudged by the respondents to be the loss of scientific information through irresponsible collecting, closely followed by excessive commercial exploitation of the resource. That the latter was considered an important issue/conflict by West Dorset coast respondents is not so surprising given that digging for fossils in the under-cliff between Lyme Regis and Charmouth caused such great local concern in the early-1980s (see 3.1.2 & 3.1.4.1 above).

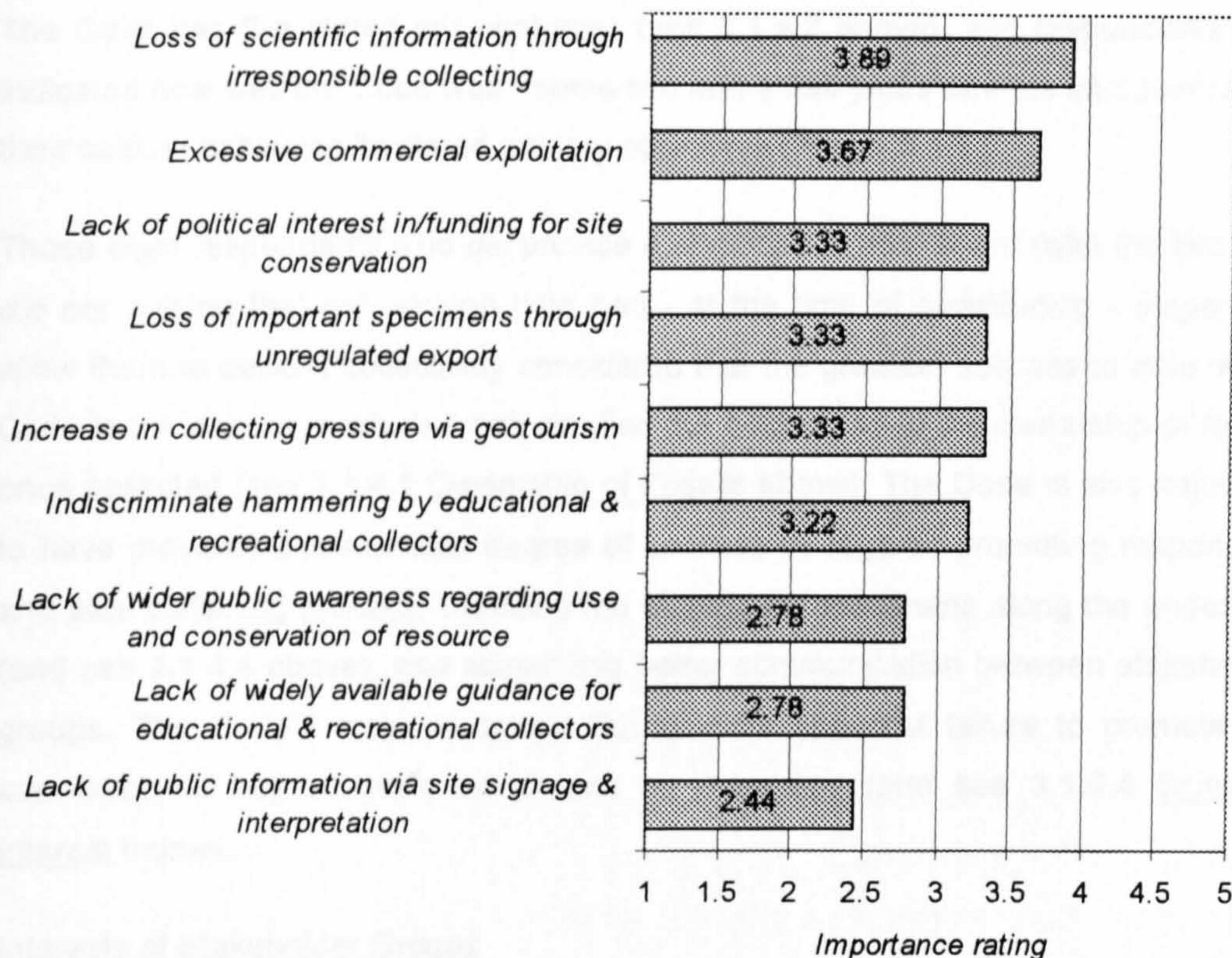
The lack of political interest in/funding for site conservation, the loss of important specimens through unregulated export, the increase in collecting pressure arising from geotourism, and indiscriminate hammering by educational and recreational collectors were also perceived as being a significant cause for concern.

The fact that the three issues and conflicts considered of least importance by respondents are all related to the need for wider public/educational and recreational collector awareness is arguably a reflection of the fact that the West Dorset coast comprises the best known and most popular fossil collecting destination in the UK,



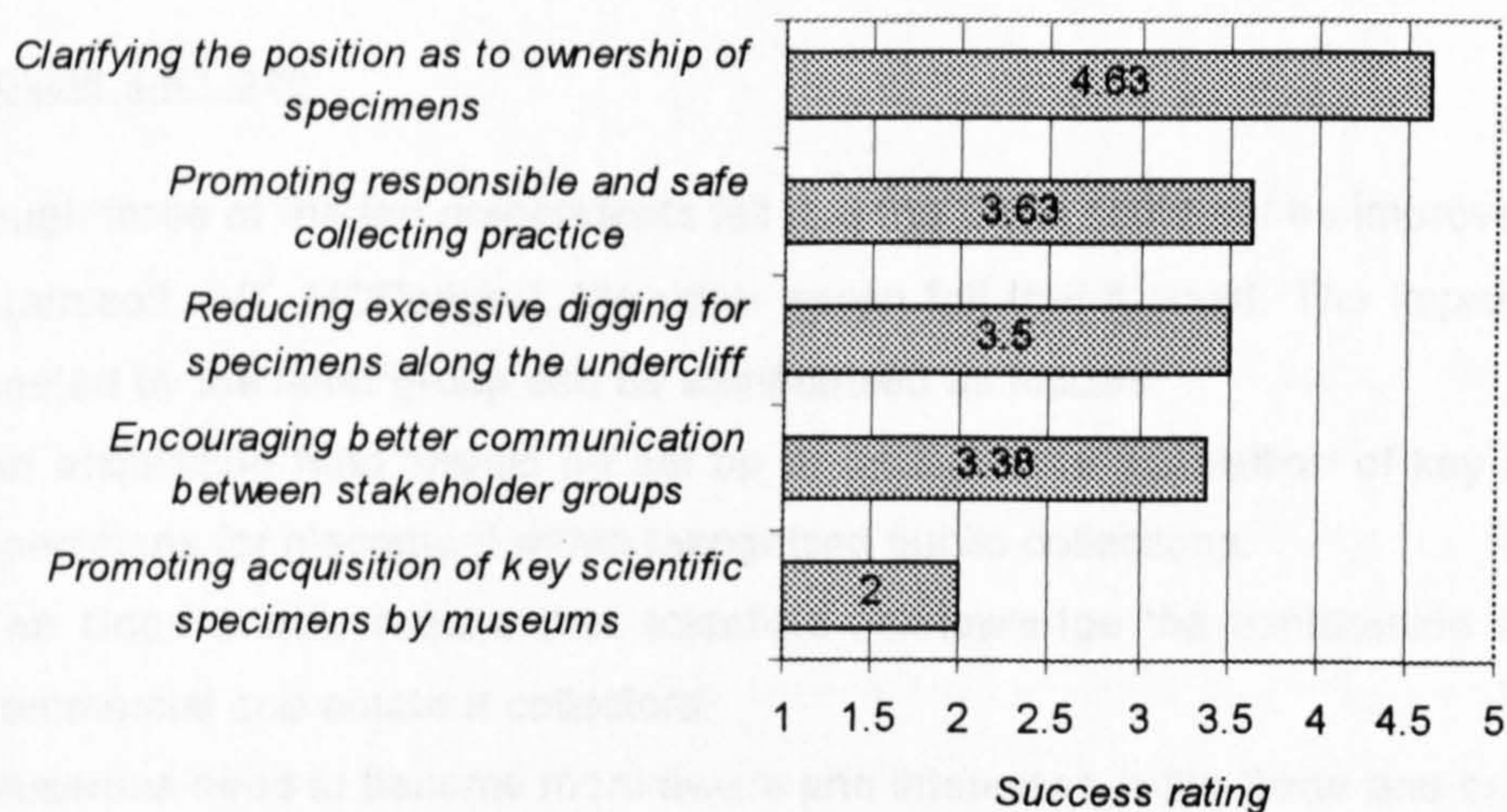
and as such these conflicts/issues have largely already been addressed to a significant degree (see 3.1.3.2 & 3.1.4 above).

**Figure 3.1.2 Issues and conflicts**



### 3.1.5.3 Fossil Collecting Code of Conduct

**Figure 3.1.3 Fossil Collecting Code of Conduct**





## Primary Objectives

The West Dorset coast is notable as a fossil collecting location not least for its recently introduced Fossil Collecting Code of Conduct (the Code), comprising as it does the first such managerial mechanism of its kind thus far introduced in the UK. The Code has five stated principal aims (see 3.1.4.2 above), and respondents next indicated how well the Code was - some two and a half years after its introduction - in their opinion achieving its stated primary objectives (Figure 3.1.3).

Those eight respondents who *did* provide a response in this regard (with the two who *did not* opining that not enough time had - at the time of questioning - elapsed to allow them to decide) collectively considered that the greatest success to date of the Code is the degree to which it has clarified the position as to the ownership of fossils once collected (see 3.1.4.1 Ownership of Fossils above). The Code is also adjudged to have provided a reasonable degree of success as regards promoting responsible and safe collecting practice, reducing the digging for specimens along the under-cliff (and see 3.1.4.4 above), and stimulating better communication between stakeholder groups. The Code's main perceived failing is its apparent failure to promote the acquisition of key scientific specimens by museums (and see 3.1.5.4 Scientific Interest below).

## Interests of Stakeholder Groups

Eight of the ten respondents felt that the Code successfully balanced the interests of all those stakeholder groups having an interest in using and conserving the fossil resource. One (BGS) of the remaining two respondents thought that not enough time had yet elapsed to properly tell.

## Improving the Code

Although three of the ten respondents felt that the Code could *not* be improved in any way (am.coll., NT, HCRanger), the other seven felt that it could. The improvements suggested by the latter group can be summarised as follows:

- 1) An acquisition fund should be set up to facilitate the acquisition of key scientific specimens for placement within recognised public collections.
- 2) The Code should require that scientists acknowledge the contribution made by commercial and amateur collectors.
- 3) Museums need to become more aware and interested in the Code and its results.
- 4) More funding is required for the enforcement of the Code.

#### **3.1.5.4 Recording Scheme**

As already discussed in 3.1.4.3 above, the Code incorporates a voluntary Recording Scheme (the Scheme) for key scientifically important fossils. The respondents' views as regards the success or otherwise of the Scheme can be summarised as follows.

##### Response from Collectors

Six of the ten respondents felt that the Scheme was indeed meeting with a satisfactory response from collectors. Two of the four remaining respondents were undecided in this regard (LO, am.coll.), whilst the remaining two (EN, am.coll.) felt that there was not enough reporting of finds, and that that this was perhaps because collectors had little to gain from so doing - some of whom were furthermore perhaps unclear as to the exact requirements of the Scheme.

##### Response from Scientific Community

*All ten* respondents considered the response to the Scheme from the scientific community to be poor. When asked to opine as to why this might be the case, the reasons given by respondents centred around a general lack of awareness (EN, LA) or interest (LA, HCRanger) allied with a lack of interest resulting from an unwillingness and/or inability to purchase specimens at open market prices (LA, LO). It was also felt that there was no clear system by which to alert the scientific community to new finds, with the term 'scientific community' furthermore being ill defined in this regard (am.coll.).

#### **3.1.5.5 Need for Additional Management Measures**

Those questioned were next asked to comment whether or not they felt that additional management measures were required - i.e. in addition to SSSI notification and the Code (and Recording Scheme therein) - to ensure adequate protection of the West Dorset coast's fossil resources. Nine of the ten respondents did not, with just one (EN) being in disagreement, noting that additional *voluntary* management measures are still required to adequately protect integrity sites (although it is debatable whether or not such sites actually exist along the West Dorset coast). One respondent saying no (HCRanger) also commented that "Landowners have the power to protect if they have a mind" and furthermore in connection with this question "Protection/conservation for whom - the scientific minority?" Another respondent (LO) qualified his response by emphasising that his views might well be different in a year or two's time should the current Code and Scheme not prove satisfactorily successful.



When asked whether or not the UK requires stricter regulatory control of the export and import of fossils, eight of the ten respondents said no, and just two said yes (EN, LO) although neither proffered any reasoning for taking such a view. The reasons provided by some of those eight respondents saying no can be summarised (in no order of priority) as follows:

- 1) Controls would lead to a massive escalation in 'black market' activities (am.coll.).
- 2) Controls would prove very difficult and expensive to adequately enforce (am.coll., HCRanger).
- 3) Lack of museum funding here in UK when compared to elsewhere in the world - so long as specimens are curated *somewhere* in the world, it does not really matter if its not here in the UK (LO, BGS).

### **3.1.5.6 World Heritage Status**

When asked whether or not they considered the designation of the West Dorset and East Devon coast as a World Heritage Site would help ensure better use and conservation of the West Dorset coast's fossil resources, five of the ten respondents said yes (EN, CO, BGS, HCRanger, LO), and five said no. The reasons given by both groups are both interesting and revealing, and can be summarised as follows:

#### For

- 1) Such designation would link fossils into a broader conservational context (BGS).
- 2) Such designation would raise the profile of the West Dorset coast's fossil resources and the need for their conservation (EN, LA, HCRanger).
- 3) Such status would highlight the importance of conserving fossil resources, and hopefully avoid further loss of important coastal sites to sea-defence works (BGS) (and see 2.5.3.1 above).

#### Against

- a) There is no need for the implementation of any additional management measures along such a fast eroding coast where fossils are destroyed by the sea if not collected.
- b) Such designation will increase geotourism which will in turn spoil the coast (am.coll.).
- c) Such designation comprises little more than an additional set of rules and regulations formulated and implemented by a group of individuals who have little or no local knowledge and experience (am.coll.).

- d) Additional rules and regulations may (on the assumption that they include collecting restrictions) increase the 'black market' commerciality of fossils from the West Dorset coast.
- e) Yet another designation will just add to the already-existing climate of suspicion (am.coll.).

Whilst the equal split in respondents' views ostensibly demonstrates little or no degree of consensus in this regard, it should be noted that it mainly - and perhaps somewhat unsurprisingly - appears to be collectors who are opposed to/suspicious as to the implications of the designation of the West Dorset (and East Devon) coast as a World Heritage Site.

#### **3.1.5.7 Visitor Safety**

As regards whether or not sufficient information is made available to the general public pointing out the dangers associated with tidal movements, landslides, and cliff-falls, nine of the ten respondents felt that it was, with just one feeling it was not. This finding is perhaps not that surprising given the recent activities of the Charmouth Heritage Coast Centre and more latterly the Jurassic Coast Project in this regard (see 3.1.3.2 above).

#### **3.1.5.8 Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities**

When asked who they would alert to any irresponsible collecting activities witnessed, five of the ten respondents said the landowner, three the police, one EN, and one the Charmouth Coast Heritage Centre (see 3.1.3.2 above). Eight of the ten respondents felt that any remedial action taken in this regard could in reality likely be undertaken quickly enough to comprise an effective deterrent to irresponsible collectors. Those two respondents who did not (am.coll., HCRanger) felt the response time would in practice prove to be too slow.

### **3.2 NORTH YORKSHIRE COAST**

#### **3.2.1 Introduction**

The North Yorkshire coast stretches over 40 miles from Staithes in the north down through Whitby, Scarborough, and Filey to Speeton in the south. The aesthetic appeal and cultural heritage of this visually dramatic stretch of coastline attracts large numbers of tourists throughout much of the year, a significant number of whom visit the area for its fossil interest. The rich fossil heritage of the North Yorkshire coast is



well illustrated by the fact that approximately 20% of its length is designated by EN as SSSIs under the provisions of the *Wildlife and Countryside Act 1981* (see 4.6.1.3 below). Furthermore, that part of the North Yorkshire coast situated between Staithes to the north and Scalby Mills near Scarborough to the south is also designated as Heritage Coastline, falling as it does within the North Yorkshire and Cleveland Heritage Coast. Much of the northern portion of the North Yorkshire coast also constitutes the northeast boundary of the North York Moors National Park.

From a palaeontological perspective, much of the North Yorkshire coast's extensive cliff and foreshore exposures comprise laminated strata laid down as mainly marine and partly estuarine sediments between 190 and 130mn years ago. The most ancient of these strata occur as the Middle Lias shales of the Lower Jurassic at Staithes to the north, and the most recent as the Lower Cretaceous clays at Speeton to the south. This virtually continuous geological sequence of shales and clays - and particularly the beds of calcareous limestone nodules occurring at regular intervals therein - offers scientific researchers and other fossil collector groups an abundance of often extremely well-preserved marine fossil fauna comprising mainly invertebrate specimens such as ammonites, belemnites, and bivalves, as well as rarer vertebrate specimens including marine reptiles and fish. Furthermore, certain localities offer exposures of sandstone strata laid down in estuarine conditions containing well-defined dinosaur footprints, with such occurrences having led to the North Yorkshire coast having recently become more popularly known - especially in media circles - as the 'Yorkshire Dinosaur Coast'.

Although the fossil fauna of the North Yorkshire coast is not today quite as widely known or keenly collected from by the wider public as its West Dorset counterpart, it should be noted that a great deal of early palaeontological research was undertaken along the North Yorkshire coast by prominent palaeontological researchers such as Owen, Sowerby, Simpson, Young & Bird etc. during the 19<sup>th</sup> Century - not least because their endeavours were greatly aided by the extensive alum quarrying activities being undertaken along much of the coastline at that time (see Osborne 1998). The North Yorkshire coast's rich fossil heritage most recently became the focus of significant media interest during August 2000, with the BBC spending a week at a locality near the village of Kettlewell some five miles north-west of Whitby to make a 50-minute programme documenting the excavation of a four metre-long fossil ichthyosaur. (Whilst participating in this dig, it was pleasing to note the positive, co-operative, and well-humoured attitude displayed between the local commercial collectors and museum researchers jointly involved in the excavation.) Guided fossil

hunting walks run under the auspices of the Yorkshire Dinosaur Coast Project (see 3.2.4 below) also similarly attracted significant media interest during the summer of 2000, with the BBC filming one such walk (guided by the writer) for its regional 'Look North' programme.

### **3.2.2 Excessive Collecting Pressure**

Although the North Yorkshire coast is perhaps not as widely recognised as a fossiliferous locality as its West Dorset counterpart, the many interesting and frequently attractive fossils which are readily found upon the coast's many shingle beaches ensure that large numbers of collectors from the UK and elsewhere are attracted to the coastline throughout the year. Incidences of irresponsible collecting are, however, relatively rare, with the only recent *known* occurrence of such activity having occurred in 1988 at a quiet and not easily accessible locality some eight miles north of Whitby. On this occasion, a known local and inexperienced amateur collector was found by local commercial collector and preparator Mike Marshall to be using a lump-hammer and bolster chisel to remove the vertebral column from a well-preserved and complete baby ichthyosaur fossil just 70cm-long. Marshall explained to the collector concerned that such a find was particularly rare and accordingly both scientifically important and commercially valuable, and quickly offered the individual a not inconsiderable sum of money for what was left of the already badly damaged specimen. The individual refused to be persuaded and subsequently carried on removing the vertebra, leaving the badly chiselled remains of the fossil minus its backbone laid in the foreshore rock (Marshall 1999 pers. comm.). Although this incident is the only known recent occurrence of blatantly destructive collecting, one is nevertheless left wondering how many similar instances have over the years taken place at the North Yorkshire coast's many quiet and relatively inaccessible localities which have simply gone unnoticed.

As regards less incident-specific excessive collecting activities, Marshall and another local commercial collector Ian Clift both remember frequent visits to the coast during the early 1980s by several groups of highly organised German collectors who systematically removed any and all fossils which they encountered (Marshall & Clift pers. comms. 2000 and see 2.5.2 above and 8.1 below). Marshall and Clift also continue to be concerned as regards the all-too-often inexperienced and consequently destructive collecting methods deployed by many recreational and educational collectors (and see 2.5.2, 2.7.3 & 2.7.4 above). The one particular fossil that apparently suffers more than most in this regard is the ammonite *Eleganticeras*



*elegans* that occurs in symmetrical nodules having a substantial 'skin' of iron pyrites. This four to eight millimetre thick 'skin' contains a high percentage of Iron pyrites - more commonly known as 'fools gold' - and as such readily takes a high polish. A properly collected and prepared example of this relatively scarce fossil accordingly makes a most attractive natural history item, comprising as it does an attractive ammonite encased in a semi-spherical and highly polished golden-looking nodule. These aesthetically appealing pieces can command high prices, with commercial collector and preparator Marshall being aware of one particularly fine and large example collected, prepared, and sold by himself which, having passed through the hands of several 'middle-men', eventually ended up in the hands of a London-based interior designer who paid £1,200 for the piece (Marshall 1999 pers. comm.). However, the 'down-side' of these nodules - which outcrop in foreshore strata at several localities - is that the iron pyrites 'skin' renders the nodules extremely tough and difficult to split open. Ammonites only occur in approximately one out of ten to 50 nodules (depending upon the exact locality) and, given that something of an expert eye is required to 'read' the nodule as regards whether or not it contains an ammonite, many less experienced collectors (as well as some who know better (Marshall 1999 pers. comm.)) simply wander along indiscriminately hammering at nodules as they lay partially exposed in foreshore strata. Since the correct way to deal with nodules is to dig them out of the foreshore rock *before* attempting to split them open (which in itself requires considerable experience in order perfect the necessary subtle blend of brute force and accuracy), it is always distressing to come upon a row or patch of *in situ* nodules the unsightly tops of which - along with any ammonites contained within - are simply battered and splintered, with the damaged nodules being rendered useless to those few collectors who do know how to 'deal' with them in the correct manner. It is, however, encouraging to note that the discouragement of irresponsible collecting practices such as indiscriminate hammering (and see 3.2.5.2 & 3.4.4.2 below) comprises one of the key aims of a new management initiative known as the Yorkshire Dinosaur Coast Project (see 3.2.4 below).

### **3.2.3 Management of Collecting Activities**

As stated previously in 3.2.1 above, approximately one-fifth of the North Yorkshire coastline is notified by EN as SSSIs with such designation comprising the only legal mechanism via which English Nature can regulate collecting activities. However, owing to the spatially extensive nature of the fossil resource, there are currently no SSSIs along the North Yorkshire coast upon which fossil collecting is controlled by

English Nature by way of imposing OLD25 (see 4.6.1.3 below) and/or implementing a permit system. Whilst the North Yorkshire coast falls within the North York Moors National Park and is also afforded Heritage Coast status, these forms of recognition offer nothing in the way of potential mechanisms via which to in any way regulate collecting activities.

Although no *regulatory* measures are presently in place to control collecting activities along the North Yorkshire coast, written guidance for fossil collectors is currently being formulated as part of a new *voluntary* management initiative known as the Yorkshire Dinosaur Coast Project.

### **3.2.4 Yorkshire Dinosaur Coast Project**

#### **3.2.4.1 Introduction**

The overall remit of the Yorkshire Dinosaur Coast Project (YDCP) is to ensure that the exceptional palaeontological heritage of the North Yorkshire coast is more widely appreciated by all those using it, and that the resource itself is commensurately more carefully used and conserved. The project was instigated by the staff of Whitby and Scarborough museums with the principal objective being to enhance the conservation of the geological heritage of the North Yorkshire coastline by promoting public awareness through a series of themed events. The YDCP was funded by £59,000 from the EC, with additional contributions from the Yorkshire Museums Council, Scarborough Borough Council, a local charitable trust, and the North York Moors National Park bringing the total to £125,000 (Davis 2000). The project also continues EN's established policy of seeking to secure effective use and conservation of England's SSSIs by building upon many of the principles set out in EN's 1996 Position Statement on Fossil Collecting (English Nature 1996 and also see Larwood & King 1996).

Appendix III outlines the aims, objectives, general principals and project partners of the YDCP which is more particularly focused on that part of the North Yorkshire coast situated between the village of Staithes in the north and Filey Bay to the south. The YDCP was developed in late-1999 and of specific relevance in the context of this thesis is stated objective 6 that reads:

“Convene a working group of all interested parties to discuss the pressures on the fossil resource of the area and explore the need for a formal protocol.”

The official Working Group was actually convened early in 2000 further to the holding of a much larger open meeting to which all those having any interest whatsoever in



the fossils resource were cordially invited to offer their views and opinions, both as regards any perceived problems associated with collecting activities, and the need for additional management measures.

#### **3.2.4.2 Open Meeting**

The open meeting was held on 24<sup>th</sup> January 2000 and was attended by 24 individuals including EN officials, museum personnel, commercial collectors, experienced amateur collectors, Heritage Coast Rangers, North York Moors National Park officials, landowners, university/college lecturers, local RIGS members, and local fossil-shop proprietors. The meeting progressed surprisingly smoothly with an encouraging lack of confrontation or hostility being displayed between any of the stakeholder groups present. The overall findings of the open meeting can be summarised as follows:

- 1) In overall terms, it was generally felt that fossil collecting along the coast did not pose any significant threat to the integrity of the type-section, although some degree of concern was expressed over the high levels of indiscriminate hammering by recreational and some educational collectors at certain easily accessible localities such as Robin Hood's Bay just south of Whitby.
- 2) Fossils will invariably be damaged and/or destroyed by the sea if not promptly recovered via responsible collecting activities.
- 3) Concern continues to be expressed by land managers and administrators such as North York Moors National Park officials as regards their liabilities in the context of health and safety.
- 4) A Fossil Collecting Code of Conduct incorporating a voluntary Recording Scheme for fossils of key scientific interest - as recently adopted along the West Dorset coast (see 3.1.4 above) - would constitute an important step in the right direction as regards ensuring the best use and conservation of the North Yorkshire coast's fossil resources. It was agreed that a small Working Group should be established to progress the development and introduction of the afore-mentioned Code.

#### **3.2.4.3 Working Group Meetings**

Further to the open meeting of 24<sup>th</sup> January 2000, a small Working Group was convened comprising - in addition to the writer - eight key individuals representing all stakeholder groups involved with the use and conservation of fossil resources situated along the North Yorkshire coast. At the time of writing, three meetings have been held by the Working Group that took place on 9<sup>th</sup> May, 3<sup>rd</sup> July, and 27<sup>th</sup> November 2000.

## First Working Group Meeting

In essence, the first meeting of the Working Group held on 9<sup>th</sup> May 2000 comprised a discussion of the suitability or otherwise of the West Dorset coast Fossil Collecting Code of Conduct (the Dorset Code) as a model upon which to base a similar Code for implementation along the North Yorkshire coast (the Yorkshire Code). Whilst all those present accepted that the Dorset Code did so offer a suitable model, it was also acknowledged and accepted that any Yorkshire Code would have to be individually tailored to reflect two additional important factors:

- 1) Whereas the Dorset Code is aimed primarily at commercial collectors, the Yorkshire Code should be more broadly aimed at *all* collector groups since it is argued by many of those involved in the use and conservation of the North Yorkshire coast's fossil resources that the indiscriminate hammering activities of recreational and educational collectors is of far greater concern than the predominantly responsible activities of a handful of commercial collectors. (There are far fewer full-time commercial collectors operating along the North Yorkshire coast than along the West Dorset coast, with North Yorkshire's commercial collectors furthermore having not in the recent past caused the same degree of controversy as their Dorset counterparts (see 3.1.2 above).)
- 2) Whilst the West Dorset coast comprises a relatively short run of mostly gently-inclined and soft clay cliffs, the North Yorkshire coast on the other hand comprises a far longer run of often sheer and precipitous rock cliffs. As a result the North Yorkshire coastline has fewer access points as well as a number of foreshore localities where unwary and/or uninformed individuals can be cut off and even drowned by the tide.

It was furthermore agreed that the Yorkshire Code should avoid listing and specifically targeting certain types of collector, as all Working Group members felt that this would only serve to separate and distance certain collector groups from each other, instead of better serving palaeontology by encouraging all collector groups to co-operate with each other. It was also decided that the Yorkshire Code would apply to the whole of the North Yorkshire coastline rather than to specific localities. Finally, all agreed that the title 'Guidance for Fossil Collectors' was far preferable to the title 'Fossil Collecting Code of Conduct' as it was felt that the latter title could be construed as conveying a potentially discouraging and alienating sense of official control and restriction, instead of promoting proactive involvement and co-operation between all those at whom the information would be aimed. It was agreed that the writer would in readiness for the next Working Group meeting prepare a draft version



of 'Guidance for Fossil Collectors' based loosely upon the West Dorset coast's Fossil Collecting Code of Practice. The first version of the draft was circulated to all members of the Working Group, further to which an amended version of the draft was prepared by the writer in readiness for the second Working Group meeting. The major changes made to the first version of the draft related to re-prioritisation of key points, and omitting or shortening certain sections of wording.

#### Second Working Group Meeting

The second meeting of the Working Group held on 3<sup>rd</sup> July 2000 concerned itself entirely with discussing the second preliminary draft of Guidance for Fossil Collectors (the third and final draft of which - including the Recording Scheme - is attached as Appendix IV). Whilst the Working Group concluded that - subject to a few minor alterations - the draft of Guidance for Fossil Collectors was now in a form more or less suitable for placement on a planned Internet web-site, the Working Group also felt, however, that the draft was far too long and detailed to be adopted as a leaflet aimed at the general public. The meeting accordingly concerned itself with adapting the key points of the draft Guidance for Fossil Collectors into a short, 'punchy' and 'user-friendly' leaflet. The ensuing A5-sized double-sided colour leaflet was widely distributed to the general public throughout August and September 2000 in connection with a number of fossil-related geotourism events held along the North Yorkshire coast under the auspices of the YDCP (see 3.2.4 above).

#### Third Working Group Meeting

The major item of discussion at the third meeting of the Working Group held on 27<sup>th</sup> November 2000 was the implementation of a Voluntary Recording Scheme broadly similar in nature and effect to that recently introduced along the West Dorset coast (see 3.1.4.3 above). It was decided that the paperwork relating to those specimens recorded via the Scheme should be held by Scarborough Museum, whilst more abbreviated details will be simultaneously made available to all those interested by way of an Internet web-site.

#### **3.2.4.4 The Future**

The final draft of the North Yorkshire coast Guidance for Fossil Collectors incorporating the Voluntary Recording Scheme (see Appendix IV) is currently being circulated to all those individuals who attended the initial full open meeting held on 24<sup>th</sup> January 2000 (see 3.2.4.2 above), and the Working Group hopes that the

guidance will meet with the approval of the second and final full meeting to be held on the 6<sup>th</sup> February 2001.

Assuming that all progresses as outlined above, it is the intention of the Working Group that copies of the Guidance for Fossil Collectors be dispatched to a wide range of bodies including local authorities, educational establishments, museums, libraries, heritage centres, conservation agencies, and landowners. Copies will also be made available to the press, and the text of the documentation will also be placed upon a number of Internet web sites directly and indirectly related to earth heritage conservation and local tourism in North Yorkshire.

Whilst the YDCP itself (see 3.2.4 above) is ostensibly funded only until June 2001, the intention at the time of writing is to eke out currently held funds until late summer when it is hoped that a new initiative not dissimilar to the YDCP will be introduced. The new project will have to be 'framed and pitched' a little differently from the YDCP, since funding bodies such as the Heritage Lottery Fund will not support any project which they perceive to be too similar in nature to one which is about to be wound up. Nevertheless, it is envisaged that the new project will, if successfully funded and implemented, provide a suitable mechanism under the auspices of which it will be possible to continue to uphold and build upon the ethos of the Guidance for Fossil Collectors and the Voluntary Recording Scheme (Bowden 2001 pers. comm.).

### **3.2.5 Questionnaire Exercise**

As an important part of this investigative case study, a questionnaire exercise was undertaken during the summer of 2000 to discover the views and opinions of all those individuals most closely involved with the use and conservation the North Yorkshire coast's fossil resources. Questions asked (see Appendix V) related specifically to value judgements, issues and conflicts, *the perceived need for additional regulatory and/or voluntary management measures*, and several other related issues.

Of the 24 individual stakeholder representatives approached, 20 returned completed questionnaires. The 20 respondents comprised two (one national and one local) EN officials, three North Yorkshire Moors National Park officials, a North Yorkshire Heritage Coast Ranger, two Scarborough Borough Council officials (the leader of the Yorkshire Dinosaur Coast Project and a Countryside Officer), four geological/palaeontological group representatives (including RIGS) resident either in North Yorkshire or Humberside, two experienced amateur collectors who regularly visit the North Yorkshire coast, two local commercial collectors, two local fossil-shop



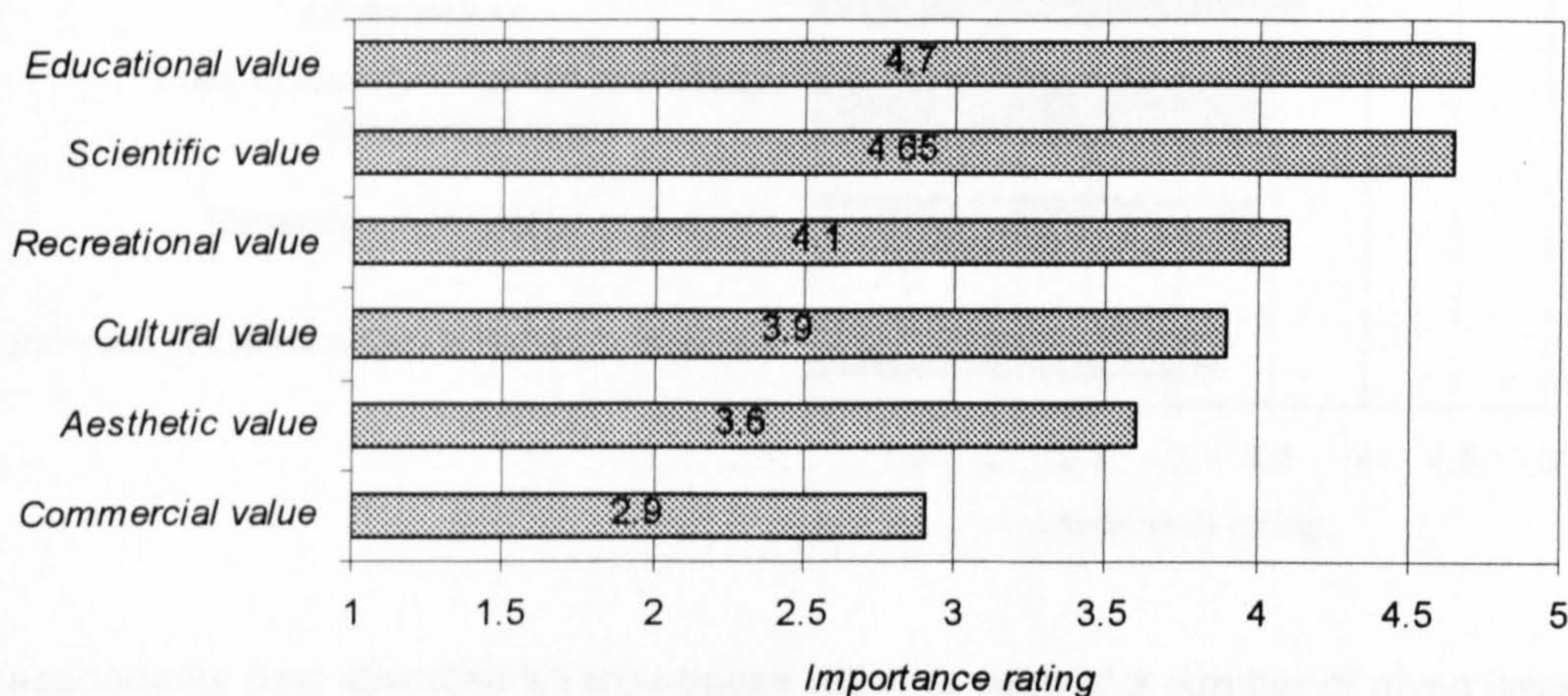
proprietors, a palaeontological curator from the Yorkshire Museum, and a representative of the National Trust (a significant local coastal landowner),.

It should be noted that - as was the case with the West Dorset coast questionnaire exercise (see 3.1.5 above) - certain North Yorkshire respondents only agreed to provide responses on condition that their identities and *stakeholder group affiliation* would remain anonymous (and see 3 above). Notwithstanding this, the following analytical discussion of questionnaire responses refers to respondent stakeholder affiliation so far as is possible (although obviously not where responses have been aggregated and presented as figures *viz. a viz.* bar-charts) within the constraints of maintaining the anonymity of those individuals concerned.

### 3.2.5.1 Value Judgements

Respondents first allocated an importance rating to six given values intrinsic to fossil resources (Figure 3.2.1). Both the educational and scientific value of fossil resources were perceived as being of the highest importance, with commercial value - even accepting the inclusion of two commercial collectors and two fossil-shop proprietors in the responding sample - being seen as least important (these perceptions incidentally being exactly the same as those encountered in Dorset - see 3.1.5.1 above).

Figure 3.2.1 Value judgements



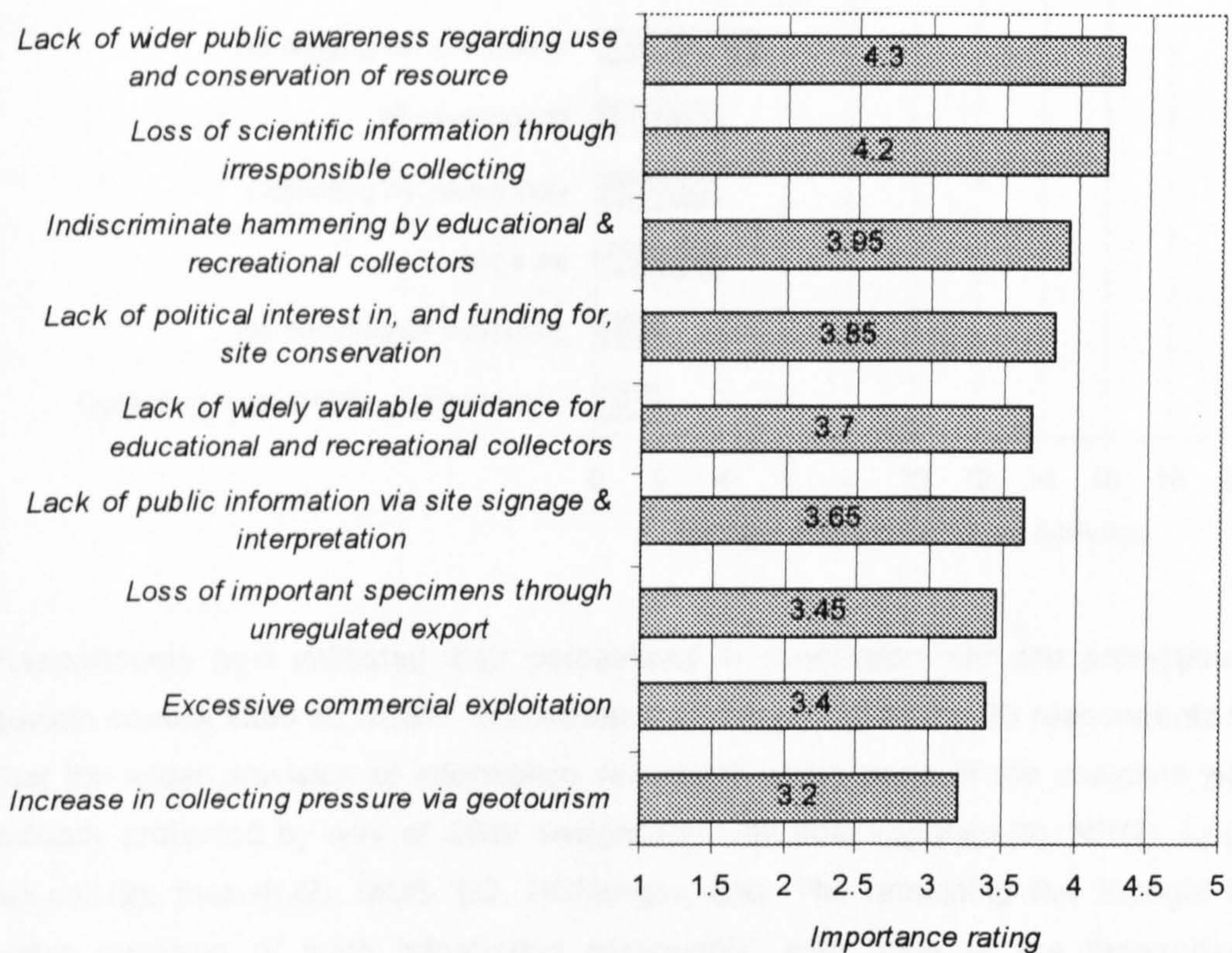
Respondents furthermore commented as to whether or not they felt that the fossil resource had any *additional* intrinsic value other than those given. Two of the 20 respondents felt that it did; one arguing that fossils have spiritual value (geol.gp.), and the other (EN) opining that fossils have an integrity value *per se* where left completely undisturbed at all (and see 2.2.4 above).



Finally in connection with value judgements, respondents commented as to whether they considered the resource to be more valuable in the ground - *in situ*, or out of it - *ex situ*. A broad split was revealed in this regard with eight of the 20 respondents opining that fossils had a higher intrinsic value *in situ* (EN, LO, NP, geol.gp.(3), LA, am.coll.), whilst eight conversely adjudged that fossils had a higher intrinsic value when *ex situ* (including NP(2), HCRanger, geol.gp.), whilst the remaining four respondents considered fossils to have equal value either way (MUS, EN, am.coll., LA).

### 3.2.5.2 Issues and Conflicts

Figure 3.2.2 Issues and conflicts



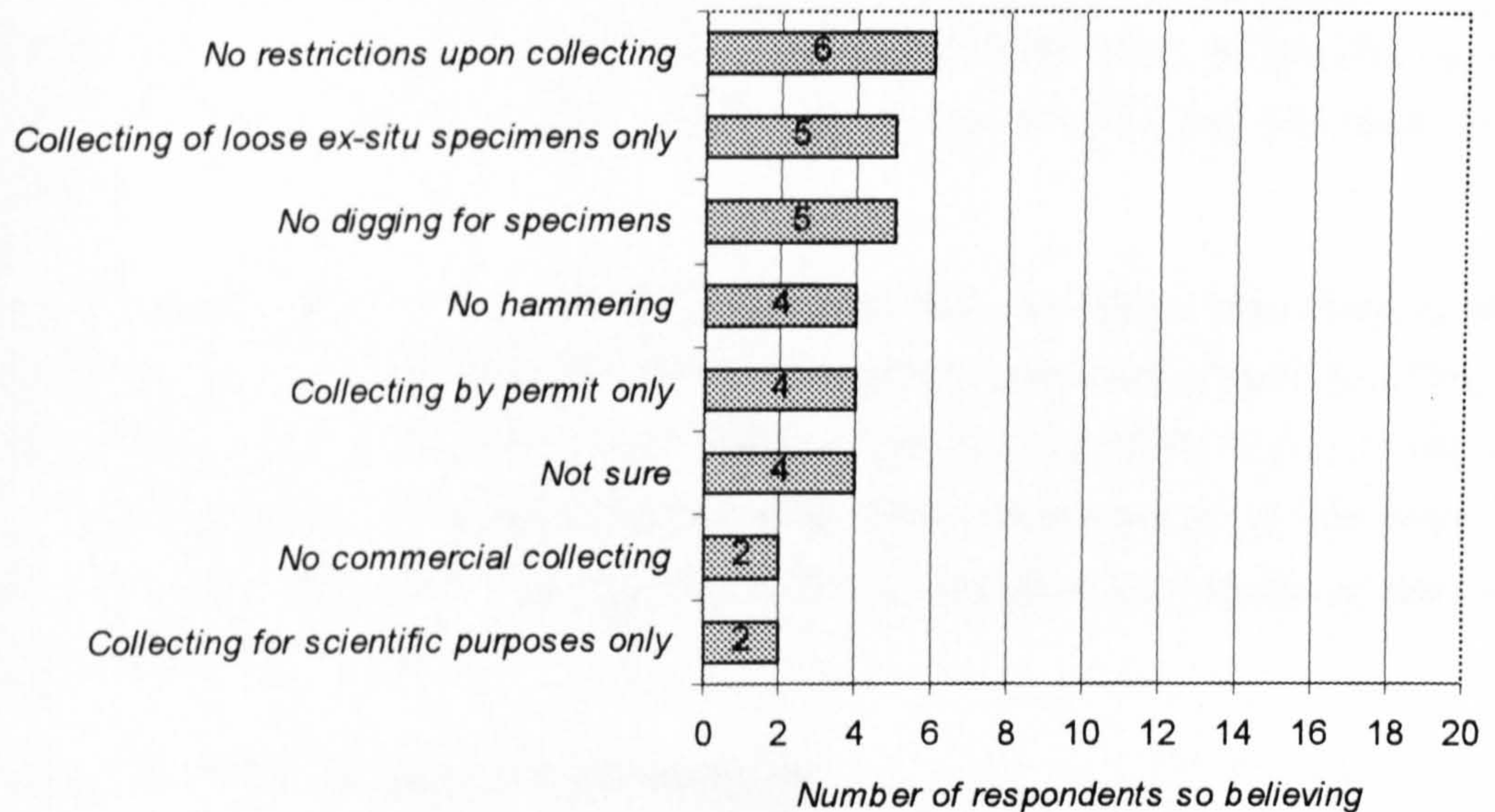
Respondents next allocated an importance rating to each of a number of given issues and conflicts that it is widely argued have adversely impacted upon the use and conservation of fossil resources over recent years (Figure 3.2.2). Perhaps the most notable finding was that excessive commercial collecting ranked significantly lower in importance as an issue/conflict than did indiscriminate hammering by educational and recreational collectors (and contrast with the West Dorset coast - see 3.1.5.2 above). That issue/conflict considered to be of most importance by Yorkshire respondents was the wider lack of public awareness regarding the use and conservation of the



resource (this interestingly being an issue/conflict not considered particularly important by either the Dorset or Skye respondents - see 3.1.5.2 above & 3.3.4.2 below respectively). That the loss of scientific information through irresponsible collecting activities was ranked second in importance correlates well with the fact that scientific value was allocated the second most important value intrinsic to fossil resources (see 3.2.5.1 above).

### 3.2.5.3 SSSI Notification

Figure 3.2.3 Perceptions as to collecting restrictions on SSSIs



Respondents next indicated their perceptions in connection with the protection of certain coastal sites as SSSIs. Somewhat disturbingly, 15 of the 20 respondents felt that the wider provision of information relating to which parts of the coastline were actually protected by way of SSSI designation was poor (geol.gp.(3), NP(2), LA(2), am.coll.(2), foss.sh.(2), MUS, LO, HCRanger, EN). The remaining five thought the wider provision of such information reasonable, with none of the respondents considering such provision to be good.

The afore-mentioned findings were reinforced when respondents next indicated what SSSI designation meant to them in terms of collecting restrictions (Figure 3.2.3). The responses revealed a wide range of misconceptions in this regard, the most notable of which can be summarised as follows:

- 1) Collecting of loose *ex situ* specimens only (geol.gp., EN, HCRanger, LO, LA).
- 2) No digging for specimens (EN, LA, NP, HCRanger, am.coll.).
- 3) No hammering (NP, LA, HCRanger, am.coll.).



4) All collecting by permit only (LA, geol.gp.(2), am.coll.).

5) No commercial collecting (HCRanger, am.coll.).

6) Collecting for scientific purposes only (EN, geol.gp.).

Given that four respondents were unsure (including a National Park official), and that only six of the 20 respondents (geol.gp.(2), EN, NP, MUS, am.coll.) correctly believed there to be no collecting restrictions on North Yorkshire's coastal SSSIs, it is accordingly arguable that additional clarification and greater awareness are required in this regard. It is, however, conversely arguable that a degree of conservational benefit exists where collecting controls are widely perceived as being more stringent than they actually are (and see 3.3.4.3 below), although it nevertheless remains undesirable that certain stakeholder group representatives such as English Nature, National Park, and local authority officials did not appear to be fully informed in this regard.

Finally, respondents commented whether or not they considered that notifying sites as SSSIs comprised an adequate means of resource protection. Some 13 of the 20 respondents (geol.gp.(3), foss.sh.(2), NP(2), am.coll.(2), EN, HCRanger, LO, LA), *did not*, although it should be noted that the SSSI system of site protection has since the time of questioning been strengthened by the *Countryside and Rights of Way Act 2000* (see 4.6.1.5 below).

#### **3.2.5.4 Need for Additional Management Measures**

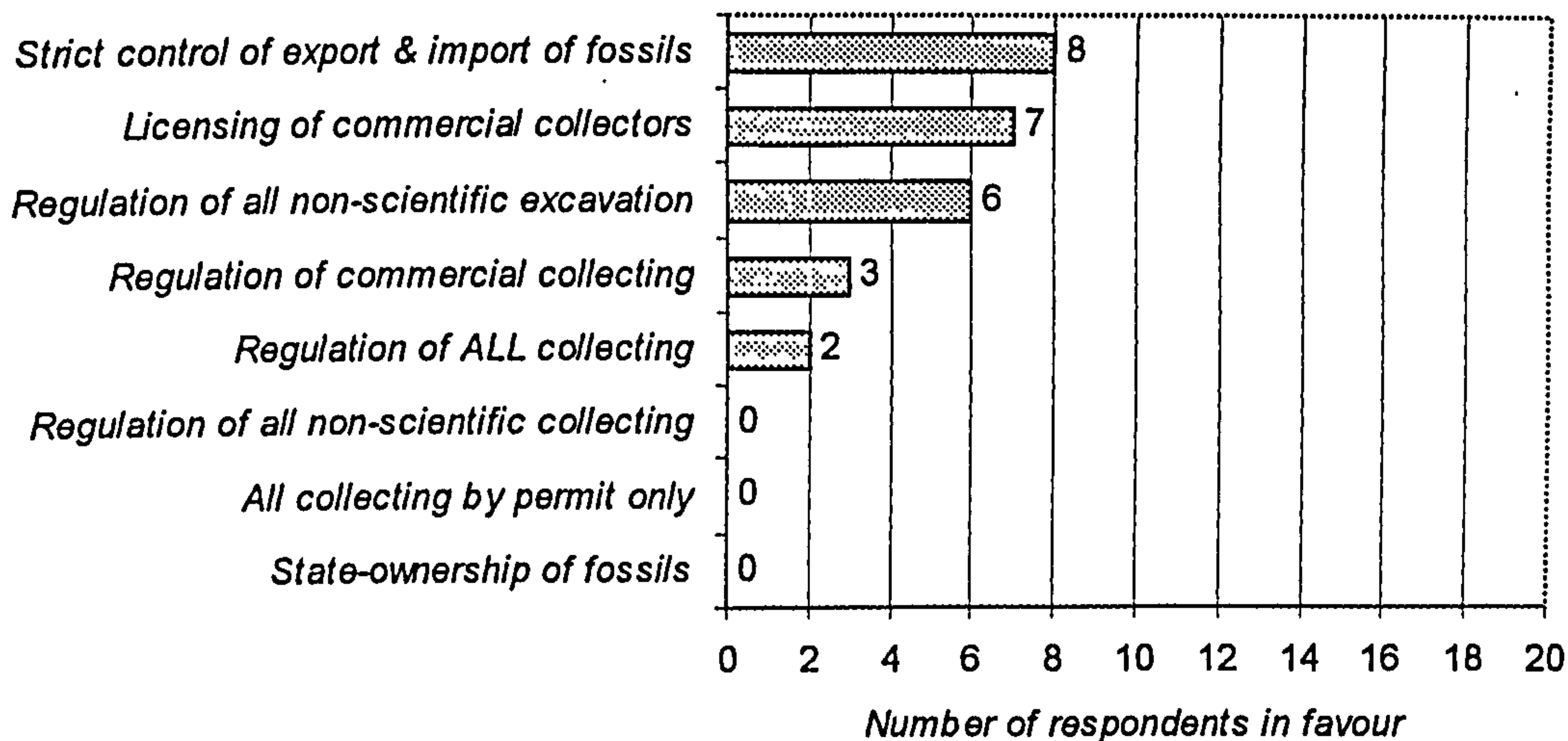
Some 13 of the 20 respondents considered that additional management measures *are* required (geol.gp.(3), NP(3), EN(2), am.coll.(2), LA, LO, HCRanger), with two adjudging them not to be ((MUS, foss.sh.). Another three respondents were undecided (LA, foss.sh., am.coll.). (Contrast with the West Dorset coast where 90% of respondents *did not* consider additional management measures necessary - see 3.1.5.5 above.)

As regards whether or not any such measures should, if introduced, be regulatory or voluntary in nature, 13 respondents felt that they should comprise a combination of the two (geol.gp.(4), LA(2), EN, NP, LO, HCRanger, foss.sh., am.coll.), with five respondents feeling that any new measures should be voluntary *only* (NP(2), MUS, EN, foss.sh.). *None* of the 20 respondents favoured the introduction of *regulatory measures alone*.

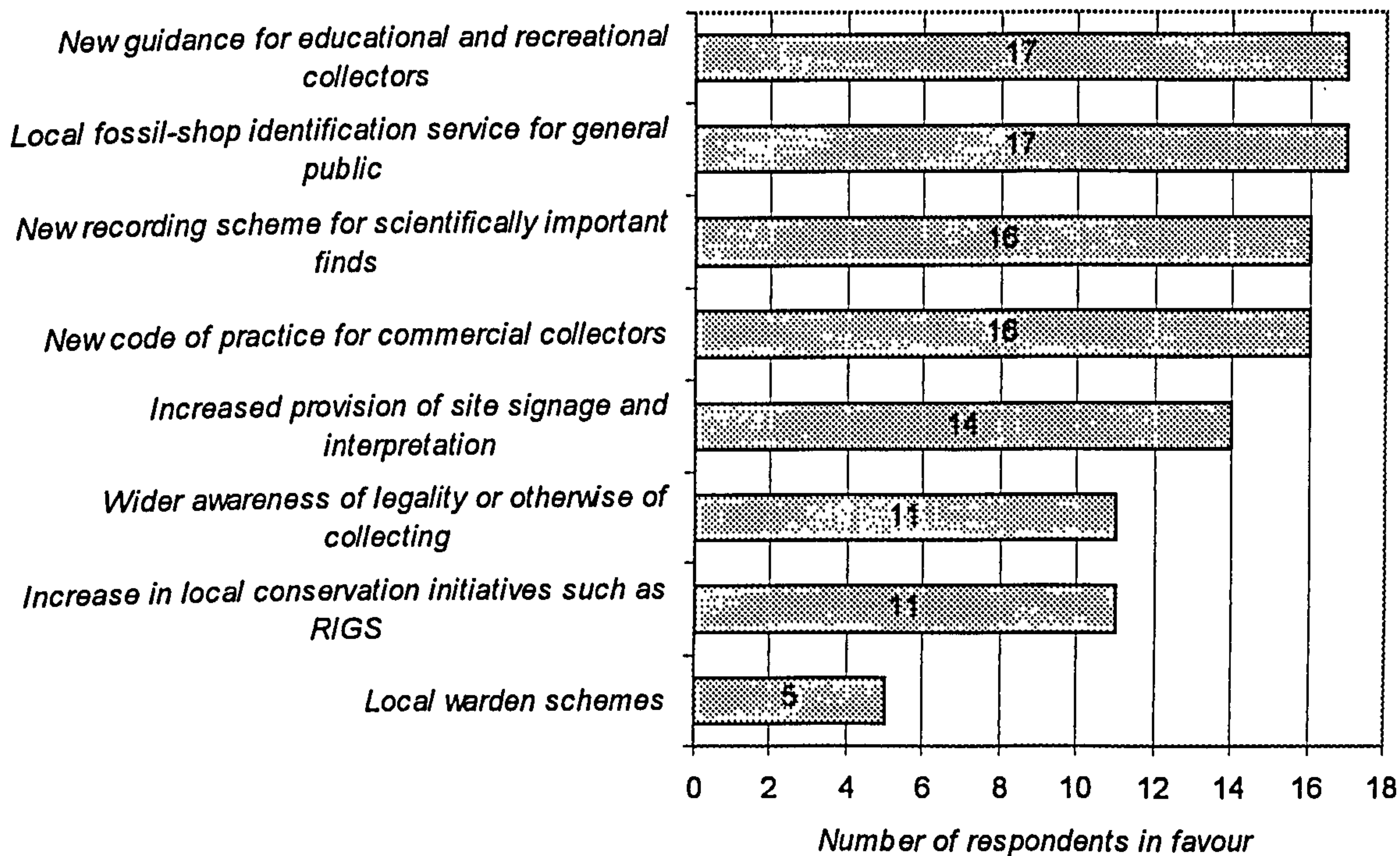


Respondents next considered *which types* of regulatory and/or voluntary management measures it would perhaps be best to introduce and implement in order to ensure better protection of fossil resources (Figures 3.2.4 and 3.2.5).

**Figure 3.2.4 Regulatory management measures required**



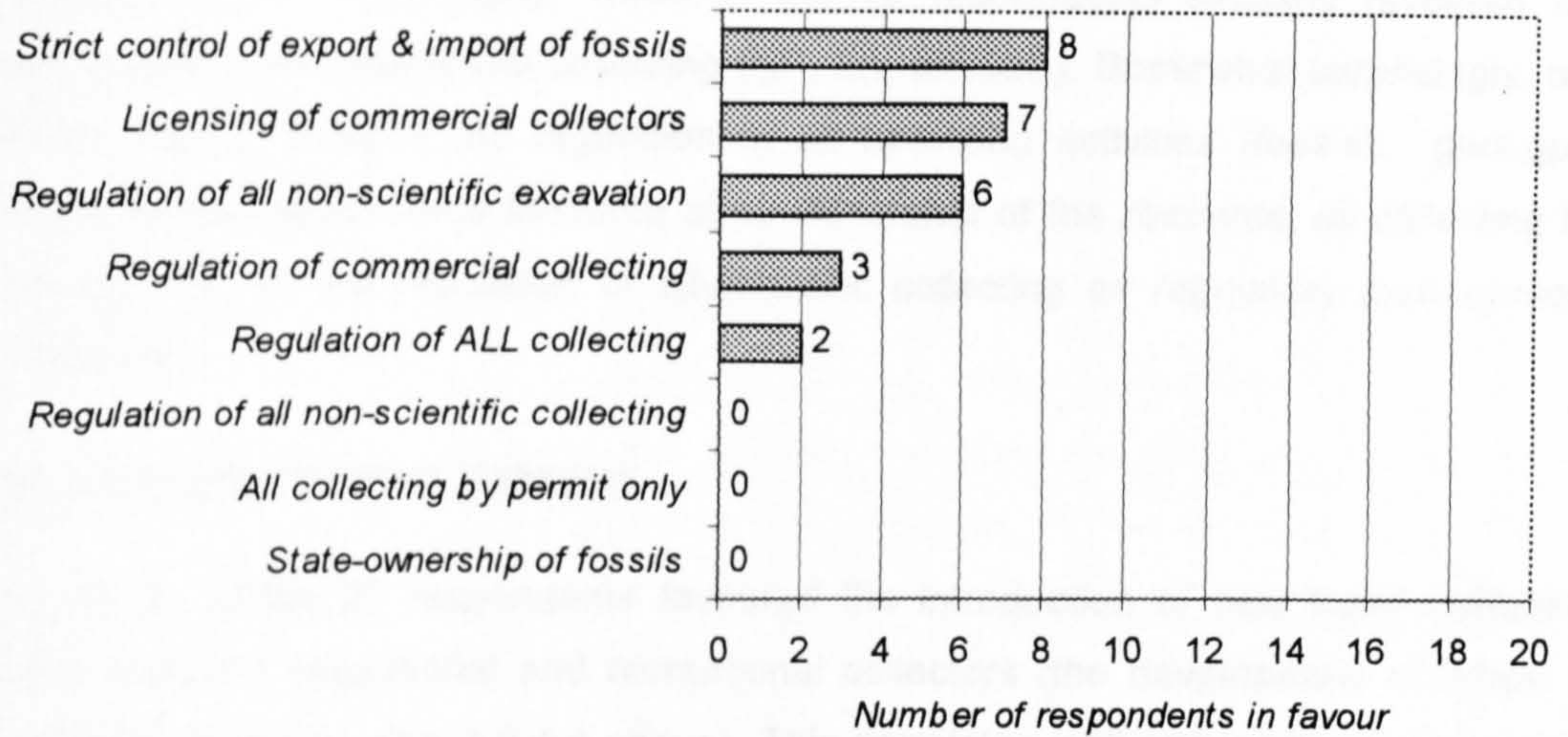
**Figure 3.2.5 Voluntary management measures required**



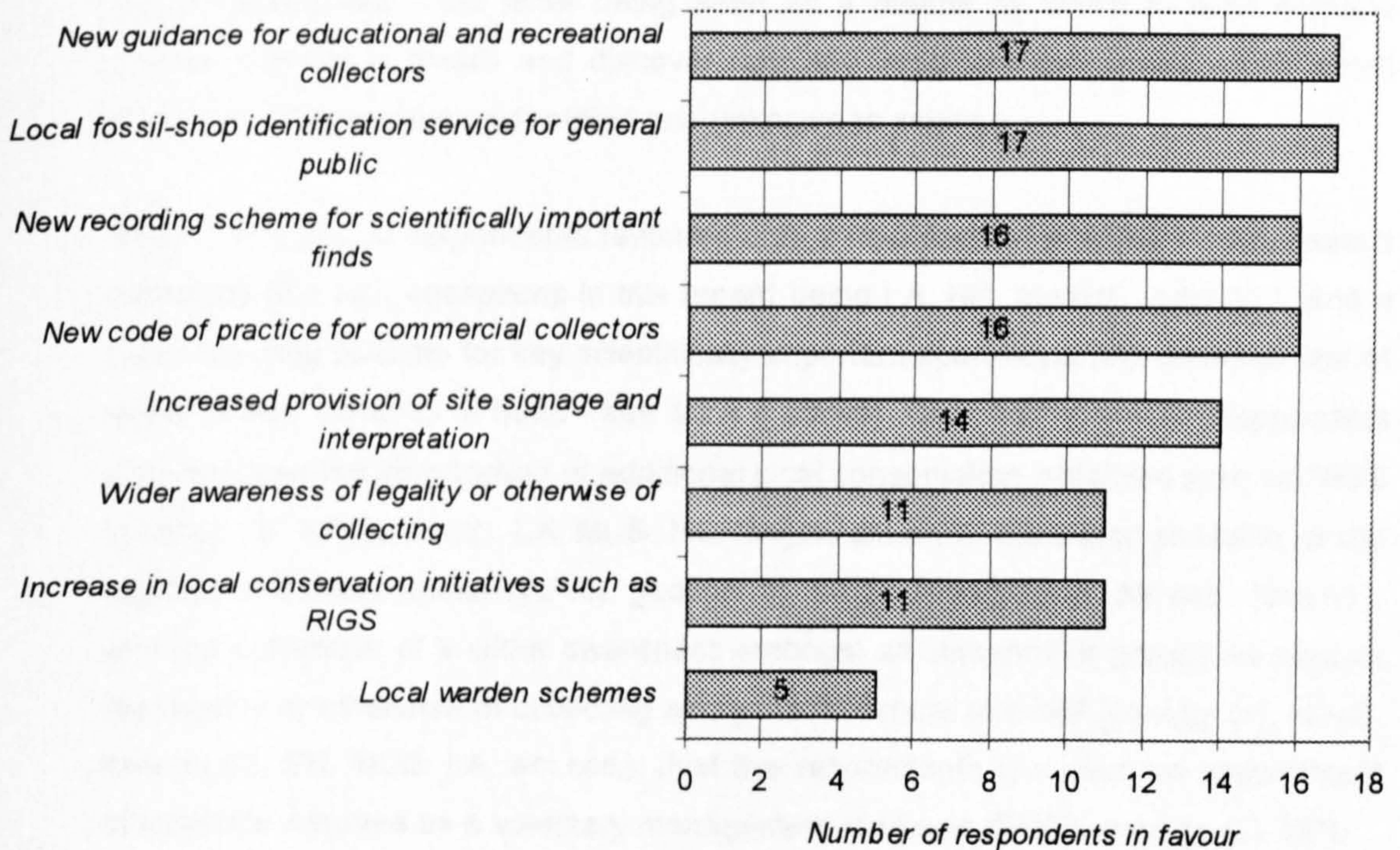


Respondents next considered *which types* of regulatory and/or voluntary management measures it would perhaps be best to introduce and implement in order to ensure better protection of fossil resources (Figures 3.2.4 and 3.2.5).

**Figure 3.2.4 Regulatory management measures required**



**Figure 3.2.5 Voluntary management measures required**





### Regulatory Management Measures

Eight of the 20 respondents favoured the introduction of strict export and import controls (geol.gp.(2), EN, LA, LO, NP, HCRanger, am.coll.), and seven the licensing of commercial collectors (geol.gp.(2), EN, LA, NP, am.coll., foss.sh.). The regulation of all non-scientific excavation was favoured by six of the 20 respondents (NP(2), am.coll.(2), LA, HCRanger). Three of the 20 respondents similarly favoured the regulation of all commercial collecting (NP, LA, am.coll.). Somewhat surprisingly, two respondents favoured the regulation of *all* collecting activities (foss.sh., geol.gp.). None of the respondents favoured state-ownership of the resource, all collecting by permit only, or the regulation of all-scientific collecting as regulatory management measures.

### Voluntary Management Measures

Some 17 of the 20 respondents favoured the introduction of new fossil collecting guidelines for educational and recreational collectors (the development of which is currently in hand - see 3.2.4.4 above). This correlates well with earlier findings that the most important issue facing the use and conservation of fossils resources was a wider lack of public awareness as regards the same (see 3.2.5.2 above). The same number also favoured the introduction of a local fossil-shop identification service for the general public - the latter being seen as a means by which to both cultivate popular interest in fossils and discover rare and important specimens which would otherwise likely remain unidentified and unknown to science.

Some 16 of the 20 respondents favoured both a new code of practice for commercial collectors (the four exceptions in this regard being LA, NP, am.coll., geol.gp.), and a new recording scheme for key scientifically important specimens (the development of which is also currently in hand - see 3.2.4.4 above). Over half of the 20 respondents also favoured the introduction of additional local conservation initiatives such as RIGS (geol.gp.(3), NP(2), EN(2), LA, MUS, HCRanger, am.coll.), increased provision of site signage and interpretation (NP(3), geol.gp.(3), LA(2), EN(2), MUS, am.coll., foss.sh.), and the cultivation of a wider awareness amongst all stakeholder groups as regards the legality or otherwise of collecting along the foreshore and cliff (geol.gp.(4), NP(2), foss.sh.(2), EN, MUS, LA, am.coll.). Just five respondents favoured the appointment of local site wardens as a voluntary management measure (EN(2), geol.gp.(2), NP).

## Regulatory versus Voluntary

In overall terms, it is notable that whilst 15 of the 20 respondents favoured a combination of regulatory and voluntary management measures as a means to better use and conserve fossil resources, it was voluntary measures which ultimately proved by far the most popular with respondents in general. Whilst the eight voluntary regulatory options were on average favoured by 67% of respondents, the eight regulatory options were only on average favoured by just 16% of respondents.

## Application to Sites

In terms of whether any additional regulatory and/or voluntary management measures introduced should apply to all sites or be site-specific, ten of the 20 respondents favoured application to *all* sites, and ten to *selected* sites. Respondents' stated reasoning in this regard can be summarised - in no particular order of importance - as follows.

### *Application to All Sites*

- 1) Application to selected sites *only* would result in excessive collecting pressure being placed on those remaining sites *not* selected.
- 2) *All* sites have potential for damage.
- 3) *All* sites require protection since the requirement to protect an individual site can change with the passage of time (as indeed can the sites themselves).
- 4) *All* sites are 'localised honey-pots' in terms of one form of collecting or another.
- 5) Consistency and clarity *per se* requires that any new measures apply to all sites.

### *Application to Selected Sites*

- a) Only those sites containing very rare and/or important specimens.
- b) Only those sites most frequently visited by collectors.
- c) Only the minimum number of sites possible given the practicality *viz. a viz.* cost of enforcement.

It is interesting to note the total lack of overall consensus in this regard. All four geological/palaeontological group representatives in the sample felt that any additional management measures introduced in the future should apply to *all* sites, as did the two Scarborough Borough Council officials. On the 'other side of the fence', the Heritage Coast Ranger, the National Trust land-agent, the Yorkshire Museum palaeontologist, and both fossil-shop proprietors all felt that any new measures



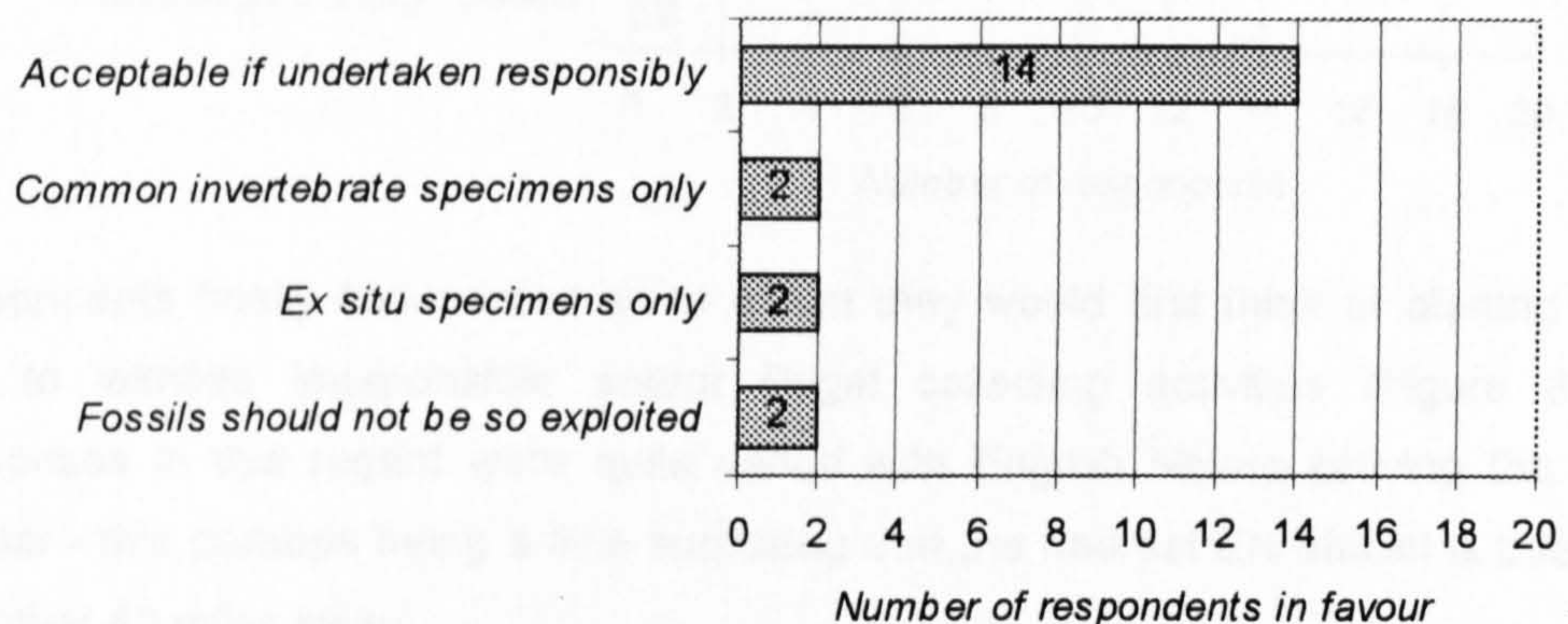
should be applied to selected sites only. Even more notably, the two EN officials in the sample were split in this regard, as were the three National Park officials and the two amateur collectors.

### 3.2.5.5 Legality of Collecting Activities

When questioned as to the wider provision of information pertaining to the legality of collecting specimens both from the intertidal area and the cliff, *all 20* respondents felt such provision to be *totally lacking* in both regards. This is both illuminating and alarming, and this apparently very grey area requires some form of wider clarification in the immediate future, so that all those involved in the use and conservation of coastal fossil resources can become more fully informed in this regard (although it should at the same time be noted that only nine respondents considered this to be an issue worthy of addressing by way of voluntary management measures (Figure 3.2.5)).

### 3.2.5.6 Commercial Market for Fossils

3.2.6 Commercial market for fossils



As regards their views on the existence of the commercial market for fossil specimens (Figure 3.2.6), 14 of the 20 respondents considered the existence of a commercial market for specimens to be acceptable in principle, whilst just two on respondents the other hand opining that fossils should not be so exploited (NT, geol.gp.). Two felt that only *ex situ* specimens should be commercially exploited (HCRanger, geol.gp.), with the remaining 2 believing that only common invertebrate specimens should be so utilised (NP, am.coll.).

### 3.2.5.7 Visitor Safety

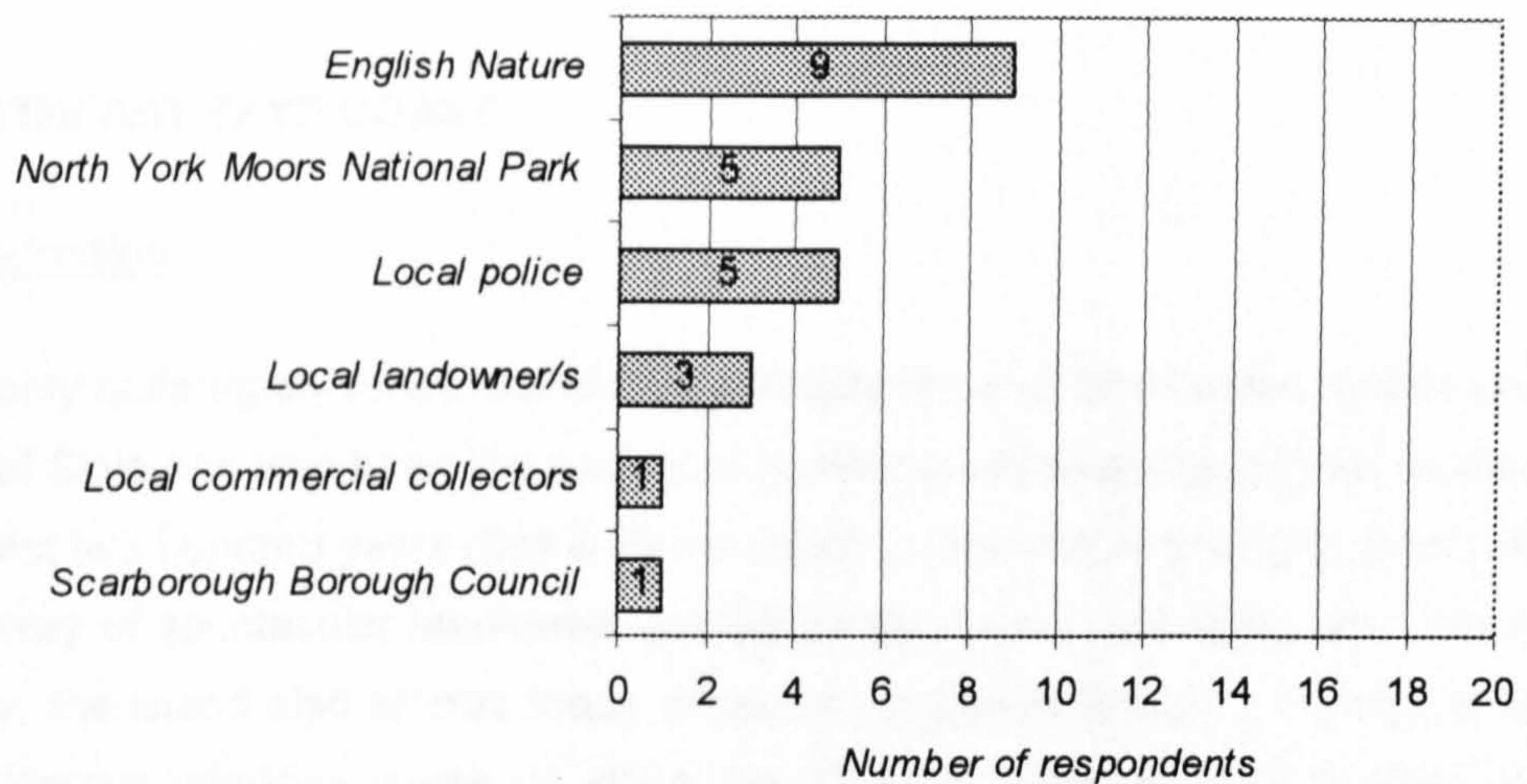
When asked whether or not enough information was made available to those individuals visiting the North Yorkshire coast for its palaeontological interest regarding



dangers associated with tidal movements and cliff-falls, 18 of the 20 respondents felt that it was not (with the other two respondents somewhat unsurprisingly being a Heritage Coast Ranger and a National Park official). This worrying finding is already currently to some extent being addressed in that the new 'Guidance for Fossil Collectors' (see 3.2.4.3 above and Appendix IV) will contain appropriate safety guidelines for collectors.

### 3.2.5.8 Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities

3.2.7 Who to alert to irresponsible/illegal collecting activities



Respondents finally commented as to whom they would first think of alerting were they to witness irresponsible and/or illegal collecting activities (Figure 3.2.7). Responses in this regard were quite varied with English Nature proving the most popular - this perhaps being a little surprising that the nearest EN official is based in York over 40 miles away.

One respondent (am.coll.) interestingly observed that local commercial collectors were perhaps the best people to alert, presumably since it is they who are strongly *viz. a viz.* financially motivated to protect their own interest in the resource, and it is members of this stakeholder group who invariably live close to, and spend much of their time visiting, fossil sites.

Notwithstanding the above, 14 of the 20 respondents also commented that effective remedial action could *not* in all likelihood be undertaken quickly enough regardless of who was alerted, the stated reasons for which can be summarised - in no particular order of importance - as follows.



- 1) Lack of political will and funding.
- 2) Conservation officials too remote from sites for effective response.
- 3) Illegal fossil collecting merits only very minor priority from police viewpoint.
- 4) No local English Nature presence.
- 5) Too few local ranger staff.

Six of the 20 respondents on the other hand felt that an effective response *could* be mounted quickly enough to comprise an effective deterrent (EN(2), NP, LA, geol.gp., am.coll.). This is an interesting finding in that the majority of the latter group are individuals who are known to live and work some distance away from the North Yorkshire coast, and are therefore arguably unaware of just how remote many of the coast's fossil localities are.

### **3.3 NORTHEAST SKYE COAST**

#### **3.3.1 Introduction**

Not only quite rightly renowned for the wild splendour of its dramatic landscapes, the Isle of Skye has also been the subject of numerous important geological studies over the last two hundred years (Bell & Harris 1986). In addition to providing scientists with an array of spectacular landforms, geological structures, and rocks and minerals to study, the island also affords those interested in palaeontology a number of classic fossiliferous localities, some of which are of world importance. A number of sites situated along the northeast Skye coast have accordingly been designated by Scottish Natural Heritage (SNH) as SSSIs. These sites include a number of Lower Jurassic exposures situated along the northeast coast of the Trotternish Peninsula between Portree to the south and Staffin to the north. It is this particular stretch of coastline which has been chosen for discussion here, owing to the fact that it has during recent years become the focus of significant media interest regarding both the discovery of scientifically important disarticulated dinosaur remains, and also the allegedly destructive activities of commercial fossil collectors (e.g. see Robertson & Leake 1996). The most abundant fossil types occurring in the sedimentary Lower Jurassic rocks of the northeast Skye coastline are unsurprisingly not dissimilar to those occurring at the other two Lower Jurassic case study locations discussed above (see 3.1.1 & 3.2.1 above) - i.e. ammonites, belemnites, bivalves etc. Although fossilised reptilian remains such as ichthyosaurs occur far less frequently along the northeast Skye coast than along the North Yorkshire and West Dorset coasts, certain locations have in recent years yielded extremely rare and scientifically important

dinosaur remains, the two most recent finds of which were very nearly lost to science altogether through irresponsible collecting activities.

### **3.3.2 Irresponsible Collecting Activities**

The two most recent and notable instances of irresponsible collecting activities on the northeast Skye coast involved damage to, and the subsequent partial loss of, two extremely important specimens of fossilised dinosaur remains. The specimens were found in cliff-fallen blocks originating from the Valtos Sandstone Formation which represents terrestrially derived sediment deposited in deltaic lagoons (Bell & Harris 1986).

#### **3.3.2.1 Cetiosaur Limb Bone**

In 1993, amateur fossil collector and British Petroleum sedimentologist Dr. David Boyd discovered the fossilised proximal end of a dinosaur limb bone on the Valtos foreshore. Unfortunately, the majority of the fossil had already been removed by a collector or collectors of unknown identity, as a consequence of which the proper generic identification of the fossilised bone was not possible. It is conceivable that the collector or collectors responsible for removing the majority of the specimen had in fact - and as is frequently the case - mistook the fossil bone for fossilised wood, since both fossil types display characteristic 'ringing' with such strengthening growth rings being found in many dinosaur limb bones (Clark 1995).

Whilst subsequently visiting Skye to more thoroughly inspect this find, palaeontologist Neil Clark of Glasgow's Hunterian Museum happened upon another portion of what appeared to be the same bone whilst meeting with local amateur collector Jan Wolf. Clark quickly realised that this new bone fragment collected by Wolf in 1993 in fact comprised the distal end of the same limb bone - the proximal end of which had been collected by Boyd.

Upon revisiting the site from which the two finds had been collected, Clark and local fossil enthusiast Dugald Ross - who is also the curator of the Staffin Folk Museum on Skye - were successful in retrieving additional fragments of fossilised dinosaur bone material, one of which fortuitously fitted onto both the proximal and distal ends as previously collected by Boyd and Wolf. Clark was now able to properly work out the size of the whole limb bone and reconstruct it by casting the missing middle section. Further to media coverage of the saga replete with pictures of the restored limb bone, the missing middle section of the bone was later anonymously mailed to Clark at the



Hunterian Museum. The only clue pertaining to the identity of the sender was that the loose packing material in which the fossil bone had been sent comprised the shredded remains of numerous invoices relating to geology-related deals done in the Birmingham area (Clark 2000 pers. comm.).

Further to subsequent study, Clark identified the fossilised limb bone as unequivocally having belonged to an herbivorous sauropod (possibly a species of *Cetiosaur*) that had lived during the Middle Jurassic (see Clark *et al.* 1995).

### **3.3.2.2 Stegosaur Elbow Bone**

In May 1997, amateur fossil collector and private banker Colin Aitken from Edinburgh found a 250mm long black fossilised bone embedded in a block of yellowish sandstone whilst undertaking a fossil collecting trip with his children at a foreshore location close to Valtos on the northeast coast of the Trotternish Peninsula (English 1997). Unable to carry both the rock containing the fossil and his exhausted younger son, Aitken secreted the rock in a nearby ruined boathouse intending to return and retrieve the fossil the following day. Owing to bad weather, Aitken did not return and salvage the fossil, and upon his return to Edinburgh instead telephoned Dugald Ross of Skye's Staffin Museum informing him of the nature and whereabouts of the specimen. When Ross went to retrieve the specimen, he discovered to his horror that another collector had beaten him to it, broken up the rock, and removed the vast majority of the bone from its matrix (Clark 2000 pers. comm.). Although the main limb had regrettably been removed by the unknown collector, the heads of the *ulna* and *radius* elbow joint bones fortunately remained, enabling Neil Clark of Glasgow's Hunterian Museum to identify the bones as having belonged to a Stegosaur belonging to the Ankylosaur group of dinosaurs (Clark 2001b). The majority of the 180mn year-old fossilised bone has not yet up until the time of writing been brought forward, as a result of which palaeontology has been deprived of the fossilised remains of a previously unknown dinosaur comprising not just the oldest member of the Ankylosaur group of dinosaurs yet found in Scotland, but in the world.

(Note: it is almost certain that this (or, for that matter, the above-mentioned - see 3.3.2.1 above) act of geological vandalism was *not* perpetrated by a commercial collector who would have likely neither mistook the bone for wood, nor drastically lowered the commercial value of the specimen by reducing it to fragments.)

### **3.3.3 Management of Collecting Activities**

Although parts of the northeast Skye coast are designated as SSSIs by SNH - with such designation comprising the only legal mechanism via which SNH can seek to regulate collecting activities - none of the designations in fact include the imposition of OLD25 (see 4.6.1.3 below) thereby affording a means whereby SNH can directly restrict collecting, and neither is collection at any of the sites specifically controlled by SNH by way of a permit system. Furthermore, Scotland quickly needs to follow England (and Wales) in tightening up the provisions of the *Wildlife and Countryside Act* 1981 (see 4.6.1.3 below) by enabling SNH to directly pursue third parties caught damaging SSSIs (see 4.6.1.4/5 below). In the absence of any nationally overreaching regulatory measures to control fossil collecting, SNH instead strives to protect Scottish fossil resources through voluntary management initiatives related to education and interpretation including the promotion of responsible collecting. By way of example, new notice boards were recently erected at Bearreraig Bay on the stretch of coastline being discussed which not only interpret the geology and landscape, but also convey an anti-collecting conservation message aimed at the general public (MacFadyen 2001). Such a step accords with a series of common-sense measures for the protection of Scotland's most vulnerable (see 2.3 above) palaeontological sites recently developed by SNH in response to problems witnessed over recent years at Lesmahagow (see 2.6.1.2 above). The afore-mentioned measures (see MacFadyen 2000) are based around the education of landowners, the greater use of site signage, enhanced site monitoring procedures, and - in rare cases - physical protection. SNH are also currently in the process of both identifying those fossil sites most at risk from irresponsible collecting activities, and producing site-specific management plans for all of Scotland's SSSIs (MacFadyen 2001).

### **3.3.4 Questionnaire Exercise**

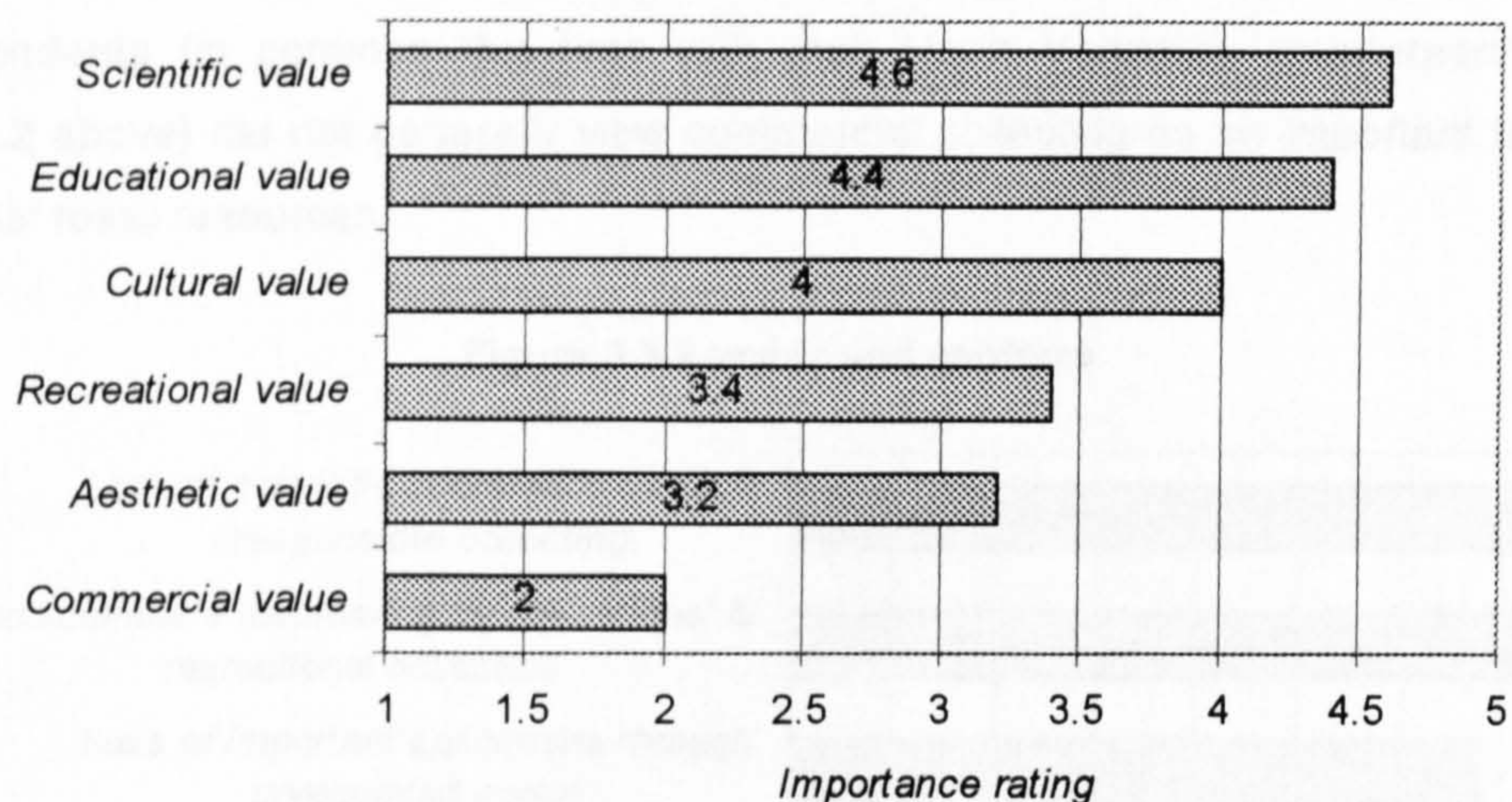
As an essential part of this investigative case study, a questionnaire exercise was undertaken during the summer of 2000 to procure the views and opinions of those individuals most actively involved with the use and conservation of the northeast Skye coast's fossil resources. Questions asked (see Appendix VI) related specifically to value judgements, issues and conflicts, *the perceived need for additional regulatory and/or voluntary management measures*, and several other more general issues. Of the six individuals approached, five returned completed questionnaires. It is obvious that five individuals comprise a relatively small sample - especially when compared to the ten and 20 individuals who responded to the West Dorset and North Yorkshire



case study questionnaires respectively (see 3.1.5 & 3.2.5 above). However, it should be pointed out that Skye - unlike West Dorset and North Yorkshire - has no resident commercial fossil collectors and no local RIGS or other national or local palaeontology group representatives. The number of individuals whom the questionnaire could realistically be targeted at was therefore relatively small, and those approached accordingly comprised a local amateur collector (and curator of a small local folk museum (which displays local fossils)), the palaeontological curator and specialist in Skye fossils from the Hunterian Museum in Glasgow, an SNH official based in Edinburgh, a Skye-based SOAEFD (a major landowner along the northeast Skye coast) land agent, a Skye-based SNH representative, and a Highlands and Islands Ranger - all of whom responded with the exception of the latter.

### 3.3.4.1 Value Judgements

Figure 3.3.1 Value judgements



As with the two previous case study questionnaire exercises, respondents first rated in terms of importance six given values intrinsic to fossil resources (Figure 3.3.1).

Scientific and commercial values were perceived as being of the greatest and least importance respectively (with this being more or less consistent with the views of the West Dorset and North Yorkshire respondent groups - see 3.1.5.1 and 3.2.5.1 above respectively). One respondent (MUS) also felt the resource to have an additional intrinsic value; this being 'geotourism value' to the local economy. As regards the value of fossil resources either in or out of the ground, two respondents (MUS, am.coll.) felt that the resource was of more value *ex situ*, one *in situ* (LO), with the remaining two respondents (both SNH) considering the resource to be equally valuable either way.

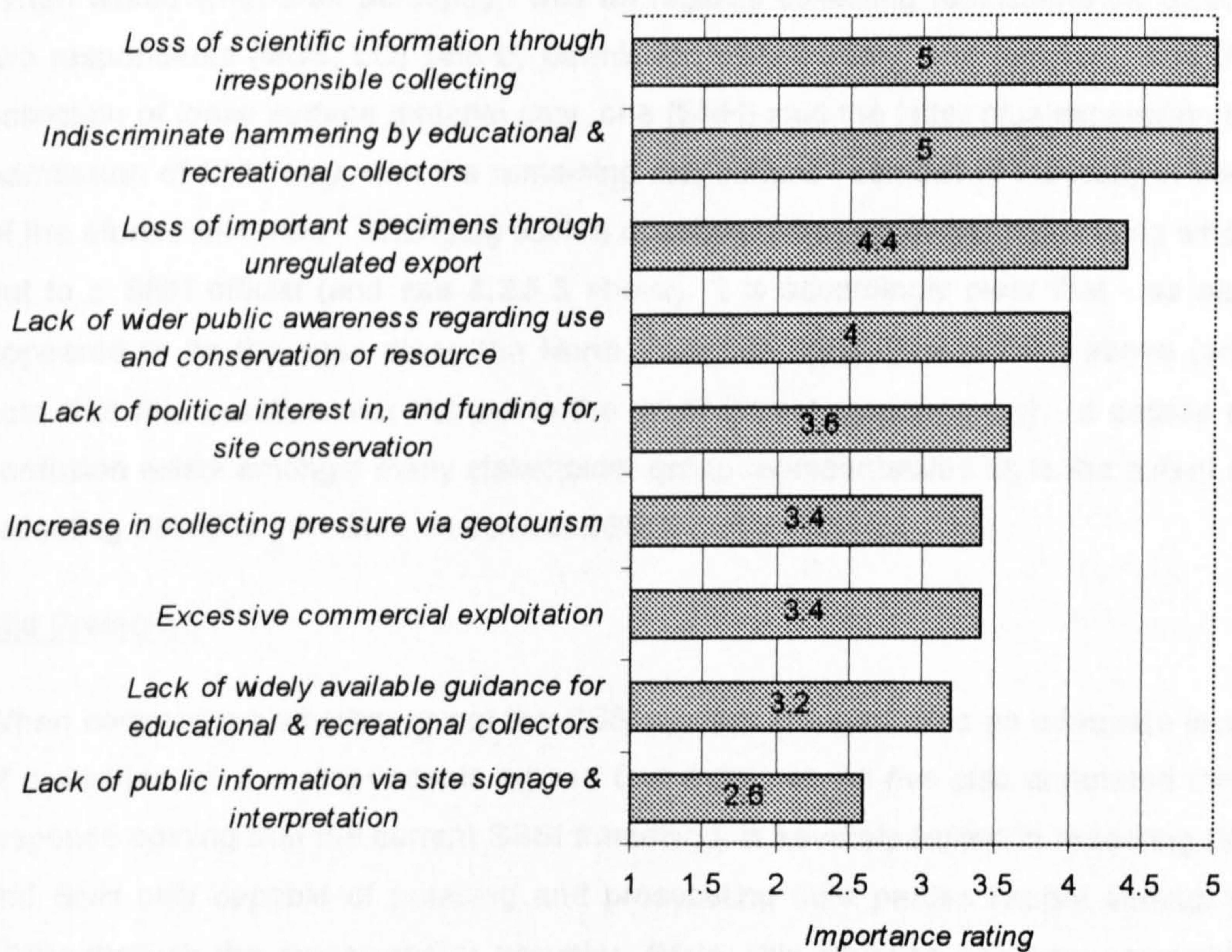


### 3.3.4.2 Issues and Conflicts

Respondents next rated in terms of importance a number of given issues and conflicts that are widely considered to have an adverse impact upon the use and conservation of palaeontological resources (Figure 3.3.2).

The loss of scientific information through irresponsible collecting and the indiscriminate hammering of educational and recreational collectors were considered by all five respondents to be the two most important issues/conflicts relating to the use and conservation of the northeast Skye coast's fossil resources. Conversely, the Skye respondents (in common with their West Dorset counterparts - see 3.1.5.2 above) felt that a lack of guidance/signage/interpretation did not comprise a particularly important issue. That more widely available guidance for educational and recreational collectors was not considered a priority is somewhat at odds with the concern expressed as regards indiscriminate hammering activities. The Skye respondents (in common this time with their North Yorkshire counterparts - see 3.2.5.2 above) did not generally view commercial collecting as an important threat to coastal fossil resources.

Figure 3.3.2 Issues and conflicts





That the Skye respondent group considered indiscriminate hammering and excessive commercial exploitation to be of issues of relatively high and low importance respectively is perhaps not so surprising given both the somewhat naïve and ineffectual nature of recent known irresponsible collecting activities on the northeast Skye coast (see 3.3.2.1/2 above) as well as the fact that no commercial collectors are resident on (or are known to live near to) the Isle of Skye.

### **3.3.4.3 SSSI Notification**

#### Wider Provision of Information

When commenting upon the wider provision of information pertaining to which stretches of the northeast Skye coast are designated as SSSIs, a wide divergence of opinion was evident with two (MUS, LO), one (am.coll.) and two (both SNH) respondents opining that such provision was good, reasonable and bad respectively. It is noteworthy that those two respondents who considered such wider provision to be poor were SNH officials - one of whom also interestingly commented that SNH are not required to 'advertise' the whereabouts of SSSIs.

#### Collecting Restrictions

When asked what their perception was as regards collecting restrictions on SSSIs, two respondents (MUS, LO) said by permission of SNH only, one (am.coll.) said the collection of loose surface material only, one (SNH) said the latter plus excavation by permission of SNH only, with the remaining respondent - somewhat ironically in view of the afore-mentioned - adjudging such a question to be somewhat patronising when put to a SNH official (and see 3.2.5.3 above). It is accordingly clear that - as also appeared to be the case along the North Yorkshire coast (see 3.2.5.3 above (and note that this question was not put to the West Dorset respondents)) - a degree of confusion exists amongst many stakeholder group representatives as to the extent of collecting activities permitted on coastal SSSIs.

#### Site Protection

When commenting whether or not the SSSI system afforded sites an adequate level of protection, *all five* respondents agreed that it did not. All five also annotated their response opining that the current SSSI framework is severely limited in rendering EN and SNH only capable of pursuing and prosecuting third parties caught damaging SSSIs through the owner and/or occupier. (Note: this situation has now ostensibly



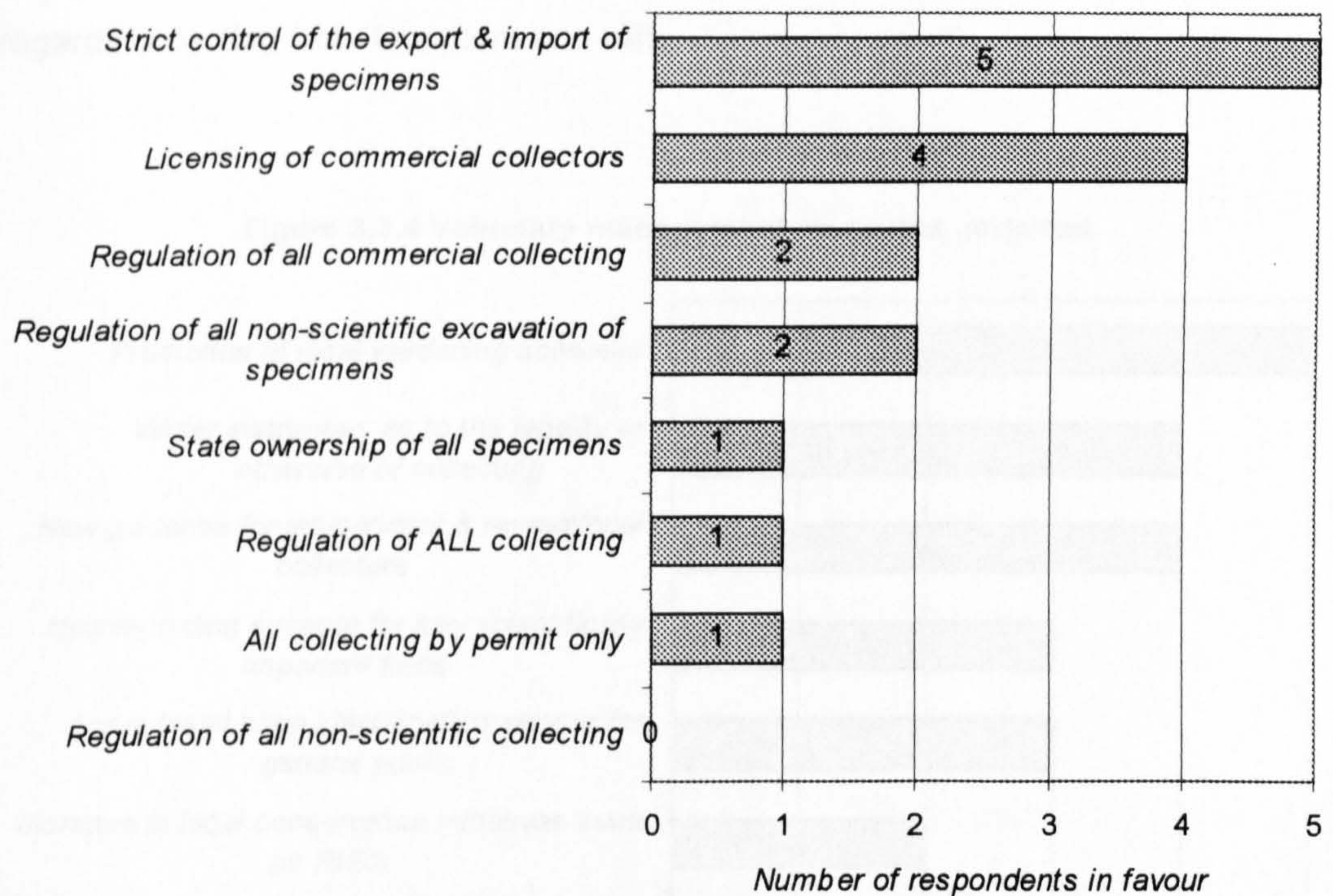
been recently rectified in England at least with the introduction of the *Countryside and Rights of Way Act 2001* - see 4.6.1.5 below.)

### 3.3.4.4 Need for Additional Management Measures

Respondents were next asked whether or not they considered that additional management measures should be introduced to ensure adequate protection for fossil resources. *All five* respondents considered that new management measures should be introduced, with all five furthermore favouring the implementation of a combination of regulatory and voluntary controls as opposed to just one or the other.

#### Regulatory Management Measures

Figure 3.3.3 Regulatory management measures required



First considering the respondents' regulatory management measure preferences (Figure 3.3.3), *all five* respondents favoured the introduction of regulatory measures controlling the export and import of fossils. Four of the five respondents (SNH(2), LO, am.coll.) also wished to see the licensing of commercial collectors. Two respondents (LO, am.coll.) favoured the regulation of all non-scientific collecting, and two (LO, am.coll.) the regulation of commercial collecting. As regards the remaining four regulatory measures, one respondent (am.coll.) favoured the state-ownership of all specimens, one (MUS) the regulation of *all* collecting activities, and one (LO) all

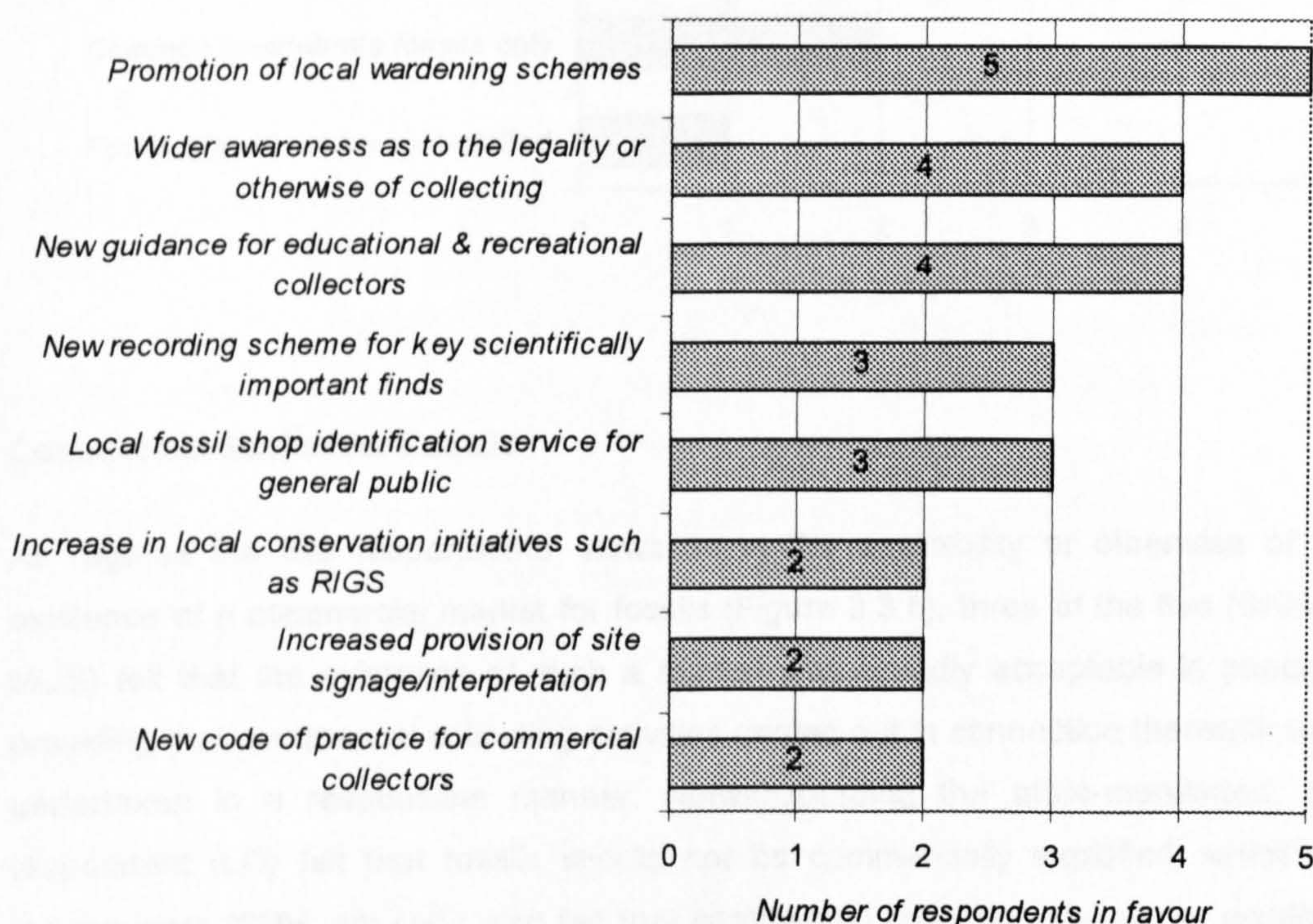


collecting by permit only. None of the respondents favoured the regulation of all non-scientific collecting. It is accordingly apparent that the control of exports and imports and the licensing of commercial collectors comprise by far the most favoured regulatory measures in respondents' minds, although relatively little consensus of opinion and/or enthusiasm is evident as regards the other proposed regulatory measures.

### Voluntary Management Measures

As regards respondents' voluntary management measure preferences (Figure 3.3.4), perhaps the most notable finding was that *all five* respondents favoured local warden schemes. Those voluntary measures next most popular with respondents - with four of the five respondents favouring each - were the wider provision of both guidance for educational and recreational collectors and information clarifying the legal position as regards collecting from foreshore and cliff.

**Figure 3.3.4 Voluntary management measures required**



### Application to Sites

As regards whether any new regulatory and/or voluntary management measures should, if introduced, be applied to all sites or selected sites, three of the five

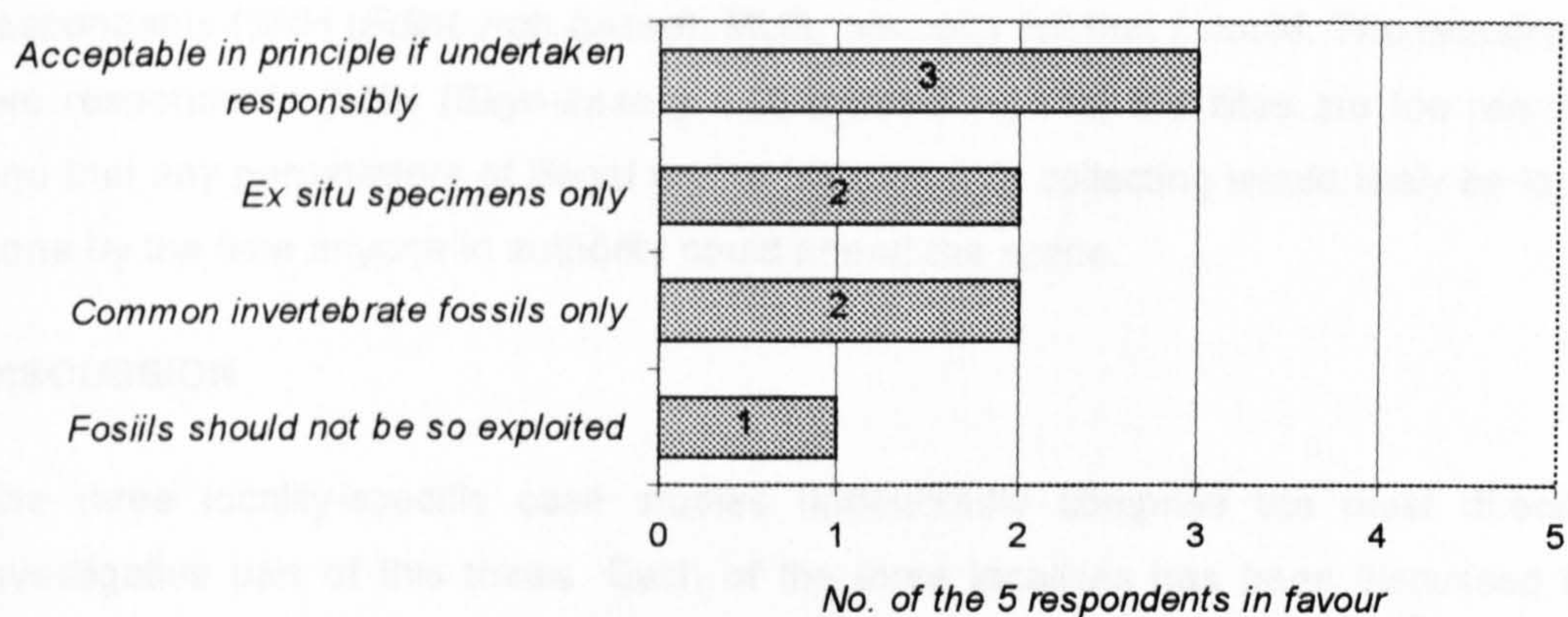


respondents (SNH(2), am.coll.) felt that differing sites needed differing levels of protection, whilst the other two respondents favoured application of any new measures to all sites (MUS, LO) feeling that it is difficult to gauge which of Skye's remote, extensive, and relatively unexplored sites may yield key specimens next.

### 3.3.4.5 Legality of Collecting Activities

All five respondents felt that the wider provision of information clarifying the legal position as regards collecting specimens from foreshore and under-cliff has to date been poor and adequate respectively. It is clear that, as is the case along the North Yorkshire coast (see 3.2.5.5 above), this undesirable situation needs addressing in the immediate future.

Figure 3.3.5 Commercial market for fossils



### 3.3.4.6 Commercial Market for Fossils

As regards the five respondents' views as to the desirability or otherwise of the existence of a commercial market for fossils (Figure 3.3.5), three of the five (SNH(2), MUS) felt that the existence of such a market was broadly acceptable in principle, providing that commercial collecting activities carried out in connection therewith were undertaken in a responsible manner. Notwithstanding the afore-mentioned, one respondent (LO) felt that fossils should *not* be commercially exploited, whilst two respondents (SNH, am.coll.) also felt that commercial collecting should be restricted to common - viz. a viz. invertebrate - *ex situ* fossils.



### **3.3.4.7 Visitor Safety**

As regards whether enough information is made available to visitors pertaining to the inherent dangers associated with tides and cliff-falls, *all five* respondents considered that it was not. It is therefore clear that more progress needs to be made in this area.

### **3.3.4.8 Remedial Action Regarding the Witnessing of Irresponsible Collecting Activities**

Respondents were finally asked whom they would first think of contacting if they were to witness irresponsible collecting activities. Two respondents said the police and/or the landowner, one said SNH and/or the landowner, one the police, and one SNH, with it accordingly being clear that the police and/or the landowner were the favoured choices closely followed by SNH. As regards whether or not remedial action could likely be taken quickly enough to comprise an effective deterrent, it is perhaps surprising given the remote nature of the northeast Skye coast that three of the five respondents (SNH (*Edinburgh-based*), MUS, am.coll.) felt that it could. The remaining two respondents (SNH (*Skye-based*), LO) instead felt that the sites are too remote and that any perpetrators of illegal and/or irresponsible collecting would likely be long gone by the time anyone in authority could attend the scene.

## **3.4 DISCUSSION**

The three locality-specific case studies undoubtedly comprise the most directly investigative part of this thesis. Each of the three localities has been discussed in terms of its palaeontological interest, the degree of collecting pressure placed upon its fossil resources and, most importantly, the views and opinions of those stakeholder group representatives most closely involved with the use and conservation of each as regards value judgements, issues and conflicts, and, most importantly in the context of this thesis, the need for additional regulatory and/or voluntary management measures.

### **3.4.1 West Dorset Coast**

Of the three, the West Dorset coast is undoubtedly the best known and most accessible fossil collecting locality, and as such faces intense pressure from all collector groups, with the activities of commercial collectors in particular having even led to a public inquiry in 1982 (see 3.1.2 above). It is therefore not surprising that the West Dorset coast has in many respects led the way in the UK as regards introducing voluntary management initiatives aimed at both promoting public awareness of conservation issues and encouraging responsible collecting practice. The voluntary

Fossil Collecting Code of Conduct recently introduced in this regard appears to have met with a significant degree of success, particularly in terms of both clarifying the legal ownership of specimens once collected and reducing the digging for specimens by commercial collectors. However, many stakeholder group representatives feel that the scientific community have as yet made little effort to become involved with the Code and its objectives. This may owe more than a little to the fact that commercial (and experienced amateur) collectors made such a strong representation during the development of the Code and are accordingly perceived by disgruntled scientists as having in practice given up very little as a result of its provisions.

### **3.4.2 North Yorkshire Coast**

The North Yorkshire coast differs most from its West Dorset counterpart in that despite it being several times longer, it is less popular with collectors - at least recreational and commercial, if not perhaps educational - owing to the fact that it is not quite as well known as a collecting locality, and is furthermore generally far more difficult to access. Nevertheless, voluntary management initiatives are currently being developed in an attempt to (once introduced) foster more responsible use and effective conservation of the North Yorkshire coast's fossil resources. This development owes more than a little to the fact that the fossil heritage of the North Yorkshire coast has recently fallen under the media spotlight owing to the escalating public interests in all things dinosaur-related, as well as West Dorset having now set an example generally adjudged fit to follow.

### **3.4.3 Northeast Skye Coast**

The northeast Skye coast differs significantly from both its West Dorset and North Yorkshire counterparts in that it is both less widely known (as a fossiliferous locality) and far more remote than either, and furthermore has no resident commercial collectors. The northeast Skye coast does, however, yield fossilised dinosaur remains of international scientific importance, several finds of which are known to have been partly lost owing to indiscriminate hammering and/or irresponsible collecting activities.

### **3.4.4 Analysis of Questionnaire Exercise Findings**

#### **3.4.4.1 Value Judgements**

One of the most notable findings of the questionnaire exercise was the high degree of overall consensus as regards value judgements. *All three* groups rated scientific and educational value as the *most* important values intrinsic to fossil resources, with



*all three* also rating aesthetic and commercial value the *least* important (although it is important to distinguish the commercial *value* of fossils from commercial collecting activities *per se* since the results of the latter undoubtedly play a significant role in furthering the science of palaeontology - see 2.7.1/2 above). Recreational and cultural value appeared to fall in the midst of these two extremes as far as the three respondent groups were concerned.

#### **3.4.4.2 Issues and Conflicts**

Again, a high degree of consensus was also evident as regards issues and conflicts. Given that fossils' scientific value was rated as being particularly important, it is not surprising to discover that the issue/conflict rated as being the most important by two of the three groups of respondents (Dorset and Skye) - and second in importance by the other (Yorkshire) - was the loss of scientific information due to irresponsible collecting activities. *All three* respondent groups also rated the indiscriminate hammering of specimens by educational and recreational collectors and the lack of political interest in, and funding for, palaeontological conservation to be of fairly high and moderate importance respectively. The contemporary increase in geotourism, the lack of collecting guidance for educational and recreational collectors, and the lack of site signage and interpretation were considered by all three respondent groups to be of relatively low importance. That this was particularly the case with the Dorset respondents is perhaps unsurprising given that voluntary measures have already largely been taken to address such issues and conflicts (see 3.1.3.2 & 3.1.4 above).

#### **Divergences in Opinions between Respondent Groups**

Views did, however, vary as regards the importance of other issues and conflicts, the most notable being that the Dorset respondent group considered excessive commercial exploitation of the resource to be a particularly important issue/conflict (second only - although in some ways inter-related - to the loss of scientific information), whilst the Yorkshire and Skye respondent groups did not. This is perhaps due to the fact that commercial collecting activities have been, and continue to be, particularly intense along the West Dorset coast, as well as arguably being something of a 'hangover' from the 1982 public inquiry concerning commercial collecting activities (see 3.1.2 above).

The views of the Yorkshire respondent group differed most from those of their Dorset and Skye counterparts in that that issue/conflict considered of most importance was the lack of wider public awareness regarding the use and conservation of fossils

resources, with the other two respondent groups considering this issue/conflict to be of only moderate importance.

The views of the Skye respondent group differed most from those of their Dorset and Yorkshire counterparts in that the loss of specimens through the UK's lack of export and import controls was considered to be of relatively high importance, whilst the other two groups considered the issue to be of only relatively low importance.

#### **3.4.4.3 SSSI Notification**

The Dorset respondent group was not questioned in this regard so as to avoid testing their patience by seeking to interrogate them on matters already extensively discussed during the development of the Fossil Collecting Code of Conduct (see 3.1.4 above). The discussion is here therefore restricted to the views of those respondent groups in Yorkshire and Skye (as indeed it largely is in 3.4.4.4/5 below also - and for the same reason).

##### Wider Provision of Information

When asked to comment upon the wider provision of information pertaining to which sites are designated as SSSIs, 75% and 25% of Yorkshire respondents considered such provision to have been poor and reasonable respectively. The five Skye respondents were more evenly split in this regard, with two (both SNH officials) opining that such provision had been poor - one of who also interestingly commented that SNH are not required to 'advertise' the whereabouts of SSSIs.

##### Collecting Restrictions

Very little consensus was evident when respondents were asked what their perceptions were as regards collecting restrictions on SSSIs, with it accordingly being abundantly clear that clarification is required in this regard. Even accepting the argument that it is beneficial to site use and conservation in general when site-users believe collecting restrictions to be more stringent than they actually are, it is nevertheless vital that those in managerial positions (National Park, English Nature, local authority etc.) are fully and accurately informed in this regard.

##### Site Protection

When asked to comment whether or not the SSSI system afforded sites an adequate level of protection, 13 of the 20 Yorkshire respondents and *all five* Skye respondents



agreed that it did not. All five Skye respondents also annotated their responses opining that the current SSSI legislation (WCA) is currently flawed as regards site damage by a third party. This situation has now ostensibly been recently rectified in England (and Wales) with the introduction of the *Countryside and Rights of Way Act* 2001 - see 4.6.1.5 below - and Scotland requires similar regulatory change at the earliest opportunity.

#### **3.4.4.4 Need for Additional Management Measures**

Given that fairly extensive voluntary measures have recently been introduced along the West Dorset coast, it is not surprising that nine of the ten Dorset respondents felt that additional management measures are *not* required at the present time - although a National Trust representative did qualify his answer by adding that the degree to which the current voluntary measures prove successful yet remains to be seen. By the same token it is perhaps equally unsurprising that 65% of the Yorkshire respondents and *all five* Skye respondents considered that additional regulatory and/or voluntary management measures *are* required for adequate resource protection. The remainder of this section will therefore by implication refer only to the views of the Yorkshire and Skye respondent groups as regards which particular additional management measures are considered to be most suitable. In overall terms, both the Yorkshire and Skye respondent groups preferred voluntary management measures (favoured on average by 67% and 62.5% of Yorkshire and Skye respondents respectively) as opposed to regulatory management controls (favoured on average by 16% and 40% of Yorkshire and Skye respondents respectively).

#### **Regulatory Management Measures**

*All five* Skye respondents favoured the introduction of tighter regulatory controls on the export and import of fossils; this not being surprising given the difficulty of monitoring collecting activities along the remote and largely inaccessible northeast Skye coast, as well as the widely publicised difficulties currently facing SNH officials trying to repatriate illegally collected Scottish fossils from a German museum (see 2.6.1.2 above). Some 40% of the Yorkshire respondent group were also in favour of export and import controls, with that 60% *not* being in favour feeling that such controls would be difficult to enforce, and would also likely lead to an escalation in 'black market' activities whereby important specimens would be lost to science altogether (with 80% of Dorset respondents also opining similarly and for the same reasons).

Some 80% and 35% of the Skye and Yorkshire respondents respectively favoured the licensing of commercial collectors (this, interestingly enough, having been one option discussed and rejected in West Dorset by a Public Inquiry held in Charmouth in 1982 (Edmonds 2001 - and see 3.1.2 above)). Such a lack of correlation between the two groups is likely linked to fears associated with the greater difficulty of monitoring commercial activities on Skye than North Yorkshire owing not least to the particularly remote nature of the former. Two of the five Skye respondents furthermore felt that all commercial collecting should be regulated, with two similarly opining as regards all non-scientific excavation, and perhaps for the same reason.

### Voluntary Management Measures

A high degree of consensus was evident in both the Yorkshire and Skye respondent groups as regards the introduction of new fossil collecting guidance for educational and recreational collectors (favoured by 85% and 80% of Yorkshire and Skye respondents respectively); this likely being seen as an effective way to reduce the indiscriminate hammering which was viewed as a relatively important issue/conflict by all three respondent groups (see 3.4.4.2 above). Both the Yorkshire and Skye respondent groups also favoured the introduction of voluntary recording schemes for key scientifically important fossils as well as a local fossil-shop identification service; both these measures presumably being seen as a way to procure and retain maximum scientific information (and see 3.4.4.1/2 above). All Yorkshire and Skye respondents felt that wider provision of information pertaining to the legality of collecting specimens from the intertidal area was poor, with the situation similarly pertaining to the cliff to be only a little better. It is therefore clear that clarification is required in this regard as soon as is practicable.

Perhaps the greatest lack of correlation between the Yorkshire and Skye respondent groups concerned local warden schemes: whilst just 25% of the Yorkshire respondent group felt that the introduction of such schemes would provide benefit, local wardening was the *only* voluntary management measure favoured by *all five* Skye respondents. This is perhaps because local wardening is seen as offering the only way of monitoring collecting activities along the remote and sparsely populated northeast Skye coast. (Local wardening has already proved to be a useful conservation aid elsewhere both in the UK (see 2.6.1.6 above) and in other parts of the world (see 6.3.1.3, 6.3.2 & 6.3.2.3 below).) Lastly, the increased provision of site signage, site interpretation, and local conservation initiatives such as RIGS were all favoured by approximately half of both the Yorkshire and Skye respondent groups.



## Application to Sites

As regards whether any new regulatory and/or voluntary management measures should, if introduced, be applied to all sites or selected sites only, both the Yorkshire and Skye respondent groups were broadly split. Those respondents favouring application to all sites argued that the protection of specific sites only would only increase collecting pressure on those sites left unprotected, and furthermore that *all* sites had the potential to be damaged. Those respondents instead favouring application to certain sites only argued that it was better to focus that limited budget more traditionally available for palaeontological resource protection on those integrity sites (and see 2.3 above) containing a vulnerable and finite resource (e.g. see 2.6.1.2 above). Such a lack of overall consensus in this regard is to some degree to be expected, and it is difficult to imagine *all* respondents being persuaded towards one school of thought or another.

### **3.4.4.5 Commercial Market for Fossils**

The majority view of both the Yorkshire and Skye respondent groups was that the existence of a commercial market for fossils is broadly acceptable in principle, providing that any collecting activities associated therewith are undertaken in a responsible manner *viz. a viz.* the proper recording of scientific information and in consultation with EN/SNH and/or museum personnel where excavating scientifically important specimens.

### **3.4.4.6 Visitor Safety**

When asked whether they considered that enough information was made available to those individuals visiting the coast for its palaeontological interest as regards the inherent dangers of tidal movements and cliff-falls, 80% of Yorkshire and *all five* Skye respondents opined that it was not. Conversely, nine of the ten Dorset respondents felt that it was, although this is almost entirely due, however, to recent initiatives in this regard by the Charmouth Heritage Coast Centre and the Jurassic Coast Project (see 3.1.3.2 below). This issue is also currently being addressed on the North Yorkshire coast under the auspices of the Yorkshire Dinosaur Coast Project (see 3.2.4 above).

### **3.4.4.7 Remedial Action regarding the Witnessing of Irresponsible Collecting Activities**

As regards whether or not remedial action could be taken quickly enough further to alerting the relevant parties - the police, EN/SNH officials, Wildlife and Heritage Coast

Rangers, landowners etc. - to constitute an effective deterrent to illegal and/or irresponsible collectors, 80%, 30%, and 60% of Dorset, Yorkshire, and Skye respondents respectively felt that it could. That the majority of the Dorset respondents felt that it could is not so surprising given that the West Dorset coast is shorter in length, more readily accessible, and far less remote than its North Yorkshire and northeast Skye counterparts, in addition to which the recent introduction of the Fossil Collectors Code of Conduct has served to raise local awareness in this regard. That three of the five Skye respondents also felt that remedial action could be effectively taken is ostensibly a little more difficult to understand given the remoteness of the northeast Skye coast. The other two Skye respondents - along with 70% of Yorkshire respondents - considered that effective remedial action would prove difficult owing to the remoteness of many sites allied with a lack of personnel and funding for palaeontological site conservation in general.



## **4 REGULATION OF PALAEOLOGICAL RESOURCES IN ENGLAND AND SCOTLAND**

### **4.1 INTRODUCTION**

UK law is in the widest sense only partly set out by legislation with the remaining and not inconsiderable part comprising common law precedent. Both contribute very little as regards specifically dealing with the protection either of palaeontological sites or the specimens collected therefrom.

Whilst both site users and landowners are, in common with everyone else, enmeshed in an invisible web of law, the situation is further complicated by the fact that no one body of law covers the whole of the UK. Although similar in many respects, English and Scottish law remain independent with Scotland having its own system of courts and in many cases its own separate legislation.

Although some provisions of more general legislation relating to property, health and safety, and taxation can have a degree of bearing upon the use and conservation of palaeontological sites, they often have unfortunate effects when so applied (Taylor & Harte 1991). It is accordingly very difficult to state precisely what the law is *and readers must not take this regulatory overview as an accurate statement of the law*; the intention here instead being somewhat more modestly to introduce, discuss, and, most importantly *clarify* those areas of law most pertinent to site users and conservators.

### **4.2 OCCUPIERS' LIABILITIES**

Whilst the *Occupiers' Liability Act 1957* and the *Occupiers' Liability (Scotland) Act 1960* impose liabilities upon occupiers for permitted visitors' safety, the *Unfair Contracts Terms Act 1977* provides for the restriction of such liability where the land concerned *is not* used for business purposes. Even on land which is used for business purposes - such as a working quarry - the *Occupiers' Liability Act 1984* excludes occupiers' liabilities where visitors are allowed in free of charge for educational or recreational purposes. Collectors can of course indemnify occupiers in circumstances where they would otherwise be liable, but it should be noted that such indemnity would *not* cover personal injury or children below the age of responsibility.

Whilst trespassers do not receive the same degree of protection as permitted visitors, they are nevertheless owed some duty of care under the *Occupiers' Liability Act*

1984, especially if they are children. The duty of care owed by the occupier to those entering private land via public rights of way is broadly similar to that owed to trespassers.

Unsurprisingly, this imposition of liability tends to deter many occupiers from giving permission for access (Black 1985 and see Ormrod 1984). Site users with permission should accordingly take care to avoid undue damage to sites (thereby further discouraging occupiers from allowing access - and see 2.5.4.2 above) as well as providing their own indemnity insurance.

### 4.3 PUBLIC RIGHTS OF ACCESS

Except by means of a public footpath or bridleway, there is no implicit right of access to private land according to UK law. Entry onto land *not* by means of a public footpath or bridleway and *without* permission accordingly constitutes the civil offence of trespass, with the criminal offences of criminal damage and/or theft also resulting where property is damaged and/or taken.

Scotland does, however, have a history of mutual tolerance between landowners and the general public where access to open country is concerned. This applies especially to mountain and moorland where, subject to responsible behaviour, the public are by virtue of this mutual tolerance in many cases effectively afforded the freedom to roam wherever they wish. It must be emphasised, however, that this situation exists as a 'tradition' only, and as such accordingly comprises a 'favour' that can be withheld rather than a 'right' in law (Forster 1999).

Whilst visitors may lawfully traverse private land via a public right of way, such access is permitted only for the purpose of travel between two points with all other activities - even theoretically speaking one so trivial as merely sitting down - being technically barred (see Clayden & Trevelyan 1983 for a review). Although more extensive rights have been claimed in the past (see Bonyhady 1987), any such rights would certainly not include the removal of fossils. In fact, in the 1990 case of the Arran and Sannox Estates it was held that a landowner had the legal right to charge those individuals using a public right of way merely to *look* at geological landscape features (Anon. 1990).

Under Section 65 of the *National Parks and Access to the Countryside Act* 1949 (and see 4.6.1.1 below), local authorities are empowered to make 'orders' enabling the public to enter onto private land where the land comprises open country such as a



stretch of cliffs. In Scotland, local authorities are empowered under Sections 13,14,30 & 31 of the *Countryside (Scotland) Act 1967* as amended by the *Natural Heritage (Scotland) Act 1991* (see 4.6.1.2 below) to create both access 'agreements' and 'orders' over wider areas of land as well as public path 'agreements' and 'orders' in the strictly linear sense. In reality these powers to create 'agreements' and 'orders' are little used by local authorities, particularly the latter which require Secretary of State approval.

#### **4.4 OWNERSHIP OF FOSSILS**

Fossils found in the UK do *not* - unlike as is the case in the Canadian province of Alberta (see 7.3.3.4 below) - belong to the province. As such, all fossils in England and Scotland are privately owned with the ownership of a specimen being strictly a matter between a landowner and collector.

##### **4.4.1 In Situ**

It can for the purposes of the law be presumed that the owner of palaeontological specimens *in situ* is the person who holds the relevant mineral rights for that piece of land (Taylor & Harte 1991, 1988). The state generally retains the rights to coal, oil, gold, and silver in the UK, with the owners of the remaining mineral rights being able to sell or lease them separately from the land (e.g. see Shoard 1987). It should be noted that the landowner, the owner of the mineral rights, and the occupier may all be different; the latter in any event having a right in the matter - whether or not they hold any further interest in the land - since an occupier's permission must always be given before access can be taken (see 3.3 above). The collection of *in situ* fossils *without* the appropriate permission/s can for practical purposes therefore be regarded as theft.

##### **4.4.2 Ex Situ**

###### **4.4.2.1 General**

*Ex situ* specimens - i.e. those which are not in any way fixed to the land - occurring on private land obviously, and in common with *in situ* specimens, belong to the landowner. Trespassers have no rights of title to any specimens under any circumstances.

#### 4.4.2.2 Coastal Localities

However, a feature common to many localities - such as many foreshore sites to which open public access is unrestricted (and see 4.4.4 below) - is that loose or seemingly *abandoned* specimens can be collected without express permission to do so. Indeed, a standard interpretation of Section 1 of the *Theft Act* 1968 is that there can be no theft of things of which ownership has been abandoned. Any visitor collecting and taking such a specimen, honestly believing it to be abandoned, can therefore escape prosecution and conviction for theft. It is nevertheless possible, however, for a landowner to claim seemingly abandoned objects back in certain circumstances, albeit with restrictions. In this regard, a distinction must be drawn in England and Wales between loose or fallen material (from cliffs, landslides etc.) which is lying in a position *above* High Water Mark (HWM), and that lying in a position *below* HWM. The former, in common with *in situ* material, technically remains the property of the landowner and can be claimed back from the collector. The latter, on the other hand, can indeed be correctly regarded as abandoned, in which case the landowner can only retain full rights to such specimens by taking positive and immediate steps to lay claim to them, which in practice means recovering them himself or authorising an agent to do so on his behalf (Taylor & Harte 1988). Alternatively, a landowner still has the option of trying to claim such specimens back if he can prove that they had not been technically abandoned; rules of limitation/prescription allowing a landowner up to six years to so recover the item (although any claim for damages *per se* in connection therewith may be precluded after only five years). It should be noted, however, that this distinction between specimens found above or below HWM is largely meaningless in the real world, since in the absence of the collection of a loose and potentially abandoned specimen having actually been observed, it is impossible to know from precisely where a loose specimen had in reality been collected from.

In Scotland (unlike in England) any truly abandoned moveable items (such as quarry dumps and beach shingle) cannot be ownerless and instead automatically comprise Crown property, and as such are not free for the taking. A landowner has 20 years to claim ownership of an item back (but only five years to claim damages associated therewith) from the Crown by proving that it had not actually been technically abandoned.



#### **4.4.3 Coastal Land Ownership**

All existing legal interests in land comprising English and Scottish coastal collecting sites are owned by someone somewhere. As regards who owns that land situated *above* HWM and that land situated *below* Low Water Mark (LWM) (i.e. the seabed beneath UK tidal waters extending out to the territorial limit), the identity of the owner/s is relatively easy to ascertain, with the former typically being the adjoining (inland) landowner, and the latter usually being the Crown Estate. In contrast, ascertaining the identity of an owner of a site situated on the foreshore or intertidal area - i.e. that land situated *between* HWM and LWM - is often fraught with difficulty, owing to the question of possible abandonment by the original landowner.

Approximately half the foreshore area in the UK owned by the Crown Estate, with the ownership of much of the remainder having devolved to other landowners including local authorities. Some authorities such as East Lothian Council choose to enforce their rights of ownership forbidding, for example, the collection of fossils from the vulnerable Granton crustacean site (see 2.6.1.4 above), whilst others in addition choose to retain their ownership rights in specimens held in museum collections (Taylor & Harte 1988). Conversely, other foreshore owners - local authority or otherwise - have chosen to abandon any such rights, preferring instead to manage such areas on an open access basis (e.g. see 3.1.4.1 Ownership of Fossils above).

In Scotland, a significant proportion of the foreshore remains in the ownership of private estates whose original title can reach far back into history. The actual extent of ownership can accordingly on occasion prove somewhat eccentric in character, in some localities still extending, for example, from HWM seaward to the farthest point to which a man wading out into the surf on horseback can throw a spear! (Clark 1996 pers. comm.) Notwithstanding this, and accepting that a detailed unravelling of the intricacies of Scottish foreshore ownership is beyond the remit of this thesis, it suffices to remember that, as with all other property, foreshore ownership ultimately vests in someone - whether or not they have deliberately or inadvertently abandoned such rights. As such, the legal collection of all fossils theoretically involves the fundamental transfer of property between the collector and the previous owner of the uncollected material.

#### **4.4.4 Implied Consent and Personal Bar**

There are many instances where the public have enjoyed free and open access to a collecting locality - typically coastal - for a long period of time, with no objection from

the landowner even in the knowledge that collecting of *ex situ* (and see 4.4.2.2 above) and/or, for that matter, *in situ* specimens has been, and still is, occurring. In these circumstances there is often an implied consent that visitors to such sites may take what they find; this constituting the only means by which both *in situ* and *ex situ* fossils can be legally collected in England and Scotland without *any* form of permission from the landowner - either to enter onto the land as a visitor in the first place, or to collect fossils *per se*. Where such implied consent exists, any landowner who does not interfere with the taking of fossils could well be personally barred from trying to claim them back at a later date. The legal doctrine of personal bar does, however, stipulate that the landowner as plaintiff must have had knowledge both of access having occurred and fossils having been taken. The doctrine also requires that regard be had to the effort expended by a collector in the course of his pursuits; a court therefore being likely to reject a landowner's claim where the finder (defendant) has invested significant time, energy, and expense in finding, extracting and preparing the specimen (and see 4.4.5 below).

A landowner can at any time bring such an implied consent to an end by simply erecting clear notices or otherwise advertising a ban on collecting. As such, no collector could then claim good title to specimens, even where it was obvious that newly revealed specimens were otherwise at risk from erosion and/or where the landowner had no interest or inclination to remove specimens himself.

#### **4.4.5 Finders' Rights and Duties**

Setting aside purely legal issues, it should also be noted that in common with the doctrine of personal bar (see 4.4.4 above), the finder of a fossil specimen also has certain moral rights owing to the personal effort expended in connection with his collecting activities. It is not unreasonable to argue that the finder of an exceptionally rare and fine specimen brings about the vast majority of its value by the act of actually finding it, which may well have involved months or even years of research and otherwise fruitless searching. By way of contrast, a collector easily extracting a relatively common specimen from an entirely predictable fossiliferous horizon only imbues the specimen with added value by the act of collecting it.

#### **4.5 EXPORT AND IMPORT**

The UK currently has no specific legislation regulating either the export or import of fossils, effectively leaving many scientifically important and/or culturally significant UK specimens particularly vulnerable to loss through export (Rolfe 1990).



#### 4.5.1 'Lizzie' the Lizard

That the UK possessed no controls *whatsoever* with which to regulate the export of even the most scientifically and culturally important fossils became abundantly clear in 1990, further to the notorious case involving the earliest amphibian fossil yet found in the UK - the fossil quickly becoming known in media circles as 'Lizzie'. The eight inch-long specimen, having been discovered in 1988 by commercial collector Stan Woods at East Kirkton in Scotland, was subsequently put up for sale for £175,000. Having been turned down by UK museums both astounded and dismayed by its high asking price, a German museum in Stuttgart agreed to purchase the specimen for the new price of £180,000. Believing that he required an export licence in order to be able to sell 'Lizzie' to a German buyer, Woods duly applied for the same. As part of the application procedure, an expert advisor had to establish whether or not the specimen met one or more of the 'Waverley Criteria' as laid down in the Export of Goods (Control) Order 1987 (as provided for under the provisions of the *Import, Export and Customs Powers (Defence) Act 1939* - the only existing regulatory mechanism currently existing in the UK controlling the export of certain important heritage items). The three Waverley Criteria are as follows:

- 1) Is the item so closely connected with our history and national life that its departure would be a misfortune?
- 2) Is the item of outstanding aesthetic importance?
- 3) Is the item of outstanding importance for the study of some particular branch of art, learning, or history?

Further to the expert advisor consulted having decided that the specimen did indeed meet one or more of the three criteria, the case was then brought before the Reviewing Committee on the Export of Works of Art, this notably being a first for a geological specimen. The Committee having ruminated upon the matter; the Dept. of Trade and Industry on the 21<sup>st</sup> December 1989 ruled that fossils, not being manufactured or produced, were *not* subject to the Export of Goods (Control) Order 1987.

Indeed, in the 36<sup>th</sup> annual Report of the Committee on the Export of Works of Art 1989-90 (HMSO 1990), concern was expressed that:

“By a quirk of drafting, fossils and natural specimens are at present outside the scope of his (Secretary of State's) controls”;

and furthermore that the current export regulatory controls:

“only extend to goods manufactured or produced more than 50 years before the date of exportation; since a fossil cannot be deemed to either have been manufactured or produced, it is outside the controls”.

It is arguable that extending *the Import, Export and Custom Powers (Defence) Act 1939* and *Export of Goods (Control) Order 1987* to cover fossils would only be of limited help. Pending investigation by the Reviewing Committee, only the very finest artefacts are currently deemed worthy of retention in the UK, with the export of other often outstandingly good material worth £16,000 or more being allowed to proceed after a set period of several months, should no UK museum be willing and/or able to raise the necessary purchase monies (Taylor & Harte 1988). Since scientific and monetary values do not necessarily correlate, with UK museums today also typically lacking sufficient finances with which to acquire particularly expensive specimens, it is therefore argued by some observers that the proper use and conservation of English and Scottish fossil resources necessitates totally new regulatory restrictions upon the export of specimens out of the UK (e.g. see 3.4.4.4 Regulatory Measures below). Conversely, any new legislation in this regard would also need to include - in order to provide an internationally equitable approach - provisions protecting foreign specimens from illegal import into the UK. Just such a framework for the control of the exports and import of geological cultural heritage items already exists in the form of the UNESCO Convention.

#### **4.5.2 UNESCO Convention**

In 1970 the United Nations Educational, Scientific and Cultural Organisation (UNESCO) adopted the Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (the Convention). The Convention seeks to contain the trade in items of cultural property illegally or improperly removed from their countries of origin; especially the one way flow of objects from less economically powerful exporting countries into the hands of private collectors and dealers elsewhere in the world.

The definition of cultural property given in the terms of the Convention includes rare collections and specimens of minerals and objects of palaeontological interest. The Convention furthermore recognises:

“That the interchange of cultural property among nations for scientific, cultural and educational purposes increases the knowledge of the civilisation of Man, enriches the cultural life of all peoples and inspires mutual respect and appreciation among nations”.



The Convention also, however, recognises:

“That the illicit import, export and transfer of ownership of cultural property is one of the main causes of the impoverishment of cultural heritage of the countries of origin of such property.....”

and also:

“That it is incumbent on every state to protect the cultural property existing within its territory against the dangers of theft, clandestine excavation and illicit export”.

It is interesting to note that the tension between these principles is immediately apparent. Whilst few would disagree that science is international, the majority of UK palaeontologists nevertheless tend to polarise towards either one of two principal schools of thought. One group regard all fossils as *global* heritage items, and as such views the nationality of that country holding a UK specimen as being inconsequential, providing that the specimen remains available to science as a whole (Clements 1988). The other group instead favours the retention of UK specimens in UK museums for the public education and entertainment of those people indigenous to that country from which the specimens originated (Rolfe 1988). Whatever one's views, it should also be borne in mind that it is UK museums in particular who have most definitely benefited from past imports of fine and exceptionally valuable geoheritage material from abroad since the 1820s, including an *Archaeopteryx* sp. from Solnhofen in Germany (and see 8.3.2 below), Darwin's fossils from Patagonia, and the Elgin Marbles (Taylor 1991). It is not therefore perhaps all that surprising to discover that the UK has yet to join those 85 states who had by 1996 enacted legislation implementing the provisions of the Convention. Many of those involved in the use and conservation of the UK's palaeontological sites consider this an act of omission, since the provisions of the Convention appear to offer an effective means whereby the export of palaeontological and mineralogical specimens can be effectively regulated, given, of course, the presumption that fossils do actually comprise cultural property.

However, it should be remembered that the Convention suffers from two fundamental flaws which can be summarised as follows:

- 1) First, the Convention is bilateral, and in order for its provisions to apply, both market and source states must be parties to the Treaty. If a cultural object is smuggled into a state that is not a party to the Treaty, the source state has no recourse unless the market state has independently enacted its own domestic legislation prohibiting the import of the object in question. The success of the Convention therefore depends upon international co-operation and support.

Critics furthermore note that the Convention lacks any concrete mechanism facilitating the resolution of disputes between member states.

- 2) Secondly, and perhaps most significantly of all in reality, is the fact that the repatriation of illegally exported cultural property is limited to those documented or accessioned objects stolen from museums or religious/secular public monuments. Such criteria obviously serve to render the vast majority of illegally collected and smuggled fossils exempt from protection, since they will typically have neither been accessioned nor documented.

## **4.6 SITE PROTECTION**

### **4.6.1 Regulatory Framework**

The *Wildlife and Countryside Act 1981 (WCA)* is by far the most significant piece of legislation regulating the use and conservation of fossil resources in both England and Scotland. Whilst the provisions of the *National Parks and Access to the Countryside Act 1949* do not (unlike the WCA) facilitate the *statutory* protection of sites *per se*, they do nevertheless provide for some albeit limited degree of protection for certain palaeontological sites by way of designation as National and Local Nature Reserves.

#### **4.6.1.1 *National Parks and Access to the Countryside Act 1949***

The *National Parks and Access to the Countryside Act 1949* not only introduced the *concept* of Sites of Special Scientific Interest (SSSIs) (see 4.6.1.4 below), but by virtue of Section 21 also empowered EN and SNH and principal local authorities to designate National and Local Nature Reserves respectively, with one of the objectives underlying such designation including the preservation (i.e. conservation - see 2.2.5 above) of features of special geoheritage interest.

#### **National Nature Reserves**

National Nature Reserves (NNRs) are areas considered to be of national importance for their nature conservation interest. They may either be owned or leased by EN and SNH, or managed by the owners and occupiers under a (Section 16) Nature Reserve Agreement. Although the writer is only aware of the existence of three NNRs in England and Scotland (out of over 200 and 70 in England and Scotland respectively) which have been designated *mainly* for their geoheritage interest (Achanarras Quarry in Caithness, Scotland; Wren's Nest near Dudley in the Midlands; and Swanscombe gravel-pit in East London), it should be noted that many other NNRs designated for



wider natural heritage interest also include a geoheritage interest component. As a consequence of their national importance, all NNRs are also - and more importantly - statutorily designated as Sites of Special Scientific Interest (see 4.6.1.4 below). Areas of land afforded NNR status enjoy some degree of protection against over-zealous and/or irresponsible collecting activities in that any collecting activities will normally require a permit from EN or SNH.

#### Local Nature Reserves

Local Nature Reserves - of which there are over 600 in England, but only 34 in Scotland - comprise areas which, although not of national importance, are nevertheless adjudged to have a particularly valuable role to play in terms of both educating the public and encouraging their informal enjoyment of natural heritage on a local basis.

#### **4.6.1.2 *Natural Heritage (Scotland) Act 1991***

*The Natural Heritage (Scotland) Act 1991* is of particular importance in the context of the main discussion here in that it established Scottish Natural Heritage (SNH) and charged it with responsibility for protecting, enhancing, and facilitating the enjoyment of Scotland's natural heritage. Furthermore, where an area of land is adjudged by SNH to be of outstanding value to the natural heritage of Scotland, and is furthermore considered at risk without the putting in place of specific protection measures, the Act makes provision whereby SNH can recommend that the Secretary of State for Scotland designate the area as a Natural Heritage Area (NHA). NHAs are in many ways analogous with National Parks, and have, in the past, been seen by many observers simply as alternatives to them. Whilst no NHAs have been designated to date, the Cairngorms Partnership was recently established to test the applicability of the designation to that particular area. Given that central government now generally favours the introduction of National Parks, it is unlikely that any NHAs will be designated, although final decisions on these matters now rests with the Scottish Parliament (SO 1999).

#### **4.6.1.3 *Wildlife and Countryside Act 1981***

Some three decades after the *National Parks and Access to the Countryside Act* (see 4.6.1.1 above) had first introduced the *concept* of a statutorily protected defined area of land, the *Wildlife and Countryside Act 1981* (as amended 1985) (WCA) for the first time actually made provision for the designation and *statutory protection* of nationally

important palaeontological sites as Sites of Special Scientific Interest (SSSIs) in both England and Scotland. Whilst information pertaining to both the legal basis for SSSI palaeontological conservation and recent guidance relating to the process of the notification of SSSIs can be found elsewhere (e.g. see Taylor & Harte 1988 and EN 1999 respectively), what is important in the context of this thesis is that this mechanism today remains the *only* statutory means by which EN and SNH can regulate the use and conservation of palaeontological sites. SSSIs are therefore at the core of national and international arrangements for the protection of geological or geomorphological features. SSSIs are notified by EN and SNH in England and Scotland respectively, and of the 5,500 or so SSSIs thus far notified in England and Scotland approximately one third are designated for their nationally important Earth science or 'mixed' Earth science/biological characteristics. Breaking down the figures yet further, England, for example, has 154 SSSIs notified *specifically* for their nationally, or in some cases, internationally important fossil interest (King & Larwood 2001). That aspect of notification most pertinent to the theme of this thesis - i.e. in the context of the regulation of collecting activities - is a list of 'Operations Likely to cause Damage' to the special interest of the SSSI as provided for by Section 28 of the WCA.

#### 'Operations Likely to Cause Damage'

Those activities adjudged to involve potential damage to the special interest of a SSSI are categorised and detailed in a standard list of notifiable activities known as 'Operations Likely to cause Damage' (OLDs). Any owner or occupier wishing to proceed with an OLD must first consult with EN or SNH, and, in order to better facilitate such discussions, cannot undertake the notified activity within a period of 4 months. It should be remembered that an OLD is essentially a mechanism for consultation between EN and SNH and landowners/occupiers, rather than a prohibition of activities *per se* (King & Larwood 2001).

If, following discussions and advice, an owner/occupier still wishes to proceed with the OLD, then EN or SNH may, under the provisions of Section 15 of the *Countryside Act* 1968, offer the owner a management agreement under the terms of which the owner and/or his appointed agents warden the site, with collecting activities being controlled by an EN/SNH-monitored permit system (but see 2.6.1.2 above).

By far the most pertinent OLD in the context of this thesis is OLD25, the usual wording for which reads the "removal of geological specimens, including rock samples, minerals, and fossils". As such, OLD25 essentially comprises a control upon



collecting in requiring that written permission be obtained from EN or SNH prior to collecting activities being undertaken. (Many stakeholder representatives in fact mistakenly believe that such permission is required prior to undertaking collecting activities on *any and all* SSSIs - this being just one example of the widespread confusion which exists in many site users minds as regards the implications of SSSI status for collectors - see **3.4.4.3 Collecting Restrictions** above.) It should be remembered, however, that the inclusion of OLD25 in the notification of a geological or geomorphological SSSI is not mandatory, but is at the discretion of EN or SNH. As regards some statistics; in England, for example, approximately 100 geological SSSIs have been notified with OLD25 in place, 55 of which have been designated as SSSIs owing to their palaeontological and/or stratigraphical interest (King & Larwood 2001). Virtually all of the aforementioned SSSIs are vulnerable integrity sites (see 2.3 above) which contain a relatively small and scientifically important fossil resource which would be irreplaceable if lost to excessive and/or irresponsible collecting activities (e.g. see 2.6.1.1 above).

Owners and occupiers are not liable for any damage resulting from the activities of a *trespasser*, who would himself instead be liable in trespass (and see 4.3 above).

#### Planning Authorities

EN and SNH must not only inform owners and occupiers of SSSI designation, but also local planning authorities (who are required to keep and maintain records of all notifications within their administrative areas). Planning authorities have, since 1972, been required as part of their remit to pay special regard to the desirability of preserving and/or enhancing the character of the areas falling within their jurisdiction. It subsequently became a requirement under the Planning Acts that planning authorities receiving applications for proposed developments affecting SSSIs must consult with EN and SNH prior to determination, with EN and SNH being entitled to a 4 month consultation period in which to attempt to mitigate the adverse effects of such development upon the SSSI's special interest. Since 1992 it has furthermore become mandatory that planning authorities proposing to grant permission in the face of an objection from EN or SNH should first refer details to the Secretary of State for the Environment.

#### Section 29

The Secretary of State for the Environment can, in extreme cases, provide more substantial protection of SSSIs under Section 29 of the WCA whereby *anyone*

carrying out an OLD can become criminally liable. This provision is only rarely used, as it effectively constitutes interference with the freedom of a landowner to use his own land as he wishes. Such interference is not only perceived in today's political landscape as being ideologically unsatisfactory, but also by implication involves the payment of significant levels of compensation to the landowner concerned (Taylor & Harte 1988).

#### **4.6.1.4 Proposed Amendments to *Wildlife and Countryside Act 1981***

In late-1998, the Government published a consultation document setting out ideas for modifying the provisions of the *Wildlife and Countryside Act 1981* to ensure better conservation and management of all Earth heritage (and wildlife) SSSIs. Further to having received over 560 responses to the document, a paper entitled 'The Government's Framework for Action' was published in July 1999, in which the Government resolved to "bring forward legislation in a number of major areas as soon as Parliamentary time permits". These areas included:

- 1) Giving conservation agencies the power to make orders restricting the activities of third parties on SSSIs.
- 2) Empowering Courts to be able to both impose unlimited fines for damaging a SSSI, and order the restoration - where practicable - of the special interest which has been damaged.
- 3) Providing additional powers for the conservation agencies to enable them to:
  - a) Refuse consent for damaging activities over which there is currently no regulatory control.
  - b) Make orders requiring land managers to carry out necessary works to prevent deterioration through neglect.
  - c) Purchase land compulsorily, if, as a last resort, that is the *only* way to preserve its special interest.
  - d) Enter onto land - subject to appropriate safeguards - in connection with a) to c) above.
- 4) Providing for a statutory duty on public bodies to secure the positive management of SSSIs which they own or occupy in accordance with an agreed site management plan.

The Government also acknowledged in the paper that additional resources would be required to underpin its latest proposals, with grant-in-aid to English Nature, for example, having already been substantially increased by £6m in the 1998 spending review in prior recognition of this fact. It should be noted that the Government's



overall stated intention here was simply to make available the powers and penalties necessary to prevent deliberate damage to, and persistent neglect of, SSSIs, rather than to undermine or replace the relevant provisions of the WCA (DETR 1999).

#### **4.6.1.5 Countryside and Rights of Way Act 2000**

The *Countryside and Rights of Way Act 2000* (CROW) accordingly came into force in England (and Wales, but not Scotland) on 30<sup>th</sup> January 2001. The Act is the most significant piece of legislation pertaining to palaeontological conservation for almost 20 years, serving as it does to enable EN to better safeguard and manage English SSSIs in the future (Prosser 2001). The salient provisions of the Act and the effects thereof can be summarised as follows:

- 1) The most crucial provision of the Act in the context of this thesis is that it makes it an offence for a *third party* - i.e. *not* an owner or occupier - to knowingly or recklessly damage a SSSI. This provision rectifies what was arguably the greatest operational weakness of the WCA in that EN could only pursue third parties - *viz.* those individuals visiting palaeontological sites such as irresponsible/unauthorised collectors - indirectly through an owner or occupier. The Act also enables EN to introduce new bylaws preventing damaging activities on SSSIs, thus further protecting against third party damage.
- 2) Owners and occupiers will not be permitted to carry out any new works that could damage SSSIs without first gaining EN's consent. This provision will hopefully encourage partnerships towards positive management of SSSIs, and where such management cannot be secured by agreement, EN will be able to impose it - e.g. upon sites which are deteriorating through neglect.
- 3) There is a new requirement upon all public bodies to conserve and enhance SSSIs, including strict requirements as regards consulting with EN and taking heed of advice given where a public body is carrying out or authorising works which may affect a SSSI.

The new Act accordingly brings a welcome 'tightening up' of palaeontological resource conservation, and whilst partnerships will remain the cornerstone of EN's approach to SSSI protection (Prosser 2001), the new Act affords EN stronger powers to act where partnership and negotiation prove problematic.

## **4.6.2 Problems with Existing Regulatory Framework**

### **4.6.2.1 Operations Liable to Cause Damage**

Despite the recent enactment of the CROW - which ostensibly affords EN (but not SNH - thus necessitating the importance of quickly introducing parallel legislation in Scotland) a means by which to directly pursue third parties/site visitors who are known to have undertaken illicit and damaging collecting activities on SSSIs (see 4.6.1.5 above) - it still remains to be seen whether or not the new measures will actually enable EN to successfully progress such a case through the courts in order to set the legal precedent necessary to comprise a truly effective deterrent.

Finally, it still remains that OLDs cannot override existing or subsequent valid planning consents (and see 4.6.1.3 Planning Authorities above), nor can they prevent the undertaking of potentially harmful emergency operations.

### **4.6.2.2 Planning Process**

The planning process involves a number of measures aimed at safeguarding the special scientific interest of palaeontological sites which are by no means simple to circumvent. Nevertheless, local authorities are, to all intents and purposes, able to obtain planning permission for controversial developments such as coastal engineering works (see 2.5.3.1 above), since the concerns and interests of EN and SNH can be overridden by central or local government during major planning enquiries (Taylor & Harte 1988).

Additionally, development carried out by both the Government and the Crown on the foreshore (or seabed, which can on occasion involve known and, more importantly, *used* fossil sites) is almost completely exempted from the planning process.

### **4.6.2.3 Access and Goodwill of Landowners**

EN and SNH run the risk of losing access to SSSIs for fieldwork and research purposes if they erode the goodwill of landowners and occupiers by seeking to restrict the freedom of the latter to use their own land as they wish (and see 2.5.4.2 above). Care will accordingly need to be taken should any additional new legislation be drafted and introduced in the future aimed at further strengthening the protection afforded to sites by the WCA (see 4.6.1.4 above) (and the CROW in England - see 4.6.1.5 above) so as not to further antagonise landowners in this regard.



#### **4.6.2.4 Locally Important Sites**

Although sometimes recognised and mentioned in local plans, many locally important palaeontological sites (other than Local Nature Reserves - see 4.6.1.1 above) enjoy no specific recognition and/or protection. This in many ways unsatisfactory situation exists despite the fact that locally important sites play a valuable role in both taking collecting pressure away from nationally important sites (SSSIs), as well as further stimulating public awareness of geoheritage issues at a local level (Robinson 1988).

It should be noted, however, that the protection of such sites is undertaken - albeit on a non-regulatory basis - by voluntary and locally based groups (as well as in some cases by interested and concerned local residents - e.g. see 6.3.1.3 and 6.3.2.3 below). Since 1990, specific voluntary local groups have been established to notify local authorities of Regionally Important Geological and Geomorphological sites (RIGS). Today RIGS groups are becoming increasingly well established throughout England and Scotland. The work of RIGS groups typically involves, and draws upon the expertise of, museums, industry, and local government, as well as local geologists. Whilst RIGS have no statutory status, local authorities will often nevertheless respond positively to protect sites that attract local support (Ellis *et al.* 1996). That RIGS groups can have a significant role to play in site conservation was well evidenced recently when it was reported in the January 1999 edition of *Earth heritage* that the Hereford and Worcester RIGS Group had successfully secured a grant of (up to) £123,000 from the Heritage Lottery Fund. The grant is a first for UK geoheritage conservation, and will finance a four year project to identify and record some 2,000 sites across the Hereford and Worcester RIGS area. The grant will fund a Director of Conservation, a Data Manager, and expenses for site assessors.

#### **4.7 LOCAL GOVERNMENT**

Although UK legislation neither requires nor specifically empowers local government to carry out site conservation and geological recording, it does, however, afford local authorities relevant discretionary powers as well as obligations in the spheres of local education and museum provision (Taylor & Harte 1988). Whilst required to provide a library service to specified standards, local government is only empowered, not required, to operate a museum service for which there is no legally defined minimum standard. A direct consequence of this is that many areas of England and Scotland either lack local museums at all, or have under-funded facilities with no in-house geoheritage specialist. Either way, site protection and recording frequently suffer as a result (Knell 1987, Doughty 1985).

## **4.8 DISCUSSION**

The UK has no overreaching laws that specifically regulate either the import and export or the collection of fossils (although those relatively few SSSIs whose notification includes OLD25 are afforded some degree of protection against damaging collecting activities (see 4.6.1.3 above)). This situation appears unlikely to change significantly in the current political climate in which planning intervention, interference with private property, and increased public spending are all viewed with varying degrees of indifference or even hostility. Any future calls for either interventionist measures or additional allocation of public resources for site conservation or museum funding will accordingly need to be accompanied by identification of those areas that would likely benefit as a result including tourism and education.

Whilst the law concerning both access to sites yielding, and ownership of, geological specimens is relatively clear, at least in theoretical terms, many landowners, land occupiers, and site users - especially members of the general public - are unaware of its provisions and, more importantly, the legal implications as regards the legality of collecting activities. Additional information and clarification would accordingly be beneficial in this regard (and see 3.4.4.5 below).

In spite of the aforementioned, other political administrations around the world instead choose to protect their palaeontological resources by treating all or part of the same as being state-owned. It is possible some of the resulting legislative approaches adopted could theoretically provide models from which new regulatory strategies could one day - if adjudged necessary and/or desirable - be developed and introduced here in the UK. Examples of such overseas approaches are accordingly discussed in detail in Chapters 5, 6, 7 & 8 below.



**5**      **REGULATION OF PALAEOLOGICAL RESOURCES IN THE UNITED STATES OF AMERICA**

**5.1**    **INTRODUCTION**

The US comprises a huge geographical area which yields a bewilderingly wide range of palaeontological and mineralogical sites and specimens including a wealth of dinosaur fossil sites and material. Its inclusion for discussion here is also essential for a number of other reasons, the most important of which can be summarised as follows:

- 1) Approximately one third (almost 740m acres) of the US is publicly owned, with federal, state, and local governments accordingly having a significant role to play in attempting to regulate the use and conservation of fossil resources. Furthermore, such ownership includes a disproportionately large number of key palaeontological sites with, for example, 82% of Nevada, 64% of Utah, 62% of Idaho, 61% of California, 43% of Arizona, approximately 40% of Oregon and Wyoming, 34% of Colorado, and 30% of Montana all being federally-owned and managed (Shelton 1997 and Clemens 1988).
- 2) It has by far the largest domestic commercial fossil (and mineral) market in the world, with 50 major fossil wholesalers believed even as far back as in 1990 to be selling well in excess of US\$5m worth of fossils each year (Breining 1991).
- 3) Even as long ago as 1985, there were estimated to be some half a million amateur palaeontological collectors in the US gathering fossils for recreational enjoyment, aesthetic pleasure, and enjoyment (NAS 1985). This number has undoubtedly grown since, and such a vast army of often avid collectors exerts a real and potentially destructive pressure on many accessible and/or vulnerable sites.

The US therefore comprises a rich source of, and a major domestic and international market for, palaeontological and mineralogical specimens. This prevailing combination of high levels of supply and demand for specimens has not surprisingly resulted in a high incidence of illicit collecting activities. It is suspected that a significant proportion of these thefts are perpetrated as a relatively low-risk way of raising money with which to support drug habits (Kuncl 1995 and see 5.4.2.3 & 6.4.2.1 below).

Perhaps the most distinguishing feature of the US in the context of geoh heritage conservation is that vast tracts of remote and frequently uninhabited land are publicly owned and federally managed and administered. Increasing numbers of collectors

and researchers wish to utilise this federal land for commercial, recreational, and scientific purposes. It is those issues connected with access to, and ownership of specimens collected from, sites situated on federal land which continue to be the major topic of debate and source of contention between the scientific community and other stakeholder groups in the US (Clemens 1988).

This Chapter commences with a brief discussion of the current situation pertaining both to the regulatory control of the export and import of geoh heritage objects, and the collection of palaeontological specimens on private land. The remaining - and necessarily most substantial - part of this Chapter first examines the current regulatory framework and problems associated therewith as regards the regulation of palaeontological resources on US federal land, the discussion then moving on to examine in some detail the recent history of, and ongoing debate surrounding, the various regulatory and managerial initiatives drafted in an attempt to provide a unified framework regulating fossil collecting from US federal land. Whilst all of these initiatives have for one reason or another failed, they still nevertheless merit detailed discussion here, since that they at least served to generate substantial and wide-ranging debate amongst all stakeholder groups. This debate has in turn highlighted many of the major issues and points of contention connected with the use and conservation of Earth heritage resources, whether located on public or private land both in the US and elsewhere in the world.

The final part of this Chapter outlines the events and issues pertaining to the somewhat notorious case of 'Sue' the T-Rex, which largely precipitated the recent enactment of new legislation by the Government of the state of South Dakota.

## **5.2 EXPORT AND IMPORT**

As previously discussed (see 4.5.2 above), the introduction of domestic enabling legislation giving effect to the provisions of the UNESCO Convention (on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property) comprises perhaps the most obvious way for states to control the export and import of cultural heritage items. The US accordingly accepted the terms of the Convention in 1983. However, whilst the Convention notably includes fossils and minerals in its definition of cultural property, the enabling US legislation implementing the UNESCO Convention - the *Cultural Property Implementation Act* (CPIA) (effective 2<sup>nd</sup> December 1983) - regrettably does not; instead being limited in its application in only affording any comprehensive levels of protection for archaeological and ethnological objects.



Geoheritage items do, however, receive a limited degree of protection under the CPIA's provision regarding stolen cultural property. In coinciding with Section 7(b) of the UNESCO Convention, this part of the CPIA provides for the repatriation of documented or accessioned palaeontological or mineralogical objects stolen from a museum or a religious or secular monument. This provision, however, is of little use in the retrieval of any of the vast majority of specimens illegally collected from federal land which have not been documented or accessioned prior to their export (and see 4.5.2 2) above).

The lack of any other specific legislation regulating the export and import of geoheritage items means that fossil specimens can be easily transported both out of and into the US. The US therefore continues to lose much of its own geoheritage through uncontrolled export activities. Given the wealth and prosperity of the US, it is not surprising that the US also comprises the largest market in the world for imported fossils, the discovery in China of over a thousand dinosaur eggs in 1993, for example, having led to a proliferation of these fossils in the US market (Flam 1993).

### **5.3 CONTROL OF COLLECTING ACTIVITIES ON PRIVATE LAND**

The US has no legislation specifically regulating the collection or ownership of palaeontological or mineralogical specimens occurring on private land. Since the US has extensive laws restraining the government from invading private property rights (Sakurai 1994), and any form of interference with such rights would likely prove particularly abhorrent to the vast majority of the US electorate, the collection and ownership of fossils on private land looks firmly set to remain strictly a matter for resolution between the landowner and collector.

Whilst numerous observers dispute the philosophy and ethics of such a position, arguing instead that fossil resources on private land belong to *all* the people of that state in which they occur, it nevertheless remains unlikely that the views of such 'detractors' will gain any significant political favour in the US in the foreseeable future.

### **5.4 CONTROL OF COLLECTING ACTIVITIES ON FEDERAL LAND**

There is perhaps no conflict which epitomises the historic disagreement in the US over access to federal land by the public who own them than that of the decades-long struggle to arrive at rational and workable regulation of palaeontological collecting on federal land (Zenker 1996 - Zenker also at that time being the Regulatory Co-ordinator for the American Lands Access Association and see 5.4.4.3 below). Since

the US arguably lacks any cohesive legislation specifically providing for the protection of fossil resources occurring on federal land, the responsibility for the enforcement of any collecting restrictions (adjudged to be necessary to protect what arguably comprises a resource which belongs to the whole of the American people) falls to over fifty federal agencies. The Dept. of the Interior manages some 70% of total federal ownership through agencies such as the Bureau of Land Management (BLM), the Fish and Wildlife Service (FWS), and the National Park Service (NPS). The Dept. of Agriculture manages a further 25% of federal land through the United States Forestry Service (USFS) (Clemens 1988).

#### 5.4.1 Current Regulatory Framework

Federal land management agencies are empowered to formulate their own rules and regulations controlling palaeontological collecting under the provisions of the *Antiquities Act* 1906 and the *Federal Lands Policy and Management Act* 1976. As shall be further discussed below, the former has historically been found lacking by the US legal system as regards its applicability to palaeontological resources, whilst the latter does afford power to manage palaeontological resources but neglects to define how this should be carried out. The current regulatory system is both uncoordinated and convoluted, with many Americans therefore not understanding the requirements for legitimate collecting on many sites in the US. It is therefore not surprising that fossil theft, both inadvertent and otherwise, constitutes a growing problem in many federally administered areas.

US mining law today affords no protection to palaeontological resources further to Supreme Court Justice Earl Douglas having in 1915 ruled that palaeontological resources fell outside the provisions of the 1872 US Mining Law. Ironically enough, this ruling was founded upon the premise that dinosaur fossil material did not possess economic value for use in the sciences or ornamental arts, nor did it comprise a mineral within the meaning of the federal land laws (Shelton 1997). The irony arises, as Lazerwitz (1994) notes, that given the high sale prices recently achieved for certain vertebrate fossils (e.g. see 5.5.1.4 below), reconsideration of the economic value issue today would surely lead to a rather different conclusion.

Although the *Archaeological Resources Protection Act* and the *Cave Resources Protection Act* provide some degree of protection to that minute proportion of fossils fortuitously located within the confines of archaeological sites and caves respectively, the *Antiquities Act* and the *Federal Lands Management and Policy Act* effectively remain the only regulatory mechanisms in force today which provide any hypothetical



measure of specific protection for palaeontological resources found on US federal land.

#### 5.4.1.1 *Antiquities Act 1906*

The earliest federal legislation utilised in an attempt to regulate palaeontological collecting on federal land was the *Antiquities Act 1906*. The Act was originally passed to protect archaeological and ethnological sites on federal land, mainly in response to increased incidences of grave-robbing, which according to Kuncl (1995) had by the late-1800s had become something of a passion in the US. Only in later years were the provisions of the Act applied to palaeontological specimens, and then predominantly only vertebrate fossils at that (Clemens 1988).

##### Intent

The Act prohibits the removal or destruction of any "historic or prehistoric ruin or monument, or any object of antiquity". Objects of antiquity may be removed or excavated by permit, providing that such removal or excavation is for the benefit of reputable museums and other recognised scientific or educational institutions. Any objects so obtained and housed remain public property, although many states now hold that some specimens may be sold on the open market if deemed sufficiently abundant.

##### Interpretation

In the decades that followed the passing of the Act, the term "object of antiquity" became the subject of much dispute. Whilst geological specimens doubtless qualify as antiquities, it is unclear whether Congress ever intended that such specimens should be covered by the Act (Sakurai 1994). Whilst many legal experts still argue that the regulatory intent of the Act is to protect sites and objects of archaeological interest, it is notable that permits to excavate fossils were issued under the provisions of the Act as early as 1908, only two years after the Act took effect (Stucky 1993).

Ongoing confusion regarding the interpretation of the Act culminated in 1973 with the Ninth Circuit Court declaring the Act to be unconstitutionally vague, finding that the term "object of antiquity" as used in the Act lacked clear definition (Clemens 1988). Although subsequent courts disagreed with the findings of the Ninth Circuit Court, the use of the Act as the basis for the regulation of palaeontological *and* archaeological resources had been fatally weakened (Clemens 1988). Whilst the *Archaeological Resources Protection Act 1979* subsequently re-established and strengthened the

protection of archaeological sites, the *Palaeontological Resources Conservation Act* 1983 (see 5.4.4.1 below) - which was devised to afford parallel protection for fossil resources - never passed into legislature.

### In Practice

In practice, the *Antiquities Act* has been interpreted in such a way which prohibits the collection of vertebrate fossils from federal land without a federal permit. Such permits are usually only granted to professional palaeontologists who are affiliated with a museum or university, and all specimens collected under the terms of such a permit must ultimately end up residing in a publicly accessible collection. As regards typically more abundant invertebrate fossils, the Act allows private collectors to surface-collect a reasonable quantity of such fossils from federal land without a federal permit, except in otherwise protected areas such as National Parks. This, however, is merely a broad generalisation, with the situation in reality often being rather more complex (see 5.4.2.1 below).

### Penalties

The maximum penalties provided for in the Act are a fine of US\$500 and/or 90 days in prison. When set against the backdrop of today's high fossil prices, such relatively trivial penalties are derisory, and hardly comprise an effective deterrent to criminally-minded commercial collectors. Federal courts have also historically been reluctant to levy maximum fines on convicted thieves; one man, for example, having only been fined US\$50 for selling a complete turtle fossil (sold for US\$35,000) which had been illegally collected from a National Park (Morell 1992). Even in the notorious 'Sue' case (see 5.5.1 below), of the 39 charges brought against Pete Larson, the taking and retention of fossils from federal land only resulted in two minor misdemeanour convictions.

#### **5.4.1.2 *Federal Lands Policy and Management Act* 1976**

In light of doubts over the applicability of the *Antiquities Act* as a basis for the regulation of fossil collecting, some federal agencies such as the BLM (Abel 1996) today frequently use the language of the *Federal Lands Policy and Management Act* 1976 as their authority for formulating rules and regulations for palaeontological collecting on federal land. However, whilst the Act mandates that federal agencies shall *manage* palaeontological resources, it crucially neglects to define *how* such resources should be managed (Zenker 1996).



## **5.4.2 Federal Enforcement of Regulations**

Recent evidence suggests that the current system of rules and regulations pertaining to the control of collecting activities on US federal land has become increasingly difficult to enforce. This is not only due to the intricate and difficult-to-understand nature of the rules themselves, but also to the extremely complex patterns of federal land stewardship which exist in many part of the US, as well to the remote and uninhabited nature of much of the land itself. When furthermore taking into account the increasingly high prices paid for fossils on the commercial market, it is unsurprising that illegal collecting activities constitute a growing problem faced by land managers and palaeontologists alike.

### **5.4.2.1 Complexity and Inconsistency**

Since the 1906 enactment of the *Antiquities Act*, a plethora of additional rules and regulations concerning fossils found on federal land (see Raup *et al.* 1987) have been introduced and implemented on an ad hoc basis by various federal agencies, which have in turn begot ever-increasingly complex systems of land management. This complexity continues to be compounded by the fact that many sites fall under the jurisdiction of several agencies, each of which have their own separate and distinct procedures and regulations. Such circumstances have led to the implementation of the *Antiquities Act* being inconsistent (Clemens 1988). For example, whilst the USFS requires permits for the collection of vertebrate fossils only from its lands, the NPS on the other hand stipulates that permits are necessary for *all* forms of fossil collecting. Furthermore, the USFS allows commercial collecting, but the NPS and the BLM do not (Sakurai 1994).

This unsatisfactory situation is further exacerbated in that so far as statutory authority enabling the regulation of palaeontological resources actually exists, it does not typically impose a duty upon management agencies to actually accept and dispense their responsibilities in connection therewith (Clemens 1988). As a result, land managers unsurprisingly fail to consistently enforce either the provisions of the *Antiquities Act* or their own agency rules and regulations (Sakurai 1994). This situation results in confusion for collectors and managers alike, and a standardised form of regulation across all US federal land accordingly remains a clear and desirable objective for the future.

#### **5.4.2.2 Impracticalities**

On a more practical note, it must also be remembered that many tracts of US federal land are both vast and relatively uninhabited, and are typically patrolled by an ineffectually small number of rangers. For example, in Moab, Utah, just one law enforcement agent and one palaeontologist oversee 6.5m acres of BLM-managed federal land (Abel 1996). Likewise in Nebraska, the USFS has only two rangers patrolling one million acres (Timms 1994). In Wyoming, the BLM oversees some 18m acres, but its law enforcement staff consists of just three special agents and three uniformed rangers.

The West's extensive open spaces and thin law enforcement presence are not the only factors which favour unauthorised collecting activities. Law enforcement officers and rangers have a wide range of duties to perform, with BLM District Manager Kate Mitchell at Moab, Utah, opining in 1996, for example, that catching fossil thieves is relatively low down on her list of priorities, coming below, say, catching looters of Indian artefacts and rescuing mountain bikers (Abel 1996).

Additionally, federal land is frequently criss-crossed by mining and prospecting trails which facilitate relatively unhindered public access to and from fossil sites. Much federal land is also defined by the government as 'multiple-use'. The sighting of a four-wheel drive loaded with digging tools may accordingly be engaged in legitimate activities not connected with palaeontological collecting.

Even further hampering enforcement, fencing boundaries cannot in practice always be relied upon as accurately - or in some cases even remotely - properly delineating between federal and private property. Ranchers often fence in usable range, but not the kind of barren and eroded terrain upon which fossils typically occur, resulting in unfenced private land lying next to unfenced federal land (Timms 1994). One incident exemplifying the confusion which can ensue in such circumstances occurred near Greybull in Wyoming in 1991 when Swiss commercial collector and dealer Hans Siber excavated a complete and perfectly articulated and preserved Allosaur fossil known as 'Big Al' on what he apparently genuinely believed to be private land. Siber maintained proper site work, kept excellent scientific records, and even endeavoured to keep the scientific community informed of his activities. Wyoming BLM officials subsequently had the land re-surveyed as a result of which the property boundary was subsequently moved by several hundred yards (Trexler 1999), thus facilitating the BLM's later confiscation of the specimen which is now housed in the Museum of



the Rockies (Bies 1994). Siber was not prosecuted as there had been no intent to illegally collect the specimen.

#### **5.4.2.3 Illegal Fossil Collecting Activities**

As the monetary value of fossils has soared during recent years, instances of illegal collecting from, and vandalism of, palaeontological sites situated on federal land have commensurately risen sharply (Shelton 1997). Furthermore, it was in 1995 estimated that the association between drugs offences and archaeological site/Native American grave violations in the US was running at some 40%, with some observers opining that had palaeontological thefts also been included, the figure would have been significantly higher (Kuncl 1995).

##### Nebraska

A 1991 study of the Oglala National Grassland in Nebraska found that 20% of the 11.4 square miles of fossiliferous bedrock surveyed showed signs of unauthorised fossil collecting. Furthermore, of the 39 sites designated as having special scientific importance (owing to the excellent preservation of fossils occurring thereon), 28% displayed evidence of collecting. The only permit to collect in these areas was held by the university researchers who undertook the survey (Shelton 1997).

##### Wyoming

Perhaps the true extent of fossil theft from US federal land is hinted at by the outcome of a multiple agency task force initiative called 'Operation Rockfish' in the state of Wyoming, where the Green River Formation draws international interest from scientists and commercial collectors alike because of its abundance of exceptionally well-preserved marine fauna. Eighteen months after its commencement in mid-1994, 29 felony arrests involving weapons and explosives violations, burglaries, grand larceny, and controlled substance violations had been made in connection with fossil thefts (Abel 1996). As part of the operation, undercover officers attended the 1995 Tucson fossil and mineral fair in Arizona where they claimed to have been offered over US\$1m worth of fossils which were suspected of having been illegally taken from federal land. In another part of the operation, 128 illegal diggings were found in a protected area where only ten digs had officially been sanctioned (Drake 1995). To date, several hundred suspects have been apprehended, though precise arrest figures are apparently unavailable because the various agencies involved have not co-ordinated the results of their endeavours (and see 5.4.2.1 above). The mentality of

some of the perpetrators involved is illustrated by the fact that Steve Rogers - a pilot and investigator for Wyoming's Lincoln County Sheriff's Department - has received death threats at his unlisted home telephone number, and on one occasion came home to discover his two house cats on his front porch with their necks broken (Wright 2000).

In one of the most recent court cases relating to theft of fish fossils from BLM land in south-west Wyoming, Lance and Belinda Peck were in 1999 found guilty of collecting vertebrate fossils without the requisite BLM permit. Having received a 'tip-off' in 1995, BLM law enforcement officers staged an all-night vigil at the end of which they apprehended the perpetrators and confiscated the 240 or so fish fossils which had been collected (Wertz 1999).

Many scientific excavations also fall victim to illegal collectors, with partially exposed specimens being hurriedly removed and/or vandalised whilst researchers are absent from the site. For example, in the early-1990s, a scientific dig in Wyoming by a Harvard University palaeontological research team was disrupted when the site was raided overnight, removing most of a dinosaur fossil which the team had uncovered (Shelton 1997).

#### Theft from Museums

Whilst not directly related with the regulation of palaeontological collecting on site, the latter-day attractiveness of fossils to US thieves is also evidenced by the fact that reported thefts of fossils from museum and other collections have also increased in recent years. For example, in 1996 thieves broke into the Cleveland Lloyd Dinosaur Quarry near Price, Utah, and stole dinosaur fossils worth an estimated US\$50,000 (Serfustini 1996). In the same year, a fossilised skull and limb from a 25m year-old rhinoceros valued at US\$20,000 went missing from an exhibit case at the University of Michigan's Exhibit Museum (Arbor 1996 and also see 8.1 below).

#### **5.4.3** Discussion

The regulatory and administrative framework currently prevailing in the US for the regulation of palaeontological resources on federal land is convoluted, cumbersome, and widely misunderstood. Palaeontological resources are protected by no one law, and as a result tend to fall into what is aptly described by Shelton (1997) as "a regulatory twilight zone", being regarded as neither mineralogical nor archaeological objects. Furthermore, the principal statute upon which regulation has more



traditionally been founded i.e. the *Antiquities Act* 1906 (see 5.4.1.1 above) lacks any semblance of a sound basis justifying its application to the protection of palaeontological resources.

Given the remote nature of much of the land itself, the inadequacies of the current system of regulation, and the escalating commercialisation of fossils, it is difficult to determine the true extent of unauthorised collecting and associated scientific loss which is occurring on US federal land at the present time.

#### **5.4.4 Previous Attempts at Unified Regulation**

Given the apparent inadequacies of the current regulatory framework, it is perhaps not surprising that a number of attempts have been made over recent years to establish a unified policy of palaeontological resource protection covering all US federal land. Whilst none of these attempts have to date either successfully culminated in the introduction of new US legislation or, for that matter, proved acceptable to all stakeholder groups concerned, they nonetheless merit detailed investigation here, since their introduction into the palaeontological arena has on each occasion precipitated a great deal of revealing and informative debate.

##### **5.4.4.1 *Palaeontological Resources Conservation Act* 1983**

In June 1983, the *Palaeontological Resources Conservation Act* (PRCA) was introduced into the US Senate. The PRCA was particularly notable in two respects. First, it provided for the regulation on federal land of vertebrate fossils only, and secondly, it included in its definition of federal land National Parks, National Wildlife Refuges, and Native Indian lands. Under the provisions of the PRCA, all vertebrate fossils collected under permit from federal land would remain the property of the US. When introducing the PRCA to the Senate, Senator Larry Pressler reaffirmed the views of many confused collectors who had for many years previously been seeking clarification regarding the legal requirements (or lack of them) for collecting on federal land, stating:

“It is a shame that during nearly a decade of personal and written contact with government officials, the (fossil) collectors have been unable to impress their concerns on these officials. The avenue of direct legislation appears to be the only viable means left for this large and unheard group”.

No hearings were held, and the bill died in committee (Zenker 1996).

#### 5.4.4.2 NAS Committee Group Report: *Palaeontological Collecting*

In 1984, and further to the PRCA (see 5.4.4.1 above) having died in committee, the National Academy for Sciences (NAS) - acting under its Congressional charter to advise Congress on scientific and technical matters - commissioned the Committee Group on Palaeontological Collecting (the Committee). The Committee was charged with the responsibility for developing a series of recommendations for the regulation of fossil collecting on federal land. The three year study which followed culminated in the production of a Report entitled *Palaeontological Collecting* (Raup *et al.* 1987) which arguably comprises the most exhaustive study of such issues to date; its validity supported by the fact that representatives from *all* stakeholder groups were involved in both data collation and the determination of conclusions (Zenker 1996).

In common with all other reports produced by committees of the National Research Council, the Report took the form of advice and guidance to the Federal Government regarding future policy formulation and modification of laws (Clemens 1988).

In addition to addressing a number of the more frequent misconceptions about fossils and their collection held both by the general public and federal agency land managers, the Report contained ten major recommendations, all of which had been unanimously adopted by Committee members.

##### Executive Summary

Prior to outlining the gist of the ten recommendations contained in the Report, it is both interesting and useful to first consider the Report's Executive Summary, as certain sections of text contained therein are particularly illuminating as regards the fundamental principles arrived at by the Committee. For example, the statement of principle adopted by the Committee as the basis for its recommendations reads:

"The science of palaeontology is best served by unimpeded access to fossil-bearing rocks in the field. In this report, 'access' is defined to include all collecting and removal of fossiliferous material for study and preservation. *From a scientific viewpoint, the role of the land manager should be to facilitate exploration for, and collection of, palaeontological materials.*" (emphasis added)

The final paragraph of the Executive Summary furthermore reads:

"By urging a simplification of routine regulatory procedures, the Committee hopes and expects that its recommendations will be an important step toward helping those charged with management of federal land. With the implementation of our recommendations, the land manager will be able to devote more time to *those*



*relatively few cases where regulation is both necessary and desirable. The science of palaeontology will be advanced by eliminating much of the unnecessary complexity of the present (and proposed) regulation of fossil collecting on federal land."* (emphasis added)

The meaning and intent of the above wording is abundantly clear, and requires no further clarification or explanation.

### Recommendations

The recommendations contained in the Report can be summarised as follows:

- 1) Federal and state Governments should adopt a single regulatory framework to apply equally to all types and modes of occurrence of fossils.
- 2) With the exception of National Parks and cases involving quarrying and commercial collecting, all federal land should be open to fossil collecting for scientific purposes, and furthermore that such collecting not be subject to permit requirements or other regulation.
- 3) 'Fossils of scientific significance' should be 'deposited in institutions where there are established research and educational programs in palaeontology'. Interestingly, the Committee argued against requirements that any such specimen be deposited in an institution situated in that state in which found (and see 7.3.6.2 below).
- 4) Commercial collecting should be allowed - albeit with scientific oversight - on federal land, subject to the adherence by such collectors to the requirements of an appropriate permit procedure.
- 5) Private landowners should be urged to only allow access for commercial collecting where thorough scientific oversight of such activities is assured.
- 6) Specific federal or state intervention as regards either the establishment of any palaeontological inventories, or the undertaking of any mitigation or salvage activities, should be avoided. Any federal land managers requiring scientific guidance should refer to the US Geological Survey or state subdivision thereof.
- 7) Nationally significant palaeontological sites should be designated and protected as National Natural Landmarks which are administered and managed by the National Park Service and are not kept under the same level of surveillance as are National Parks and Monuments (Clemens 1988).)
- 8) Palaeontological societies should be encouraged to formulate and instigate programs educating the public about the needs of palaeontological research.

## Subsequent Reaction to the Report

Further to the Committee having arrived at its recommendations, the majority of Committee members concurred that providing that the recommendations were followed, there would then be no need for further subsequent legislation. Committee members went home expecting to read new regulatory rules and regulations published in the Federal Register within a year (Zenker 1996). In fact, soon after reading the Committee's Report, the then Secretary of the Interior Donald Paul Hodel wrote to the Chair of the Senate Energy and Natural Resources Committee Senator J. Bennet Johnston saying:

"The Report (*Palaeontological Collecting*) has now been completed. We, therefore, plan to develop and publish new proposed rules, during fiscal year 1988, that will provide for the management and protection of palaeontological resources consistent with the (Committee's) recommendations" (Zenker 1996).

However, at the Society of Vertebrate Palaeontology's (SVP) 1986 annual meeting, the SVP's Government Liaison Committee responded negatively to much of the content of the Committee's final draft of the forthcoming Report (see Novacek 1987). The major points of contention can be summarised as follows:

- a) Although endorsing the goal of developing a uniform policy for the regulation of palaeontological fieldwork, the SVP Committee opposed the establishment of a uniform regulatory framework that applied equally to all types of fossils and modes of occurrence thereof. The rationale underlying this objection was that specimens and occurrences of unusual and rare vertebrate fossils required higher levels of protection than did specimens and occurrences of relatively abundant invertebrate and botanical fossils (Clemens 1988). This objection is not so surprising given that the *Antiquities Act* had historically only been used predominantly for the protection of vertebrate fossils (see 5.4.1.1 above).
- b) The SVP Committee was also vehemently opposed to federal land being open to commercial collecting, such activity being viewed as the pillaging of a resource owned by the many (the American people) for the benefit of the few (commercial collectors). This attitude had previously been emphatically and categorically expressed in a motion passed at the SVP's 1972 business meeting:

"The (SVP) goes on record as opposing the sale to the public of fossils of any sort and that this resolution should be sent to the Secretary of the Interior and the Secretary of Agriculture of the United States" (Clemens 1988). (Note: invertebrate palaeontologists have historically taken the opposite view (e.g. see Raup *et al.* 1987).)



- c) Lastly, the SVP Committee disagreed with the principle of non-interference or intervention by Federal or state Government as regards either the establishment of any palaeontological inventories, or the undertaking of any mitigation or salvage activities (Clemens 1988).

SVP Committee members accordingly began lobbying federal land managers and members of Congress against the implementation of any regulatory legislation based upon the recommendations contained in the NAS Committee Group's Report. A preliminary draft of proposed regulations based on the NAS Committee Group's recommendations was circulated within the Department of the Interior, but they were never published in the Federal Register for public comment. Instead, both NAS Committee Group members and other key figures within the palaeontological community were contacted and informed that agreement could not be reached as to how the proposed regulations should read, and that a new initiative to reach agreement would begin (Zenker 1996).

#### **5.4.4.3 'Negotiated Rule-Making Process'**

In 1989, the BLM and USFS initiated and funded the 'Negotiated Rule-Making Process' which brought together representatives from the BLM, USFS, US Geological Survey, State Geological Surveys, as well as from amateur, commercial, and academic palaeontological associations. Participants were charged with arriving at a consensus on guidelines for the drafting of regulations governing the collection of fossils from federal land, and were further informed that land management agencies would produce and implement new regulations upon the completion of the 'Process' (Zenker 1996). After over one year of negotiation, consensus was reached, and new guidelines were published and transmitted to the BLM and the USFS. However, these guidelines were never published in the Federal Register, sources within the BLM claiming that the Department of the Interior had intervened and stopped their publication (Willis 1996).

#### **5.4.4.4 *Vertebrate Palaeontological Resources Protection Act***

In July 1992, new legislation lobbied predominantly for by vertebrate palaeontologists was introduced into the US Senate by Senator Max Baucus from Montana. Whilst the legislation was titled the *Vertebrate Palaeontological Resources Protection Act* (VPRPA), it became later better known as the 'Baucus Bill'. The VPRPA sought to restrict the collection of vertebrate fossils on federal land by both amateur and commercial collectors.

## Provisions of the VPRPA

The major provisions of the VPRPA can be summarised as follows:

- 1) Amateur surface-collecting (removal without significant disturbance of the site) of fossils to be permissible by permit only, and only where the amateur collector is associated with a government institution or public or non-profit organisation. Any 'scientifically significant' fossils so collected to be turned over to the relevant land manager.
- 2) Any surface-collected fossils not deemed to be 'scientifically significant' may be retained by the amateur collector only for the purposes of his/her own personal collection, all such specimens nevertheless to remain held in trust on behalf of the US Government, and accordingly kept available to any interested parties for the purposes of scientific study. Any surface-collected fossils retained by amateur collectors not to be bartered or sold.
- 3) Amateur collectors not to conduct any excavations (activities involving digging, blasting or drilling) for fossils.
- 4) All commercial collecting on federal land to be permissible by permit only; and furthermore only where pursuant to a contract with a public institution.
- 5) The unauthorised excavation of fossils without a permit; the sale, purchase, exchange, transport, export, or receipt of a fossil excavated in violation of US law; wrongful trafficking under state or local law; and false labelling of any specimens excavated or removed from federal land, to be prohibited.
- 6) Strict penalties to be imposed for violations. First time offenders to face penalties of up to US\$10,000 (US\$20,000) and/or up to one (two) year(s) of imprisonment (where the value of the specimen including costs of recovery, repair etc. exceeds US\$500), with penalties of up to US\$100,000 and/or up to five years imprisonment for any subsequent violations.

Furthermore, the provisions of the VPRPA included an option whereby civil penalties could be imposed by federal land managers against violators, with the proviso that such a penalty could not exceed an amount double the cost of recovery, restoration, and repair of the specimen or site, or double the fair market value of any specimen destroyed or not recovered.

## Objections to the VPRPA

The VPRPA was immediately and vehemently opposed by the amateur and commercial collecting community, as well as more significantly by a sizeable



proportion of the academic community. The major objections to the provisions of the VPRPA can be summarised as follows:

- a) The prohibition of amateur ownership of non-scientifically significant fossils would likely result in amateur collectors either being discouraged from actively collecting fossils which would otherwise arguably be lost to erosion, or choosing simply not report their discoveries to the land manager at all. As a result, a far higher number of specimens would be left out in the field to erode and/or collectors might well choose not to report their finds. Either way, the VPRPA would effectively fail in its remit to preserve and document rare and scientifically valuable fossils. In any event, it would certainly prove excessively cumbersome to keep detailed records of all specimens held by private collectors (Sakurai 1994).
- b) Despite the fact both that land managers would have broad discretion, and that the regulatory intent of the VPRPA was to prosecute illegal traffickers and dealers, many stakeholders felt that the maximum penalty for a first offence was draconian and excessive.
- c) Commercial collectors contended that in substantially curtailing their activities, the VPRPA would result in a higher number of scientifically important specimens being destroyed by erosion; particularly since academic palaeontologists are relatively few in number, and spend relatively little of their time in institutions and not out collecting in the field. Commercial collectors furthermore contended that they have historically been responsible for the majority of major vertebrate fossil finds, a good number of which are today on display in museums throughout the US. However, this assertion is to some extent refuted by the results of a survey of 33 museums undertaken in 1991 by the Denver Museum of Natural History, which revealed that only 0.25% of their vertebrate fossils had actually been 'purchased' from commercial collectors (Stucky 1991). It should, however, be borne in mind that the vast majority of a typical museum collection comprises small and partial specimens (and see **2.8.1.2 Scientific Requirement for Specimens** above) of little or no commercial value. It accordingly remains likely that a large proportion of the quoted 0.25% would have constituted those large and showy specimens such as complete vertebrate skeletons and skulls which typically comprise the centrepieces of museums' public displays.
- d) The terminology 'scientifically significant' was adjudged by many observers as being too vague. The VPRPA merely required that any land manager consult with a vertebrate palaeontologist qualified to assess the resource, and did not define either the requirements to be met for a palaeontologist to be qualified, or the criteria to be used by a palaeontologist in establishing the scientific importance of a specimen (Sakurai 1994).

### In Defence of the VPRPA

Despite the above and arguably valid objections, it is only fair to point out that, had it been successfully implemented, the VPRPA would have nevertheless achieved certain arguably desirable goals. Permit procedures would have been standardised, thus eliminating some of the inconsistencies that had arisen as a result of the lack of statutory guidelines in the *Antiquities Act* (see 5.4.1.1 above). The VPRPA would furthermore have legitimised rights for amateurs to collect; greatly reduced the pecuniary gain of commercial collectors; and ensured that only the most competent and reputable of commercial collectors would have been permitted to collect in the first place, thus facilitating an increased likelihood that the maximum scientific data would be obtained with each specimen collected (Sakurai 1994).

### Outcome

In addition to conflicting with much of the timbre of the 1987 NAS Report *Palaeontological Collecting* (see 5.4.4.2 above), the VPRPA was, in the final analysis, considered by many to be severe, elitist, and anti-American (Abel 1996), and the massive protest which ensued ensured that no hearings were ever scheduled. The bill died in committee (Zenker 1996).

#### **5.4.4.5 *Palaeontological Resources Preservation Act***

Contemporaneous with the inception and drafting of the VPRPA (see 5.4.4.4 above), rumours connected with the aims and intent of the same, as well as the failure of the 'Negotiated Rule-Making Process' (see 5.4.4.3 above), had led to the amateur community taking an increasingly proactive stance as regards the protection of their perceived rights to collect. At the annual meeting of the American Federation of Mineralogical Suppliers held in Brunswick, Ohio in July 1992 (notably the same month in which the VPRPA was introduced into the US Senate), officers and members voted to establish the American Lands Access Association (ALAA).

The express purpose of the ALAA was and still is to promote and protect the right of the general public to utilise US public (and private) lands for educational and recreational purposes, including amateur fossil and mineral collecting, recreational prospecting, and mining. ALAA officers and members convey the concerns and interests of amateur fossil and mineral collectors to local, state, and federal elected officials, non-elected regulators, and appointed land management agency heads (Zenker 1996). Speaking in 1996, the ALAA's Secretary Bob Cranston said that the



ALAA “speaks for a lot of poor people with a four-wheel drive and a tank of gas” (Abel 1996).

The introduction of the VPRPA into the US Senate compelled alarmed ALAA Directors to look further afield for additional support. The ALAA proceeded to try and enlist the support of all recreational users of federal land, and by 1996 the ALAA’s supporters included the American Land Rights Association, the Eastern Oregon Mining Association, People for the West!, and the Grassroots Multiple Use Coalition. It was the contributions of these groups, as well as from commercial dealers, which helped send a lobbyist to Washington DC to co-author new draft legislation that would serve to protect the US public’s rights to access, and collect fossils from, federal land. This legislation, known as the *Palaeontological Resources Preservation Act* (PRPA), was written in consultation with commercial and academic palaeontologists, as well as with input from museum curators and directors (Abel 1996). The PRPA was furthermore notable in that it closely followed the recommendations contained in the 1987 NAS Report *Palaeontological Collecting* (Raup *et al.* 1987 and see 5.4.4.2 above).

The PRPA specifically defined ‘federal land’ for the purposes of the legislation as comprising those lands managed by the Bureau of Land Management, the US Forestry Service, the US Fish and Wildlife Service, the US Army Corps. of Engineers, and the Bureau of Reclamation (i.e. excluding land managed as National Parks and Monuments, Wilderness Areas, Areas of Critical Environmental Concern, all Indian Lands, and any land already under the protection of the *Archaeological Resources Protection Act* and the *Cave Resources Protection Act* (see 5.4.1 above)).

The PRPA would have not only allowed scientists to collect from federal land, but also amateur and commercial collectors, with permits not being required for ‘casual use collection’ (analogous to the term ‘surface collection’ as contained in the wording of the VPRPA (see 5.4.4.4 above)).

In 1993, the Honourable Tim Johnson (hence the PRPA’s more popular title of the ‘Johnson Bill’) and Joe Skeen agreed to act as prime sponsors for the introduction of the PRPA into the House of Representatives. Prime sponsors in the US Senate were also sought. Due to a number of rewrites of the original bill, as well as heavy lobbying against the bill by the Society of Vertebrate Palaeontology, introduction of the bill was subsequently delayed (but see 5.4.4.7 & 5.4.4.8 below).

#### **5.4.4.6 US Forest Service 'Proposed Rules'**

In 1994, the US Forest Service (USFS) published new 'proposed rules' in the Federal Register which would prohibit all collecting of fossils (along with many other natural resources) on USFS lands except with a special permit. Over 100,000 letters and faxes of protest quickly followed from both recreational and commercial users of USFS lands, and the new rules were withdrawn. Both the severe nature of the USFS 'proposed rules' and the following massive public protest against them helped persuade several members of Congress of the pressing need for specific legislation mandating how palaeontological resources should be managed on federal land.

#### **5.4.4.7 Fossil Protection Act 1996: The 'Johnson Bill' Resurrected**

In 1995, Senator Larry Craig considered prime sponsorship of the by now slightly revised 'Johnson Bill' or *Palaeontological Resources Preservation Act* (see 5.4.4.5 above), but the changed political complexion of the 104<sup>th</sup> Congress seated in January 1995 delayed the Regulatory Research Council's review of the revised PRPA.

In February 1996, the by now revised *Palaeontological Resources Preservation Act* (PRPA) - re-titled the *Fossil Preservation Act 1996* (FPA) (and also known as the American Lands Access Association Bill) - was finally introduced into the US House of Representatives by the Honourable Tim Johnson and Joe Skeen.

##### Principles and Provisions of the FPA

In common with its earlier incarnation as the PRPA, the FPA's fundamental underlying principle was that the science of palaeontology, as distinct from archaeology, is in fact most closely allied with geology and biology. As such, palaeontology would under the provisions of proper guidelines be best served by unimpeded access to fossils and fossil-bearing rocks in the field (thereby reducing the loss of fossils to erosion and theft) by research scientists, educators, amateur collectors, and commercial entities alike. On the other hand, the FPA also recognised that collecting would decrease the benefit derived from federal land by the people of the US if the collecting:

- 1) Separated scientifically unique fossils from their geological and palaeontological contexts.
- 2) Removed scientifically unique fossils from the realm of public education or scientific study.



- 3) Interfered with ongoing excavation by researchers engaged in permitted studies or excavations.

The FPA arguably comprises the most recent fully evolved US attempt to date to introduce a unified policy for palaeontological collecting on federal land. The major implications of the FPA pertaining to the collection and ownership of fossils can be summarised as follows:

- a) All federal land (the definition of which accords with that of the PRPA - see 5.4.4.5 above) to be open to 'reconnaissance' collecting (i.e. activities resulting in a surface disturbance of less than two metres - use of simple hand-tools permitted) by scientific, amateur, and commercial collectors without permit (subject to non-interference with ongoing research activities).
- b) All federal land to be open to the quarrying of fossils (i.e. collecting other than reconnaissance) for educational or scientific purposes, but only pursuant to the appropriate permit and advance notice.
- c) The Director of the US Geological Survey (USGS) to establish the National Fossil Council (NFC) comprising seven members comprising the Director of the USGS, one museum representative, two palaeontologists, one federal land manager representative, and two persons representing the amateur and commercial collecting communities respectively. The NFC's duties would include the determination of royalty fees payable by commercial collectors - see e) below.
- d) Any fossils collected as per a) and b) above which are subsequently deemed to be 'scientifically unique' in nature - as decided by the relevant federal land manager in consultation with the Chair of the NFC - to be placed in the custody of the Director of the USGS.
- e) All federal land to be open to the quarrying (i.e. collecting other than reconnaissance - see 1) above) of fossils for commercial purposes. Any fossils which are subsequently deemed to be 'scientifically unique' in nature - as decided by a majority vote of five of the seven members of the NFC - to remain the property of the US and be deposited in a suitable palaeontological institution. Commercial entities undertaking fossil quarrying activities to pay appropriate permit costs and royalties; to deposit all scientific evidence accompanying specimens recovered with the USGS; and to file reports with the permit granting agency describing all quarried materials.
- f) The Federal Land Manager to be empowered to assess a civil penalty (but no criminal penalties, and contrast with the VPRPA - see 5.4.4.4 Provisions of the VPRPA 6) above) of more than US\$1,000 but not more than US\$100,000 against any person who wilfully violates any provision of the FPA, the provisions of any

permit issued under the Act, or any rule or regulation promulgated by the Federal Land Manager pursuant to the Act. Violations to include the sale, purchase, exchange, transport, and receipt of wrongfully obtained fossils; the submission of false, inaccurate, or misleading information on permit applications; and failing to make or file any report required by the Act.

### Objections to the FPA

The introduction of the FPA was quickly followed by a great deal of frequently acrimonious debate, with the bulk of the objections emanating from the scientific community - as opposed to from the amateur and commercial collecting communities as had previously been the case following the introduction of the VPRPA (see 5.4.4.4 above) in 1992. These objections (with, where relevant, accompanying notes pointing out how the provisions of the FPA differ from those of the VPRPA) can be summarised as follows:

- i) Both *amateur and commercial* collectors would be allowed access to areas of federal land which had been previously off-limits i.e. that federal land managed by those federal agencies not permitting certain types of collecting, such as for example the USFS who do not allow commercial collecting on federal land falling under their jurisdiction.
- ii) No permits would be required by any collector group for 'reconnaissance' (i.e. surface) collecting. Objectors argued that this would result in countless scientifically important specimens being collected with no scientific oversight and/or procurement of accompanying scientific information (Flynn 1996, and contrast with the VPRPA which would have required permits for *all* surface collection of vertebrate fossils - see 5.4.4.4 above).
- iii) Both *amateur (surface-collecting) and commercial (surface-collecting and quarrying)* collectors would acquire ownership of all non-'scientifically unique' fossils collected, therefore resulting in a resource ostensibly owned by the whole of the American people only in fact giving benefit to a relatively small number of collectors (and contrast with the VPRPA under which *all vertebrate* fossils collected would either be owned by, or held in trust on behalf of, the US Federal Government - see 5.4.4.4 above). (Note that under the original incarnation of the FPA i.e. the PRPA (see 5.4.4.5 above), commercial collectors would have furthermore owned 'scientifically unique' (then termed 'scientifically significant') specimens, and would have merely been required to give a US public institution first refusal to purchase any such specimen collected at fair market value. Commercial collectors would furthermore not have been required to pay any



permit fees or royalties whatsoever in respect of any other specimens collected. It is not difficult to anticipate the degree of hostility with which these even more relaxed controls upon commercial collecting would have been met with from the academic palaeontological community if introduced.)

- iv) Quarrying for educational and scientific purposes would be subject to a permit system, thereby interfering with and hampering research activities. In simple terms, the scientific community did not take kindly to their research activities via quarrying being made subject to a permit procedure (albeit a different procedure) in common with commercial entities. The scientific community also argued that by making the quarrying of more common invertebrate fossils subject to a permit system, interested amateur and educational collectors would be discouraged from becoming involved in palaeontological fieldwork (Willis 1996).
- v) Under the original incarnation of the FPA i.e. the PRPA (see 5.4.4.5 above), the maximum penalty which could have been imposed was a maximum fine of only US\$2,000. Despite the fact that this had now under the provisions of the FPA been increased to US\$100,000, the academic community still opined that even a maximum financial penalty would not necessarily deter unscrupulous commercial collectors when individual vertebrate specimens occasionally commanded prices measured in hundreds of thousands, and even millions, of dollars (e.g. 'Sue' the T.Rex specimen which in 1997 sold for an unprecedented US\$8.36m - see 5.5.1.4 below). Dissenters furthermore opined that this situation would be further exacerbated by the fact that the FPA did not contain any provisions for criminal penalties i.e. imprisonment (and contrast with the VPRPA which, in addition to civil penalties, also imposed criminal penalties including up to five years of imprisonment - see 5.4.4.4 Provisions of the VPRPA 6) above).
- vi) The scientific community felt that the term 'scientifically unique' was poorly and inadequately defined in the provisions of the FPA (Willis 1996), and could accordingly be open to misinterpretation of a nature harmful to the furtherance of the science of palaeontology. (It is interesting to note, however, that the VPRPA's analogous terminology, 'scientifically significant', was equally poorly defined: the VPRPA also stipulated that any potentially 'scientifically significant' specimen need be referred to only one qualified palaeontologist for verification.)
- vii) The FPA made no financial provisions either to enable federal land management agencies to put in place the additional staff necessary to administer the provisions of the Act, nor to fund the setting up and running of the National Fossil Council (Flynn 1996).

Objections to the provisions of the FPA precipitated the formation of the group SAFE (Save America's Fossils for Everyone); an organisation founded - rather predictably - by the Society of Vertebrate Palaeontology . SAFE positions itself as an organisation dedicated to preserving America's fossils for the public domain and promoting the educational and intellectual enjoyment of fossils as a non-renewable resource.

#### Support for the FPA

Not surprisingly, many amateur and commercial collectors came out in support of the FPA citing that the long history of co-operation between themselves and the scientific community, and mutual benefits resulting therefrom, could only be enhanced by increased access to federal land for collecting purposes. Commercial collectors also supported the FPA on the basis that they often possess both greater financial resources and expertise as regards excavation and preparation of important specimens than do many museums, and should be accordingly afforded increased access to federal land for collecting purposes.

#### Outcome

There have subsequently been suggestions from some quarters that in initiating the processes which culminated in the introduction of the FPA, the ALAA succeeded in exacerbating what was an already existing dichotomy between amateur and scientific palaeontologists. Indeed, Bob Cranston, the then Secretary of the ALAA, lobbied all those hobbyists and amateur collectors who subscribed to Internet palaeontological discussion groups to write to their Senators and Congressmen in support of the FPA (Flynn 1996), and it is likely that a number of individuals were coerced into supporting the introduction of the FPA without necessarily understanding the full scope of its implications and likely effect in practice. In the final analysis, the FPA - like both the NAS Committee Group Report (see 5.4.4.2 above) and PRPA (see 5.4.4.5 above) before it - proved wholly unacceptable to the scientific community, and the bill accordingly died in committee.

#### **5.4.4.8 Discussion**

The introduction of both the *Vertebrate Palaeontological Resources Protection Act* (VPRPA) (see 5.4.4.4 above) and the *Fossil Protection Act* (FPA) (see 5.4.4.7 above) arguably comprised in some ways commendable attempts to implement a much-needed unified regulatory policy for the protection of palaeontological resources on US federal land. However, the former was perhaps too biased towards the



requirements and wishes of the scientific community, with the latter leaning rather too heavily towards the interests of commercial and amateur collector groups. As a result, both bills were somewhat ill-conceived in that each was heavily biased towards the requirements of one stakeholder group, but with minimal regard to the interests of the other stakeholder groups involved. Although many of the provisions of the FPA paralleled the principles and recommendations of the three year NAS Report *Palaeontological Collecting* (see 5.4.4.2 above), it is arguable that the spiralling fossil prices seen throughout the early-1990s might by 1995/6 have led the NAS Committee to draw rather different conclusions from those it arrived at some ten years earlier.

In view of the failure of the FPA and the VPRPA to progress even through the committee stage, there now exists, perhaps unsurprisingly, a pervasive sentiment amongst much of the palaeontological community that such failure was largely due to the fact that the issues raised in the bills were poorly understood by, and were of little interest to, the US government (Willis 1996).

It should be said, however, that the introduction of the VPRPA and the FPA did, if nothing else, at least provide the impetus for increased dialogue between various stakeholder groups as regards the many issues connected with the collection and ownership of fossils. The hostility with which the VPRPA and the US Forestry Service' proposed rules' (see 5.4.4.6 above) met certainly shows that issues pertaining to public access to federal land are especially emotive in the US.

As regards more recent developments, the Department of the Interior (DOI) on 25<sup>th</sup> October 1999 released a draft version of its congressionally mandated report entitled 'Assessment of Fossil Management on Federal and Indian Lands'. Eight federal agencies - the Bureau of Indian Affairs, the Bureau of Land Management, the Bureau of Reclamation, the US Fish and Wildlife Service, the US Forest Service, the National Park Service, the Smithsonian Institution, and the US Geological Survey - assisted in the development of the report. The report uses seven "basic principles" as the basis for recommendations regarding the development of future legislation governing the treatment of fossils on federal land. These basic principles are as follows:

- Fossils on federal land are a part of America's heritage.
- Most vertebrate fossils are rare.
- Some invertebrate and plant fossils are rare.
- Penalties for fossil theft should be strengthened.
- Effective stewardship requires accurate information.

- Federal fossil collections should be preserved and available for research and public education.
- Federal fossil management should emphasise opportunities for public involvement.

It is asserted by some observers that the DOI actually produced the draft report further to the inclusion of an obscure paragraph in a 1999 DOI fiscal appropriations bill pressing for the preparation of such a report in order to push the Clinton administration to address the need for a national policy for fossils on federal land. One of the two Senators who pressed for the inclusion of the aforementioned paragraph was Tim Johnson (D-SD), the same Senator whose previous attempt at introducing such a unified policy - the FPA (see 5.4.4.7 above) - had been rebuffed by the Clinton administration (Hill 1999).

Some seven months after the release of the draft report, DOI Secretary Bruce Babbitt on 15<sup>th</sup> May 2000 released the official congressionally mandated report on federal fossil policy. The final report is broadly similar to the previously released draft report, maintaining the same basic principles as outlined above. In a press statement accompanying the release of the final report Secretary Babbitt stated:

"For the first time our federal land management agencies have come forward together with recommendations to stop deterioration and loss of fossils and promote science and education. Too often, America's fossil treasure chests have been robbed, damaged or neglected because there was no consistent guidance or support for resource managers on the ground."

According to the release, Babbitt asks Congress in a letter accompanying the report:

"To consider the merits of action on a framework for fossils analogous to the *Archaeological Resources Protection Act*" (see 5.4.1 above and 9 below).

Secretary Babbitt's letter also stated that Congress should consider:

"The need for stiffer penalties for those who damage and steal certain fossils and more resources to enforce the law; the need to move forward with cost-effective new technologies for research and conservation; the need for regional studies and partnerships with amateurs and the academic community; and the need to do a better job at inventory and monitoring of fossil resources."

Despite the appearance of the new report, many members of the scientific community nevertheless remain sceptical as to whether such a proposed unified framework of regulation will ever come to pass, since each of the federal agencies have their own specific agendas and sets of already long-established rules (Herbel 1999). Whatever does or does not transpire further to the release of the report, there is clearly a need



to both increase public awareness of the need to properly use and conserve US fossil resources, and facilitate further and properly informed debate between all stakeholder groups (including the public) prior to the introduction of any new unified regulatory policy for the protection of palaeontological resources on US federal land. Whether or not such enhanced electoral awareness and necessary discourse can be successfully and equitably undertaken, and also whether or not the Federal Government can in the final analysis be convinced that the protection of palaeontological resources is of sufficient importance to merit the time-consuming enactment of legislation, as yet remains to be seen.

## **5.5 SOUTH DAKOTA**

Set against the backdrop of the lack of a unified policy of palaeontological resource regulation for US federal land, the US state of South Dakota in January 1996 chose to enact its own legislation regulating palaeontological activities on *school and public land* (as opposed to federal land). It is certain that such action was mainly precipitated by the notorious case of 'Sue' the T.Rex.

### **5.5.1 'Sue' The T.Rex**

There is no single fossil specimen in the sphere of modern palaeontological history which has so dramatically brought into the focus of mainstream public life many of the more emotive philosophical and ethical issues connected with palaeontological collecting than 'Sue' the T.Rex.

Almost certainly the best known fossil specimen in the world, 'Sue' comprises a 90% complete *Tyrannosaurus rex* specimen (believed to have been a female) which was found near Faith, South Dakota on 12<sup>th</sup> August 1990. At the time of finding, only ten other specimens were known, none of which were as large or complete as 'Sue'. The specimen measures some 41 ft in length, and is estimated to have weighed between six and eight tonnes when alive between 65 and 68m years ago. The T.Rex is arguably the most enigmatic of dinosaurs, and 'Sue' remains without doubt the finest specimen unearthed to date.

'Sue' was found by, and named after, her finder Sue Hendrickson, an associate of the Black Hills Institute of Geological Research (BHI). The BHI is based in Hill City, South Dakota and comprises a large private commercial concern which finds, excavates, prepares, and commercially deals in fossils.

The land upon which 'Sue' was discovered was owned by Maurice Williams, a member of the Cheyenne River Sioux, his ranch being located within the tribe's Reservation borders. At the time of discovery, Williams' land was being held in trust by the federal government.

The BHI alleges that Williams sold them all rights to the fossil for the sum of US\$5,000. However, in the absence of any proper paperwork, Williams subsequently claimed that he had made no such sale to BHI, and had instead accepted the US\$5,000 in return for access and reconnaissance purposes only (and see 5.5.1.2 below).

#### **5.5.1.1 FBI Seizure of 'Sue'**

As word of the discovery of 'Sue' spread locally and then nationally, a ground-swell of opinion emerged reaffirming and reinforcing the view that it was ethically unsatisfactory for private individuals to profit from the commercial exploitation of national cultural treasures ostensibly belonging to the American people. In view of the fact that Williams' land had at the time of discovery been held in trust by the federal government, the US Attorney in South Dakota accordingly took the opportunity to charge that 'Sue' had been illegally collected from land under federal administration.

On the 14<sup>th</sup> May 1992, 39 armed FBI agents and National Guard troops raided BHI's premises and seized possession of 'Sue' as well as other fossils and various paperwork (Tayman 1997). On the assumption that they were the owners of the specimen, the BHI had by this time invested approximately US\$212,000 in the excavation, protection, transport, and preparation of 'Sue'. Once fully prepared and mounted, BHI still hold that it was their intention to house 'Sue' in their own museum where the specimen would remain on permanent public display, and be available for scientific study.

#### **5.5.1.2 Ownership of 'Sue'**

In 1993, the BHI and the Black Hills Museum Foundation (an affiliated non-profit organisation) sued the US Department of Justice for possession of 'Sue'. They lost, and the decision by the US Courts of Appeal Eighth Circuit that the sale of 'Sue' to the BHI had been illegal was subsequently upheld by the US Supreme Court in October 1994.

In essence, the Courts decided that since there was no applicable federal definition of land, 'Sue' should be treated the same as 'land' under South Dakota law. Under



his trust agreement with the US, Maurice Williams had been required to seek the approval of the Secretary of the Interior prior to selling any of his land. Since Williams had not sought and obtained any such permission, the sale of 'Sue' to the BHI was declared null and void. Maurice Williams was accordingly deemed to be the sole owner of the specimen.

### **5.5.1.3 Court Action Against the BHI**

In 1993, a grand jury indicted five officers and associates of the BHI on 39 charges mostly related to trafficking in fossils illegally excavated from federal land. An additional number of federal indictments were also issued relating to charges of illegal currency transactions, fraud, money-laundering, illegal international commerce, and other felonies. The case commenced in February 1994.

In early-1995, a three week trial was held in City, South Dakota where on 17<sup>th</sup> March 1995, and after much legal manoeuvring, the jury either acquitted or failed to reach a verdict on all but 8 of the total of 149 felony charges which had been brought against the accused. On 25<sup>th</sup> April 1995, Judge Battey denied a motion to acquit the 68 undecided charges, and three days later seven members of the jury held a press conference expressing concern that Judge Battey was in fact heavily biased towards the prosecution (Willis 1996).

The case subsequently drew towards a conclusion of sorts when, on 31<sup>st</sup> January 1996, Judge Battey sentenced Peter Larson of the BHI to two years imprisonment for two felonies relating to unreported movements of currency into and out of the US (US\$31,700 in travellers cheques from Japan, and US\$15,000 cash into Peru). Larson was also convicted of two minor misdemeanours for illegally taking a fossil worth less than US\$100 from federal land and illegally retaining another small fossil.

It is notable that the prosecution, who had obviously been seeking to make an example of the BHI by way of a warning to all commercial collectors and dealers that illegal collecting from US federal land would not be tolerated, failed to achieve any conviction pertaining to the actual collection of 'Sue' the T.Rex. Such a failure further highlights the various problems associated with the current US system of regulating palaeontological collecting on federal land (see 5.4.2 above).

Although the prosecution did, however, manage to convict Larson of unrelated currency movements, the BHI's defence pointed out afterwards that awarding Larson a two year sentence for such offences sent a rather strange message to the

American people, given that a South Dakota man had contemporaneously received merely a probationary sentence for killing his wife in a drunken rage. Larson himself subsequently commented with some bemusement that he would have faced a longer prison sentence than the 258 years handed down to the serial killer Jeffrey Dahmer had he been successfully convicted of all main felony charges (Browne 1996).

The case was estimated in 1996 to have cost the US taxpayer US\$5-7m, and the BHI are known to have spent over US\$1m on their defence.

#### **5.5.1.4 Auction**

Having been deemed the sole owner of 'Sue', Maurice Williams applied for permission to publicly auction the fossil from the US Secretary of the Interior (see 5.5.1.2 above). Under the *Indian Reorganisation Act*, the Secretary can only reject a sale if not in the best interests of the owner, and there is no mechanism for denying a sale based on scientific necessity or public benefit. Permission was accordingly granted.

On 4<sup>th</sup> October 1997, 300 onlookers at Sotheby's auction house in New York witnessed a tense nine minutes during which the bidding for 'Sue' proceeded from US\$500,000 past the pre-auction estimate of US\$1m with the gavel finally coming down at US\$8.36m. 'Sue' was acquired by the Chicago Field Museum, the purchase funds having been provided by a group of contributing sponsors including McDonald's Corporation, Ronald McDonald's House Charities, Walt Disney World Resort, the California State University System, and several private individuals. Once preparation has been completed in mid-to-late-2000, 'Sue' will be placed on permanent public display at the Chicago Field Museum. Also in 2000, McDonald's will tour two life-size 'casts' of 'Sue' throughout the US and the rest of the world. A life-size replica of 'Sue' will also be showcased at the forthcoming Dinoland USA - a new attraction which will open in several years at Disney's Animal Kingdom at the Walt Disney World Resort in Florida. Whilst many scientists might frown on such 'glamorising' of important specimens, it is also conversely arguable that the association of fossils with the media and show-business comprises one of the better available avenues by which to secure the popularisation, enhanced funding, and survival of palaeontology in the modern world.



### **5.5.1.5 Issues Raised by the Sale of 'Sue'**

The sale of a T.Rex specimen for such a colossal and unprecedented sum of money served to further fuel an already alarmed and turbid state of affairs in the palaeontological community as regards the spiralling market prices commanded by certain fossils. J. Keith Rigby Jr., a palaeontologist at the University of Notre Dame in Montana, stated afterwards that "This sale may be the single most damaging action in the history of vertebrate palaeontology." (Monastersky 1997). The major concerns of the scientific community as regards the potentially damaging implications for palaeontology arising as a consequence of the sale of 'Sue' can be summarised as follows:

- 1) An increased likelihood that private landowners will give preference to money-paying commercial collectors and dealers over scientific researchers when granting permission for access and collection rights.
- 2) A greater probability that avaricious private landowners will themselves embark upon, at best, scientifically unsound, and at worst, destructive attempts at collection in the hope of realising a quick profit from the sale of any material collected.
- 3) A commensurate increase in unauthorised collecting activities on US federal land - not only by commercial collectors and dealers, but also by other more criminally-minded individuals newly realising that fossils can be worth serious money.
- 4) Serious reservations as to whether or not museums should even attend such sales, let alone bid for specimens, since such behaviour can be ostensibly construed as a scientific endorsement of the commercial market for fossils (and see Appendix I).

(Another more recent example of an extremely rare and scientifically important fossil being controversially sold by auction to a private bidder is the 200m year-old 175mm-long flying lizard *Icarosaurus siefkeri* sold on 28<sup>th</sup> August 2000 by US auction house Butterfield & Butterfield for US\$168,000. The earliest yet known flying vertebrate specimen had for over 30 years been in the care of the American Museum of Natural History, when its original finder and owner Alfred Siefker decided to sell the fossil to raise some cash to pay for his healthcare. The sale was described by vertebrate palaeontologist Mark Goodwin of the Museum of Paleontology in Berkeley as a "highly unethical event that will only increase commercialisation and encourage the theft of fossils from museums" (Anon. 2000a and see 5.4.2.3 Theft from Museums above).)

#### **5.5.1.6 Discussion**

The sale of 'Sue' for over eight million dollars set a worrying precedent in the eyes of the scientific community. The emerging predominance of the commercial market for palaeontological specimens seems to some extent to actually disenfranchise science itself. This in turn leads to a deepening of the already previously existing dichotomy between scientists and commercial collectors/dealers.

The broad extent of the legal action taken against the BHI, and the severity of the sentence handed down to Peter Larson, also provide strong evidence that the Federal Government considers itself to be under significant pressure to restrict the activities of commercial collectors and dealers. This is perhaps not so surprising given that vertebrate specimens in particular have in recent years commanded prices frequently measured in tens and hundreds of thousands of dollars on the commercial market.

The failure of the prosecution to secure any conviction in respect of any aspect of the collecting of 'Sue' serves to both furthermore underscore the inadequacy and vagueness of the current legal and administrative system of regulating palaeontological resources on US federal land, as well as to highlight the increasingly pressing need for the revision of the same. At the same time, the increased friction between scientists and commercial collectors/dealers unfortunately, and somewhat paradoxically, makes a consensus between all stakeholder groups - an essential preliminary stage in the development of a new uniform policy of regulation - even more difficult to reach.

The saga of 'Sue' also highlights the importance of ascertaining precisely who owns a fossil specimen prior to its collection (and see 5.4.2.2 above).

Finally, it is perhaps ironic that 'Sue' might well have never been sold by public auction, if sold at all, had the Federal Government not instigated the whole series of events which ultimately led to the sale by instructing the FBI to dispossess the BHI of the specimen in 1992.

#### **5.5.2 South Dakota Act**

In January 1996, and largely in response to the 'Sue' case (see 5.5.1 above), the state of South Dakota 71<sup>st</sup> Regulatory Assembly 1996 passed legislation regulating palaeontological collecting on the 807,000 acres of school and public lands throughout the state. It should be noted that the *South Dakota Act* relates solely to



state land as opposed to federal land under the administration of the federal agencies. The new measures were passed with a 35 - 0 vote in favour.

The salient provisions the of the Act can be summarised as follows:

- 1) All exploration for, and excavation of, palaeontological resources on school and public lands only permissible by permit from the Commissioner for school and public lands (the Commissioner).
- 2) The Commissioner shall promulgate rules governing the issuance of permits, including minimum permittee qualifications, permit duration, co-ordination with lessee/s for entry, the retrieval of maximum scientific, palaeontological, and educational information (as well as the specimens themselves), and proof of consultation with a qualified palaeontologist regarding the curation of any specimens collected. Exploratory and excavation permits to cost no more than US\$25 and US\$250 respectively.
- 3) No person to remove from the state any specimens collected from school and public lands without the permission of the Commissioner further to consultations with lessees and other agencies as applicable.
- 4) Any 'scientifically significant' palaeontological collections comprise the property of the state, with the repository or curation of such collections to be designated by the Commissioner in consultation with a qualified palaeontologist.
- 5) Any person discovering 'scientifically significant' palaeontological resources to report the find to the Commissioner.
- 6) Any person violating either the Act or the associated rules promulgated by the Commissioner shall be guilty of a Class 1 misdemeanour, and in addition, shall forfeit to the state any interest in any specimens collected.

The efficacy and enforceability of these recently introduced controls has yet to be tested, and only time and practical experience will tell whether or not the measures will prove any more successful in controlling collecting activities than similar federally enforced initiatives. Whatever the outcome, one US-wide overriding co-ordinated system of regulation still ultimately remains a far more desirable goal than additional ad hoc state-by-state or agency-by-agency initiatives.

## 6 REGULATION OF PALAEOLOGICAL RESOURCES IN AUSTRALIA

### 6.1 INTRODUCTION

Australia comprises a vast continent with a commensurate wealth of internationally significant palaeontological sites. Its population is relatively small when compared to its huge geographical area, and much of its virtually uninhabited inland area is arid in nature. This same aridity has resulted in the large-scale erosion of much of the Australian interior, with such forces having revealed extensive palaeontological resources.

Whilst Australia *has* introduced national legislation specifically controlling the export and import of fossils and minerals, it *has not* yet chosen to enact national legislation regulating the collection of such specimens. Palaeontological site protection *per se* is alternatively provided for upon a state-by-state basis, with those states who have not thus far chosen to introduce specific state-wide legislation to control collecting activities relying instead upon a series of site-specific management measures.

This Chapter first examines current Australian legislation regulating the export and import of palaeontological (and mineralogical) specimens, before moving on to discuss those regulatory measures which have been introduced in an attempt to control collecting activities. The Chapter then concludes with a review to date as to the degree to which current Australian regulatory management measures appear to be succeeding in practice as regards protecting Australia's palaeontological heritage.

### 6.2 EXPORT AND IMPORT

Whilst Australia has no legislation specifically controlling either the collection or ownership of palaeontological and mineralogical specimens, it has, however, chosen to enact legislation controlling the export (and import) of the same on the basis that such specimens comprise an important part of Australia's cultural heritage.

#### 6.2.1 Commonwealth Protection of Movable Cultural Heritage Act 1986

Australia ratified the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (see 4.5.2 above) by passing the *Commonwealth Protection of Movable Cultural Heritage Act* (PMCHA) that became effective on 1<sup>st</sup> July 1987. The PMCHA regulates the export of the most significant aspects of Australia's movable cultural heritage, as well as providing for the return of that cultural property illegally imported into Australia



from elsewhere. Whilst the legislation is chiefly concerned with the protection of Aboriginal and Torres Strait Islander cultural heritage, it also provides a degree of protection for Australian natural science objects.

The PMCHA is not intended to restrict normal and legitimate trade in cultural property, and does not affect an individual's rights to own or sell such items in Australia. Penalties for breaches of the Act include fines of up to AUS\$100,000 and/or imprisonment of up to five years and/or forfeiture of protected objects. The Act creates both a National Cultural Heritage Control List (the Control List - see 6.2.1.1 below) and the National Cultural Heritage Committee (NCHC). The latter is composed of four representatives from different collecting institutions, a member of the Australia vice-chancellor's Committee, a nominee of the Minister for Aboriginal Affairs, and four other members with experience relevant to the cultural heritage of Australia. The NCHC provides the government with advice and recommendations on cultural heritage protection and the suitability or otherwise of any object for export.

#### **6.2.1.1 Control List**

The Control List is published in the regulations of the PMCHA and specifies those objects for which permission to export must be sought, as well as those objects which can never be exported. Different classes of object are defined using different significance criteria including thresholds of time and monetary value. The Control List is divided into two broad classes.

Class A consists of Aboriginal and Torres Strait Islander cultural heritage objects which cannot be exported.

Class B objects comprise natural science objects of Australian origin - including all palaeontological specimens, as well as meteorites and mineralogical specimens having an open market value in excess of AUS\$10,000 - that are of exceptional cultural significance to Australia, and which accordingly require permission to be exported (Creaser 1994). The Control List is extensive and covers a large and diverse range of objects including archaeological items, objects of applied science and technology, military objects, decorative art, fine art, books, records, documents, graphics, philatelic objects, and objects of social history (Stevens 1995).

#### **6.2.1.2 Permission to Export and Import**

If an object is covered or is likely to be covered by a Class B category on the Control List (see 6.2.1.1 above), then permission must be sought before it can be exported

out of, or in some cases temporarily imported back into, Australia. Permits and certificates for these situations are approved or refused by the Minister for Communications and the Arts or his delegate.

#### Permit to Export a Class B Cultural Heritage Object

An object covered by one of the Class B categories on the Control List requires a permit to allow its permanent or temporary export from Australia.

#### Certificate of Exemption from Export Control

Class B objects already outside Australia also require a certificate of exemption to be temporarily brought back into Australia.

#### Class B General Export Permit

Commonwealth or state public collecting institutions can apply for general permission to temporarily export any Class B item within their own collections.

### **6.2.1.3 Determining an Object's Significance**

An export permit will normally be refused where the loss of a specimen would "significantly diminish the cultural heritage of Australia". Expert examiners (including palaeontologists) assess the significance of objects against a number of criteria, and provide the NCHC (see 6.2.1 above) with recommendations as regards whether or not a permit should be granted.

### **6.2.1.4 Some Recent Statistics**

In the eight years from 1<sup>st</sup> July 1987 (the date upon which the PMCHA became effective), permits were only refused for nine items, none of which comprised palaeontological or other geological objects. In the same period the NCHC granted 230 permits for permanent export, 74 permits for temporary export, and 17 certificates of exemption (Brosnan 1996).

Despite the diversity of items included on the Control List (see 6.2.1.1 above), it is noteworthy that 54% of submissions for permits in 1994-5 were for palaeontological items. Despite this figure being down eight percent from the previous year, the sheer number of palaeontological applications is still considered by some officials to be unacceptably excessive, with the vast majority of palaeontological specimens submitted for export being of little or no scientific or cultural value (Stevens 1995).



### **6.2.1.5 Review of the Control List**

In early-1995, a group of consultants were commissioned by the NCHC to examine the efficacy and suitability of the Control List. One of the major conclusions reached in the Policies Update report which followed (Marshall *et al.* 1995) was that the PMCHA is not sufficiently clear as regards the level of significance of objects that should be subject to export controls. The report suggests three possible models for changing the relevant wording of the Act accordingly i.e. a descriptive model, a significance model, and a 'hybrid' model combining elements of the two.

#### **Treatment of Fossils**

Marshall *et al.* (1995) also made a number of specific recommendations pertaining to the treatment of fossils which included that:

- 1) Further consideration should be given to the reinstatement of the original AUS\$1000 limit on fossils (removed in 1993 further to the Vaughan trial - see 6.4.1.3 below) to remove the need for export permits for more abundant fossil types (and see 6.2.1.4 above).
- 2) Measures should be taken to ensure the adequate representation of fossils in public collections by species, anatomical/botanical component, provenance and condition as a filter for assessment.
- 3) Allowance should be made for the specific protection of outstanding examples of each species, perhaps by words such as 'adequate representation in public collections of specimens of at least equal quality'.
- 4) Certification should be given by a relevant state institution as to the adequacy of representation in the public collections as part of the application documentation.
- 5) Consideration should be given to linking export approval to state certification of the legitimacy under state law of the collection of the object, or alternatively objects from protected fossil sites should be listed as Class A (see 6.2.1.1 above).
- 6) Opalised fossils should, in addition to being assessed under any other relevant category (e.g. as minerals or jewellery), be considered as comprising palaeontological specimens *per se* for the purposes of the PMCHA.

#### **Additional Suggested Changes**

Whilst most observers consider the above-mentioned recommendations to be useful and constructive, Willis (1996) suggests that two further changes to the PMCHA merit additional consideration, these being that:

- a) Measures should be taken to stop permits being swapped between specimens, as one possible technique with which to illegitimately gain an export permit for an important specimen is simply to submit a common fossil of similar size and weight when making the application. Upon being subsequently granted, the permit is then used instead for the important specimen. Currently the only check against this is the requirement of a photograph to be submitted with each and every export permit request. It is, however, a simple matter to change the photographs after the permit has been issued. One possible way around this would be to stamp or emboss across the photograph and permit upon their having been affixed together. A system of random checks by qualified palaeontologists of known fossil exports could also be introduced.
- b) The fact that ignorance of the Act currently constitutes a legitimate defence against prosecution is unsatisfactory and ought to be addressed. (Willis 1996).

#### Problems with Public Ignorance and Funding

The 1995 review also gave detailed consideration to two other problems previously identified in the Report on the Ministerial Review of the PMCHA and Regulations prepared by John F. Ley in July 1991; namely the wider public ignorance of the existence and operation of the Act, and also the lack of funding to facilitate the acquisition of objects - i.e. those refused export permits - by public collecting institutions for public display in Australia. As regards the former, awareness campaigns were subsequently developed which have since been implemented to better inform the public, customs officials, and industry about the existence and operation of the Act. Regarding the latter, funds have still not to date been provided by the Government to assist an owner to achieve a 'fair' viz. a viz. international market price for an object thereby ensuring that important items of national heritage - which are barred from export - are readily available to the Australian public via display in a public collection. As a result, public collections continue to be deprived of a number of important fossils, and there is little in the way of financial inducement for an owner of a scientifically important and commercially valuable fossil to comply with the Act.

#### **6.2.1.6 Holding Periods**

Recent legal interpretation has also confirmed the Minister's power to grant an export permit subject to specific conditions which establish a 'holding period' during which the object must be offered for sale to public collecting institutions. This type of



provision has been widely sought in order to better balance the national interest with the financial interests of those owners seeking to sell important specimens.

#### **6.2.1.7 Discussion**

The inclusion of palaeontological and other geological specimens on the Control List of the PMCHA ostensibly constitutes a theoretically sound means of policing the export of this important part of Australia's natural cultural heritage. Whilst the fact that no permits for the export of fossils were refused between 1985-95 suggests that little or no attempt was made during that period to export important specimens, other evidence (e.g. the Vaughan case - see 6.4.1 below) would suggest otherwise. Although the Act in general, and the scope and application of the Control List in particular, are subject to a process of ongoing review and refinement, perhaps one of the major problems associated with, as opposed to directly attributable to, the provisions of the Act itself remains the failure of the Australian Government to provide monies for a public acquisitions fund. Whilst the recent introduction of holding periods at least allows public institutions more time to try to raise funds for purchase purposes, it remains that in the absence of central Government funding there is little real incentive for collectors and owners of important specimens - wishing to sell such specimens at international open market prices - to comply with the provisions of the Act.

In the final analysis, the Australian PMCHA system of control appears to at least successfully regulate *legitimate* export (and import) activities (as evidenced by the copious paperwork which accompanies all Australian material imported into the UK (Marshall, pers. comm. 1999)). The major challenge still facing the Australian Government is the effective control of illicitly exported material. It is frequently these specimens which are of significant cultural and scientific interest and rarity, since it is the high prices commanded by such objects which provides the incentive to risk breaking the law in the first place.

### **6.3 COLLECTING ACTIVITIES**

Since Australia has no national legislation specifically preventing interference with, or removal of, geological and geomorphological formations or features, the protection of palaeontological sites accordingly occurs at a number of different levels. Internationally significant sites are in some cases afforded protection largely by default under the auspices of having gained World Heritage status, although in other

cases internationally important sites are afforded little or no protection whatsoever (Swart 1994).

Australian geological sites adjudged to be of national as opposed to international importance may be protected by the Australian Heritage Commission through inclusion on the Register of the National Estate (RNE). The RNE lists those items and areas deemed worthy of protection for the benefit of future generations. By 1996 more than 240 'geological monuments' nationally had been nominated for inclusion, and subsequently listed, on the RNE. The Geological Society of Australia continues today to be, as it has been since 1974, the recognised expert body involved with the nomination of RNE sites in most of the mainland states (Dixon 1996).

The Australian Government is responsible for ensuring that listed sites are not adversely affected by any form of harmful development activity. However, since each individual state Government takes precedence over the Australian Government in jurisdictional terms, any state Government wishing to permit mining or other potentially damaging activities on RNE sites may proceed as it sees fit. Neither does the Australian Heritage Commission have any power over either local government or landowners; nor does the inclusion of a site on the RNE restrict or limit public access. Moreover, since the enabling legislation contains no provisions pertaining to financial penalties or custodial sentences, it in reality provides no more than a degree of moral protection to RNE sites (Swart 1994).

In addition to reservation around cave entrances and karst features, significant geological features may be afforded a degree of protection by way of being declared National Parks and/or National Fossil Reserves (e.g. see 6.3.2.1 below), with geological collecting accordingly being restricted or prohibited.

Since the majority of Australian geoheritage protection measures are undertaken by each state on an individual basis, the remainder of this Chapter examines a variety of mechanisms introduced in an effort to control collecting activities in the states of Queensland, South Australia, and Victoria. These three states were selected for discussion on the basis that they are fully representative of the variety of approaches currently practised in Australia, which range from what effectively amounts to state-ownership of geological specimens (Queensland), through less extensive and more site-specific resource protection by way of state Heritage Listing as National Parks and designation as Reserves (Queensland and South Australia), to no specific state regulatory geoheritage protection measures whatsoever (Victoria).



### 6.3.1 Queensland

Queensland has recently introduced extensive legislation effectively controlling the collection of geological specimens by declaring all such specimens as comprising the property of the state, with permissible items only legitimately being collectible under licence.

Palaeontological sites throughout the state are also afforded specific protection with larger scale geological and geographical features being preserved as National Parks. Smaller scale features can also be preserved as Educational Reserves (much like LNRs in England and Scotland - see 4.6.1.1 above). The responsibility for site protection in Queensland also often resides at a local level with initiatives typically being managed by local groups and landowners.

#### 6.3.1.1 *Queensland Fossicking Act 1994*

The *Queensland Fossicking Act 1994* (QFA) came into force on 1<sup>st</sup> February 1995 to simplify tourist and recreational fossicking in that state. For the purposes of the QFA, fossicking means to search for and collect minerals, rocks and invertebrate fossils from the ground's surface. The Act replaces the *Mining (Fossicking) Act 1985* (Qld) which applied only to certain declared areas. Whilst only the salient and more pertinent effects of the QFA are discussed here, a comprehensive summary of the scope and applications of the Act can be found in an article by Neville (1995).

#### Effect

The most significant effect of the QFA is that all fossils, minerals, gems, and rocks comprise and remain the property of the state until collected by an authorised licensee. Vertebrate fossils, meteorites, and tektites (which do not fall into the category of permitted fossickable items for the purposes of the Act) can only be collected with written permission from the relevant government authority on state land or the consent of the landowner on private land, with such specimens furthermore remaining the property of the state once collected.

The term fossicking extends only to recreational, tourist, and educational purposes and does not extend to commercial activities. Fossickers must not dig deeper than to a depth of two metres on land or half a metre in a watercourse, no digging is permitted in road reserves, and only hand tools - i.e. no mechanical aids - may be used for digging. Whilst fossicking is permitted on unoccupied land, there are exceptions such as National Parks (although the *Nature Conservation Act 1992*

contains provisions for “consideration of geological aspects in future National Parks” which could reasonably include fossicking) and lands under Native Title.

Under the provisions of the QFA, a fossicker must be in possession of a current fossicker’s licence which may be obtained from the Department of Mines and Energy and Mining Registrars at Regional Offices. The Act does not apply to collecting by, or on behalf of, recognised scientific institutions. Group fossicking licences (such as those granted to rock clubs and school groups) allow for not more than 50 persons to fossick at any one time at the same place.

The QFA is enforced by way of inspection by authorised officers who have certain powers to restrict or discontinue fossicking activities, issue on-the-spot fines, cancel licences, and instigate further legal proceedings as and if appropriate in respect of breaches of the Act.

### Discussion

The fact that the QFA controls - and therefore effectively restricts - the amount of relatively abundant invertebrate fossils collected could arguably in reality result in the loss of many specimens to erosion. Furthermore, the Act could serve to discourage many of those members of the public possessing some embryonic interest in palaeontology being discouraged from collecting because of the fossicking license requirement. Moreover, any intended advantage inherent in the fact that Act distinguishes between vertebrate and invertebrate fossils is more than likely compromised, given that the majority of predominantly amateur licensees may well be unable to differentiate between the two categories of fossil (Willis 1996).

#### **6.3.1.2 Riversleigh Fossil Area within Lawn Hill National Park**

Riversleigh Fossil Area comprises 77,000 hectares of the 262,000 hectare Lawn Hill National Park located in north-west Queensland; the Fossil Area comprising not only the largest expanse of limestone-associated fossil fauna in the state of Queensland (DEH 1994), but one of the most important tertiary fossil mammal sites in the world.

The Riversleigh Fossil Area was added to Lawn Hill National Park on 3<sup>rd</sup> July 1992 and was therefore not included in the original management plan for the Park. Furthermore, in 1994, the Riversleigh Fossil Area acquired World Heritage Listing solely for its palaeontological values. It therefore transpired that the provisions of the original Park management plan accounted neither for the Riversleigh Fossil Area’s unique fossil heritage or its World Heritage Listing (Dixon 1996). By way of



addressing this undesirable scenario, a new draft management plan was produced by the Queensland Dept. of Environment and Heritage and the Queensland National Parks and Wildlife Service in 1994. The primary obligation under the provisions of the plan was to ensure that Lawn Hill National Park is managed in accordance with the principles set out in Section 17 of the *Nature Conservation Act 1992 (Qld)*. The plan was also drafted to meet with the management requirements for a World Heritage Site.

The new draft management plan only makes passing comment as regards vandalism and opportunistic pilfering of fossils, and no consideration whatsoever is given over to the organised theft of fossils (Dixon 1996). Paradoxically, whilst many of the sites' remoteness offers them their best defence from unwanted interference, the same remoteness also renders any illegal collecting activities extremely difficult to detect. It is also possible that increased tourist interest and associated visits might well serve to bring otherwise generally unknown sites to the attentions of unscrupulous collectors. It is therefore arguable that the only truly effective deterrent measure would be the full-time on-site presence of two or more rangers: a likely unacceptably expensive solution in the eyes of most government administrators. The new draft management plan has not yet been proceeded with, largely because of its inherent inadequacies to effectively manage the Riversleigh fossil area as a palaeontological site of World Heritage significance (Dixon 1996).

That the Riversleigh fossil site desperately requires more proactive management - including at least one permanent Queensland Parks and Wildlife Service ranger - was unfortunately highlighted recently when a 25m year-old crocodile skull was smashed and a 150kg block of rock containing numerous bones was stolen from the site. Perhaps even more regrettably, a recently built site-interpretation building was recently vandalised because no member of staff was present to look after it. Certain Australian scientists are even considering suspending their fieldtrips to Riversleigh until such problems are resolved and their research can proceed unhindered by acts of site vandalism (Woodford 2000).

### **6.3.1.3 Chinchilla**

The Chinchilla deposit is located on the eastern Darling Downs in southern Queensland, and comprises a Pliocene system of channels and erosion gullies containing an abundance of vertebrate fossils. The locality is relatively remote, is well hidden, and can only be located with prior knowledge. The site remains under continuous investigation by a local married couple (the Wilkinsons) on behalf of the

Queensland Museum. (Site management often resides at a local level in Queensland, with an additional example being the Lark Quarry Environmental Park - containing a large slab pitted with hundreds of dinosaur footprints - which has been placed under the trusteeship of the local Winton Shire Council in association with the Queensland Museum (QTTC 1994 and also see 6.3.2.3 below).)

In recent years whilst the Wilkinsons have been away touring in the summer, lapidary clubs have frequently entered and destroyed sections of the site. Collecting methods have, on occasion, included 'attacking' the site with a mechanical plough. Such crude collecting techniques have invariably resulted in more fossil vertebrate specimens being destroyed than successfully retrieved. Moreover, fragments of bones strewn around the diggings indicated that many specimens had likely been complete prior to excavation. These likely unauthorised and unlicensed collectors have consistently targeted every separate site under investigation by the Wilkinsons. On the one occasion when the Wilkinsons actually encountered and challenged a group of such collectors, they refused to identify themselves (Willis 1996).

The Wilkinsons continue to search for solutions to their problems. It has been suggested that appropriate signage and/or a network of informed and 'snoopy' locals may assist in deterring such activities. The land is owned by the local shire, and cannot be readily fenced off as it is also frequently used by other groups for fishing and camping etc. (in common with much US federal land - see 5.4.2.2 above). One possible solution may be to invite clubs along on official digs as volunteers: in this manner they can be better educated as to both the importance of the resource and correct excavation techniques. Less important specimens could moreover be retained by club members for their own collections to provide an additional degree of motivation to become involved with such a voluntary scheme in the first place (Dixon 1996).

#### **6.3.1.4 Educational Reserves**

Land subdivisions in Queensland require that certain areas of land be allocated for public use. It was some years ago proposed that such areas could, where appropriate, be designated as Scientific or Educational Reserves, and this mechanism was in fact used as a means of affording some albeit limited degree of protection to a Tertiary fossil site in 1993 (Joyce 1994).



### **6.3.2 South Australia**

South Australia has three declared Fossil Reserves at Ediacara (21 sq. km; Precambrian soft-bodied fauna), Lake Callabona (448 sq. km; Pleistocene vertebrates), and Lake Palankarina (31 sq. km; Tertiary mammals). The three Fossil Reserves are administered by the South Australian Museum Board who are afforded jurisdiction under the *Crown Lands Act* to regulate collection of specimens and access to the sites yielding them. Unauthorised collection of palaeontological specimens within the Reserves is therefore prohibited. All three Reserves are situated in extremely remote areas, and whilst this is their best defence against the casual uninformed recreational collector, such remote locations offer little or no protection against more determined and unscrupulous commercial collectors.

Other geological sites in Southern Australia regarded as being of state importance are accordingly state Heritage Listed (see 6.3.2.2 below) and are typically managed by the South Australia National Park & Wildlife Service as Conservation Parks, or as part of larger National Parks or National Reserves. Swart (1994) is critical of the capacity of the South Australia National Park & Wildlife Service to effectively manage and protect geological sites, arguing that it lacks a strong understanding of the geoheritage management issues involved in such site management.

Other smaller sites are often best managed on a local basis (Swart 1994) with their protection being undertaken by concerned local groups and landowners (and see 6.3.1.3 above & 6.3.2.3 below).

#### **6.3.2.1 Ediacara Fossil Reserve**

Without doubt one of the best known palaeontological sites in the world, Ediacara was declared a fossil reserve in 1958. It is arguable that rather than serving to protect the site against irresponsible collecting, the declaration instead served to draw still further unwanted attention to the site (Dixon 1996). Whatever one's views, it remains a fact that tonnes of material have been illegally removed from the site, much of it now doubtless residing in overseas collections (and see 6.4.1.1 below). It is accordingly arguable that the site has been depleted to the point where it has now sadly lost much of its research importance (McBrior and Hassenor 1994). As with many other famous Australian (and US - see 5.4.2.2 above) fossil localities, it is Ediacara's remoteness that makes the effective control of collecting activities almost impossible to achieve. Whilst collecting is only allowed at the site with permission, there is no real way of monitoring visitors or their activities. Even in the event of an

observed occurrence of unauthorised collecting, the nearest police station is situated at Leigh Creek some 42km away.

#### **6.3.2.2 *Heritage Act 1993***

South Australia's *Heritage Act 1993* superseded the previous 1978 version of the Act, and applies to all lands including those privately owned. The principal aim of the *Heritage Act* is to prevent the destruction and impairment of heritage character. Whilst *a priori* concerned with the built environment, the Act also provides for a degree of protection to Earth heritage sites. Those sites selected for protection under the provisions of the Act are listed on a site register which includes several sites of geoheritage significance. It is left up to individuals and organisations to notify the state Heritage Authority of a site's existence and significance, and in not relying upon any form of systematic survey, site selection is, at best, somewhat ad hoc. Sites are then listed if considered to be of appropriate merit, and whilst owners are given an opportunity to object, any such objections are usually over-ridden (Dixon 1996). All palaeontological sites listed up until 1996 were previously identified by, and have been derived from, the Geological Society of Australia's geological monument inventories (see Dixon 1996). South Australia's three Fossil Reserves (see 6.3.2 above), as well as several geological sites within other Reserves (see Swart 1994), are also state Heritage Listed in an attempt to afford them additional protection.

#### **6.3.2.3 Local Initiatives**

Swart (1994) notes that some of the most successful site protection measures are voluntary (as opposed to regulatory) in nature and comprise schemes operating at the local community level (and see 3.3.4.4 above). By way of example, Horse Gully comprises a small privately owned area of land situated on the Yorke Peninsula. The owner of the site is both interested in, and committed to, its protection, and with the help of appropriate expert advice has instigated a permit system. Permission does not constitute an entitlement to collect: any specific collection requests made must be supported with good reason and/or backing from a recognised research institution. Any persons entering the site without permission are asked to leave.

It must be emphasised, however, that such local management initiatives, whilst undoubtedly laudable, could not realistically be expected to operate successfully if applied to large sites in remote locations (Dixon 1996). It is also arguably less than desirable that palaeontological site conservation be left to the whims of local landowners who may or may not be interested in such matters.



### **6.3.3 Victoria**

Victoria has no legislation designed specifically to protect geological features either on private or public land; this being in marked contrast to the situation for archaeological and historic features. The only statutory conservation measure available to planning authorities is that of planning control.

Moreover, Victoria's land management agency, the Department of Conservation and Natural Resources, employs no earth science specialists (a dubious distinction which it regrettably shares with many other Australian land management agencies).

Any geological features requiring specific protection measures are identified by the Department only by reference to literature or outside specialists, with such research and any resultant conservation policy inevitably being rather ad hoc and uncoordinated as a result (Dixon 1996).

## **6.4 EFFICACY OR OTHERWISE OF CURRENT REGULATORY MANAGEMENT MEASURES**

Despite the existence of the various regulatory (and a small number of local voluntary) measures outlined in 6.2 and 6.3 above, recent evidence indicates that many important Australian palaeontological specimens continue to be illegally collected and exported. As recently as March 1999, an extremely rare 570m year-old (and possibly new species of) jellyfish fossil (discovered in October of the previous year) was reported stolen from a site in the Flinders Ranges of the Southern Australian outback (Flannigan 1999).

The one major Australian case pertaining to the theft and illegal export of fossils to have occurred during the 1990s, as well as several other recent and notable examples of illegal collecting and/or export of geological specimens in Australia, are discussed in detail below. Such incidents inevitably give rise to a number of questions as regards the enforceability and practicability of those current regulatory management measures aimed at ensuring the best use and conservation of Australia's fossil resources.

### **6.4.1 Vaughan Case**

The Vaughan case involves a number of separate incidents of illegal collection and export of protected fossils. The events giving rise to the case occurred in 1991, and the case is still not yet finally resolved. Nevertheless, the case is particularly important

and accordingly worthy of detailed discussion here in that it is the first and so far the only case tried under the *Protection of Moveable Cultural Heritage Act* (see 6.2.1 above).

#### **6.4.1.1 Localities and Thefts**

The case involves the theft of a variety of specimens from three protected sites in South Australia.

##### Kangaroo Island

The Big Gully site, which has been known since the 1950s, is located on the northern coast of Kangaroo Island which is itself situated some 100km south-west of Adelaide. The site consists of Cambrian Emu Bay Shale which outcrops both on a wave-cut platform, and in the faulting of the steep cliffs which comprise the perimeter of the small embayment site. The site yields spectacular trilobite fossils which are well preserved as a pinkish-red calcite on a dark grey matrix. Individual trilobites can approach 30cm in length, and accordingly make impressive and sought-after display pieces.

The site is also the only exposure of the Burgess Shale formation in the Southern hemisphere, and yields fossil fauna including three possibly distinct species of *Anomolacaris* sp. in addition to other weird and as yet undescribed material. The first *Anomolacaris* sp. specimens were actually discovered in the spoil piles left by Vaughan and his accomplices at the site in January 1991: rumours from the Japan Fossil and Mineral Fair of May 1991 also suggesting that Vaughan had at the same time collected some other highly unusual and exciting material, all of which is now lost to science (McHenry 1998).

It is believed that Vaughan (a known West Australian fossil and mineral dealer) and his accomplices (two South Australians and one German) spent approximately two weeks camped at the Big Gully site, during which time they used crowbars to remove a large chunk of wave-cut platform the size of a small car, which they then proceeded to split on the beach. They also used explosives which they had illegally brought onto the island to blast a similar sized block of rock out of the cliff which was also cleaved into slabs on the foreshore.



## Ediacara Fossil Reserve and Flinders Ranges National Park

Vaughan and his associates also took time in early-1991 to illegally collect protected Ediacaran fossils from both the Ediacara Fossil Reserve (see 6.3.2.1 above) and the Flinders Ranges National Park. Ediacaran fossils are of particular scientific importance since they evidence the first appearance of complex life forms on Earth above the cyanobacteria level. The activities of Vaughan *et al.* became apparent in April 1991 when two Australian palaeontologists from the South Australia Museum visited a particular locality in the Flinders Ranges National Park. They arrived to discover to their horror that what is arguably the finest Ediacaran sea-pen fossil specimen (consisting of several good individual impressions) in the world had been removed. This fossil, discovered in 1973, is figured in palaeontological literature and was also at the time of its theft registered as part of the South Australian Museum's collections (McHenry 1998). The red quartzite slab measuring approximately one metre square and 30cm deep had somewhat amazingly been removed from a steep incline some 200m high. The specimen was tentatively estimated at the time to be worth up to AUS\$600,000 (Southward 1991).

The Australian National Parks and Federal Arts Department were duly notified of the theft of the slab, and the international geological community were alerted as to the theft via advertisements placed in a number of palaeontological and geological journals. Further to the subsequent involvement of the Australian Federal Police, Vaughan was identified as the chief suspect. A customs alert was accordingly put in place whereby the police would be notified should Vaughan attempt to either leave, or export any items out of, Australia.

### **6.4.1.2 Apprehension of Vaughan and Confiscation of Fossils**

In November 1991, Vaughan was apprehended by police at Perth Airport whilst attempting to leave Australia for Japan. A search of Vaughan's hand luggage at the airport resulted in the seizure of two opalised fossil crinoid specimens from Coober Pedy in South Australia (at the time estimated to be worth some AUS\$20-25,000 each), as well as several acid-prepared Devonian fossil fish nodules from Go-Go Station, Kimberley, Western Australia. Vaughan was also attempting to illegally export two 44-gallon drums containing some 300 additional unprepared fish nodules. Acid preparation of fish nodules from Go-Go Station reveals perfectly preserved three dimensional head shields etc., the nodules accordingly being both of great scientific interest and commercial value.

A subsequent police raid on Vaughan's home yielded hundreds of Kangaroo Island trilobites (see 6.4.1.1 Kangaroo Island above) and Go-Go Station fish nodules, as well as a number of Ediacaran specimens, all of which were seized under a search warrant (Southward 1991). Several homes in both South and Western Australia belonging to a number of Vaughan's known associates were also searched under a total of 13 search warrants as part of the investigation. In addition to yet more protected fossils, the Australian Federal Police also discovered and confiscated documentation implying that other fossils, including a Tasmanian Tiger (*Thylacinus cynocephalus*) and an opalised ichthyosaur, might have already been illegally exported from Australia (Willis 1996 and see 6.4.3.2 & 6.4.3.3 below).

The police believed that all of the seized fossils were destined to be sold on the international market since there is virtually no domestic Australian market whatsoever for such rare and commercially valuable fossils (Southward 1991).

#### **6.4.1.3 Vaughan on Trial**

Vaughan *et al* were subsequently charged under the *Commonwealth Protection of Movable Cultural Heritage Act 1986* (PMCHA) (see 6.2.1 above). Unfortunately, in its original wording, the provisions of the PMCHA only applied to Australian fossils having a commercial market (Australian) value of AUS\$1,000 or more. This enabled Vaughan to evade prosecution for collecting and possessing those specimens seized having a value of less than AUS\$1,000. Vaughan furthermore argued that it was difficult to establish any meaningful or significant Australian market value for specimens given that virtually no domestic market exists for fossils illegally collected from protected areas. Many of the seized fossils did not, therefore, at the time of confiscation, fall under the auspices of the PMCHA. The Act was subsequently amended to protect "any fossil of scientific importance" (McHenry 1999 but see also 6.2.1.5 1) above).

Owing to the fact that this was the first case ever to be brought under the PMCHA, proceedings became somewhat protracted as the prosecution carefully attempted to put together a 'watertight' case to secure a successful outcome which would effectively set the precedent for any similar cases in the future. The case finally went to court in 1997, with Vaughan himself being charged with four separate breaches under the Act relating to the theft of Cretaceous opalised crinoids from South Australia, Devonian fish nodules from Western Australia, Cambrian trilobites from Kangaroo Island, and Ediacaran specimens from various localities in South Australia.



Upon being found guilty of the first breach relating to the theft of the opalised crinoids, Vaughan subsequently plea-bargained with respect to the other three charges, then later also pleading guilty to a second charge (relating to the theft of the Ediacaran material) in exchange for the then remaining two charges being dropped. Vaughan became the first individual charged under the auspices of the PMCHA, and was given a suspended custodial sentence of three years and fined AUS\$35,000 (Sexton 2000). (The other two Australian perpetrators involved received fines of AUS\$10,000 and AUS\$1,000 (Reynolds 1999).) Vaughan subsequently, and somewhat stealthily, appealed the second plea-bargained conviction charge (relating to the theft of the Ediacaran material), whilst the prosecution simultaneously appealed the leniency of the punishment. Vaughan's appeal was successfully upheld on the grounds that the judge had misdirected the jury.

Although the case is scheduled to appear in court once again in the near future, the Vaughan case has now lasted virtually a decade and cost almost AUS\$1m to prosecute. It is, therefore, hardly surprising to discover that the Dept. of Public Prosecutions was in 1999 rumoured to be reluctant to proceed much further (McHenry 1999).

The Ediacaran quartzite slab with sea-pen impressions was eventually returned to the South Australian Government on 25<sup>th</sup> August 2000 after having been traced (with the full co-operation of the Japanese Government) to a museum near Tokyo (Anon. 2000b).

Whilst the prosecution intend to apply to have the Kangaroo Island material returned by Vaughan, Vaughan himself is set to contest such a case arguing that even if the material had been illegally collected (which he denies), the statute of limitations for these infractions has now passed, and he cannot therefore legitimately be tried (McHenry 1998).

Whatever the eventual outcome should matters proceed further, Vaughan has in theory already forfeited those specimens involved in the charges to which he has already pleaded guilty. He will, however, probably be able to keep the Kangaroo Island material as he had not attempted to export it, the majority of the unprepared specimens falling below the AUS\$1,000 threshold (later removed in 1993 partly in response to this case, but see 6.2.1.5 1) above) as provided for in the original wording of the PMCHA.

No additional charges in respect of illegal use of explosives and/or 'mining' in a coastal reserve etc. could be brought against Vaughan *et al* since over six months (exceeding the statute of limitations) had elapsed between the theft and seizure of the specimens (McHenry 1998).

## **6.4.2 Other Recent Instances of the Illegal Export and Collecting of Fossils**

In addition to the Vaughan case (see 6.4.1 above), several other illustrious occurrences of the illegal collecting and exporting of fossils and other geological specimens have also been reported and documented in recent years.

### **6.4.2.1 Stegosaurus Footprints**

In 1996, a unique set of 120m year-old Stegosaur footprints (and three 7,000 year-old human footprints) were illegally removed from two sacred Aboriginal sites (i.e. protected under Aboriginal sacred sites legislation, but not otherwise protected as a National Park, Reserve etc.) located near Broome on the northwest coast of Western Australia. Aborigines believe that the Stegosaur footprints belong to the 'giant Emu-man' from their 'dreamtime', the theft accordingly enraging local aborigines and scientists alike (Anon. 1999a). Power tools had been used to remove the four Stegosaur footprints which were believed to be the only set of their kind in the world.

Western Australian state Premier Richard Court offered local police all government resources to assist in the investigation of the theft and, in November 1998, a footprint believed to be one of the stolen Stegosaur footprints was recovered by Broome police, further to which two men were charged with its theft (and also the theft of the human footprints). One of the two men is also charged with cultivating cannabis (and see 5.1 & 5.4.2.3 above as regards the connection between drug offences and fossil thefts in the US) and wilfully starting a bush fire. Each of the three toes of the recovered footprint measures 15cm in length, the 30kg slab of rock containing the print measuring 60 x 40 x 13cm deep. Australian palaeontologists later established in early 1999 that the recovered footprint did not in fact comprise one of the stolen Stegosaur footprints, but was instead a footprint belonging to the sauropod *Megalosaurupus broomensis* (Long 1999).

(On a more general note, all fossils found on public land in Western Australia belong to the Crown under the provisions of the *Crown Land Act*. There is no specific legislation providing protection for fossils found on private land.)



#### **6.4.2.2 Haag's Meteorite**

Haag's meteorite was discovered in 1990 by a collector operating at a locality near Calcalong Creek, northeast of Perth in Western Australia. Researchers at the University of Arizona subsequently concluded in 1991 that the 19gm meteorite comprised a fragment of the moon; one of only a dozen or so found on Earth, and notably the first to have been found outside Antarctica. By mid-1992, the meteorite was in the US in the hands of a private meteorite collector and dealer called Robert Haag, who later claimed that he had purchased the specimen from an Australian collector. Since all meteorites found in Western Australia automatically comprise Crown property, and as such can only be exported with the appropriate permit, the major controversy surrounding Haag's meteorite centred upon the fact no such permit had in fact been issued.

Haag later openly advertised the specimen in his sale catalogue. In response to pleas from scientists from the Western Australia Museum for him to return the specimen to Australia, Haag later somewhat insensitively commented on Australian television that "If the Museum thinks that the rock came from there, why don't they go out and find one themselves" (Dayton 1992). At approximately the same time, a yearlong investigation by the Australian Police into the possible theft and illegal export of a number of Australian meteorites was being concluded. When questioned over the Haag's meteorite affair, Officer Gary Noble commented " It is very disappointing. We can't prove that Haag's meteorite landed in Australia and we can't prove when it was exported, so there is insufficient evidence to prosecute" (Dayton 1992). Neither Haag's meteorite nor any part thereof has yet been returned to Australia, and the present whereabouts thereof remains unknown.

#### **6.4.2.3 Stromatolite Fossils**

In 1999, Australian scientist Dr. Kath Grey of Macquarie University in New South Wales discovered a series of *Stromatolite* sp. fossils - estimated to be some 3.46bn years old - in the Pinbarra region of Western Australia. When Dr. Grey returned shortly thereafter with an assembled international team of palaeontological experts keen to inspect the truly ancient fossils, she was disappointed to discover that some of her find was already missing. A value of some AUS\$40,000 was placed upon what remained of the specimens, with the scientists involved having accordingly now carefully removed the originals and replaced them with imitations (Reynolds 1999 and also see 2.6.1.4 above).

#### **6.4.2.4 Extinct Giant Elephant Bird Egg**

Though not exactly constituting a theft *per se*, a series of events in the early-1990s surrounding the discovery of a fossilised egg attracted an equal degree of interest and concern amongst both the Australian and international palaeontological communities. In 1993, a group of children playing in some sand dunes in Western Australia discovered a fossilised egg some 79cm in circumference. The egg had been laid many thousands of years ago by a Giant Elephant Bird in Madagascar, and had somewhat amazingly floated across thousands of miles of ocean before finally arriving and subsequently fossilising in Western Australia.

Having been found on public land, the scientifically significant specimen theoretically belonged as of right to the state Government of Western Australia. A finders fee of AUS\$17,000 was offered to the childrens' family by the state Government, but before the Government could take possession of the fossil the 'children' reburied the egg where it had been discovered. Only when the Government had been persuaded to up their 'offer' to a rather more substantial AUS\$109,000 did the 'children' finally hand over the egg. This incident is particularly disturbing in that the Government was effectively held to ransom by what ostensibly appeared to be a group of children, in addition to which the fossil could have been lost when reburied (Sakurai 1994).

#### **6.4.3 Discussion**

As stated previously, Australia is of particular interest for the purposes of this thesis as it has both nationally and on a state-by-state basis enacted a wide variety of regulatory measures in an attempt to control the illegal import, export, and collection of palaeontological heritage items. Despite having implemented such measures, Australia nevertheless continues to lose important fossils through the illegal activities of a number of unscrupulous and irresponsible commercial collectors and dealers.

##### **6.4.3.1 Non-Commercial Collectors**

Australia does not appear to experience significant problems in the form of indiscriminate collecting by amateur/recreational collectors, except perhaps as a result of the activities of the occasional and determined lapidary club (e.g. see 6.3.1.3 above). Indeed, the activities of responsible amateur collectors can provide a valuable service to palaeontology and geology and should, if anything, be encouraged (Willis 1996 and see 2.7.3 above). This is perhaps largely due to the fact that Australia - in stark contrast to the UK - comprises a huge geographical area



accommodating only a relatively small population, the vast majority of which inhabits the continent's coastal fringe. Most of Australia's palaeontological sites are accordingly extremely remote and commensurately difficult and expensive to reach, with the usual motivation for non-scientific collecting trips to such localities therefore more typically being financial gain.

#### **6.4.3.2 Control of the Illegal Export and Collecting of Fossils**

Examination of the Vaughan case reveals that it is relatively easy to illegally collect and accumulate an extensive hoard of protected fossils from Australia's typically remote sites without detection. Perhaps it is therefore this particular case which accordingly serves to provide the definitive example of why Australia has, in general, chosen to focus its regulatory legislature upon strictly controlling the export of fossils. In this way it can at least endeavour to ensure that specimens remain in Australia, even if it has yet to arrive at a practicable way of restricting collecting activities.

Aesthetically appealing and visually dramatic Australian palaeontological and mineralogical specimens are highly sought-after by collectors all over the world, and accordingly command high prices on the international commercial market. Such qualities are exemplified by opalised vertebrate remains from Coober Pedy: in the mid-1990s, rumours circulating on the Lightning Ridge opal-fields suggested that a skeleton preserved in black opal had in 1995 been 'spirited' out of Australia for a seven figure sum. Subsequent research into this matter was hampered by the secrecy and lack of co-operation that typifies the majority of the mining community (Willis 1998 and see 6.4.3.3 below). Not only aesthetically appealing, many Australian specimens are also highly unusual and/or rare, and are accordingly also of high commercial value owing to their scientific significance and rarity. It is therefore likely to continue to be the case that, in common with drugs, strict export and import restrictions may perhaps never be truly effective in controlling the loss of such specimens out of Australia in the absence of the channelling of substantial financial resources into enforcement. Given the prevailing circumstances and available evidence, one is left to wonder as to the true extent of scientifically important and even unique palaeontological material which is illegally collected and exported from Australia without detection. Is the Vaughan case along with the other known instances of illicit activities merely the 'tip of the iceberg'?

### 6.4.3.3 Alternative Strategies for Site Protection

Whilst a policy of secrecy as regards site localities can doubtless assist in protecting fossil resources, it must be borne in mind that many commercial (and amateur) collectors themselves often possess considerable expertise and/or are highly resourceful in obtaining information as regards site locations etc. (and see 2.7.1/2 above).

As an additional if somewhat drastic protective measure, small integrity sites can be scientifically excavated and emptied of their resource, thus saving at least the specimens if not the site itself (e.g. see 6.4.2.3 above). This measure is, however, hardly practicable in the majority of Australia's often spatially extensive sites. In 1997, the University of New South Wales (UNSW) took this principle one step further by leasing an existing opal mine at Lightning Ridge which is now dug specifically for opalised fossils. The *Protection of Movable Cultural Heritage Act* (see 6.2.1 above) illegalises the export of opalised fossils without the appropriate permit, and it is extremely unlikely that an export permit would ever be granted in respect of an opalised vertebrate skeleton. Moreover, any officially reported discovery of an opalised vertebrate specimen would result in the temporary (and expensive) halting of mining activities for scientific investigative purposes. It is therefore suspected that the invariably secretive miners usually either cut up the typically partial skeleton for rough opal and say nothing, or if discovering a truly exceptional and complete specimen likely endeavour to quickly (and illegally) export such a commercially valuable specimen out Australia (and see 6.4.3.2 above). The majority of specimens discovered by miners are in most cases invariably damaged in the process of being found. The UNSW team are now at the stage where the commercial rough opal from the mine almost pays for the costs of the operation (Willis 1998). Whilst doubtless enterprising and innovative, this protective management strategy obviously has very limited applications in the wider international palaeontological arena.

One is accordingly left with two remaining alternatives: the policing of sites so as to secure more effective regulation of collecting activities and/or the introduction of voluntary management measures aimed at increasing public awareness of the value of geoheritage resources and the need for their conservation. Site policing would invariably prove prohibitively expensive if applied to remote Australian localities. Increasing public awareness and encouraging voluntary local management initiatives can provide a degree of protection against unauthorised collecting, but this measure requires the on or near site presence of a local population, which is the exception



rather than the norm in Australia's often arid and inhospitable interior. Given the difficulties of enforcing collecting restrictions, the best approach would appear to be that already seemingly favoured by Australian legislators, namely the strict control of exports (and imports) to at least strive to ensure that important Australian specimens actually remain in Australia, even where illicitly collected (and see 3.4.4.4 above). Given the high commercial value of many Australian specimens on the international commercial market allied with the vast funding required for truly effective enforcement, this is in itself no easy task.

## **7 REGULATION OF PALAEOLOGICAL RESOURCES IN THE CANADIAN PROVINCE OF ALBERTA**

### **7.1 INTRODUCTION**

With the exception of National Parks, First Nation Lands, and Military Reserves (managed under the *National Parks Act* and the *Historic Sites and Monuments Act*), the Canadian provinces have no federal legislation pertaining to the regulation of the collecting and ownership of palaeontological and geological specimens; the responsibility for the same being undertaken by each province on an individual basis.

Regulation at the provincial level varies widely, ranging from Quebec which has no specific legislation to Alberta which has the most extensive and rigorous legislation (Sakurai 1994). Other provincial approaches fall somewhere between with, for example, New Brunswick's *Ecological Reserves Act* providing for the preservation of all rare and unique 'geological phenomena'; Nova Scotia's *Special Places Protection Act* and British Columbia's *Heritage Conservation Act* referring specifically to palaeontological sites and specimens; and Saskatchewan's *Historic Resources Act* being yet narrower in scope, referring only to 'vertebrate palaeontological objects' (Dixon 1996).

Of all the Canadian provinces, Alberta has been selected for specific discussion here for a number of important reasons:

- 1) Its geoheritage legislation comprises not only the most rigorous approach to palaeontological resource management currently practiced in Canada, but one of the most stringent approaches to geoheritage protection in force anywhere in the world today.
- 2) It yields an abundance of scientifically important fossil and mineral specimens, including much sought-after and accordingly commercially valuable dinosaur fossil material with Alberta's Dinosaur National Park, for example, containing one of the richest dinosaur fossil deposits in the world.
- 3) It is unique in Canada (and the world) in that it possesses an active and sizeable commercial fossil-mining industry, the existence and operation of which must also be accommodated within Alberta's geoheritage protection legislation. Whilst arguably of limited relevance from a UK perspective at the present time, Alberta's commercial fossil mining industry nevertheless warrants a degree of investigation for a number of reasons. Fossils have in the recent past been recovered in great numbers for commercial purposes from several sites in England, for example at Connesby near Scunthorpe (in association with quarrying activities - see



Thompson (2001)) and at Charmouth in Dorset (in connection with highway engineering operations - see Sole (2001)). If, in the future, public demand for real fossil specimens increases - possibly even as a consequence of implementing a wider strategy to increase public awareness of, and interest in, Earth heritage issues - it is possible (though not by implication arguably desirable) that more abundant fossils of relatively little scientific importance may be commercially extracted to supply such a demand. It is therefore not unreasonable to surmise that individual circumstances may in some cases dictate the adoption of a management approach drawing upon some aspects of the regulatory/managerial framework currently deployed to control Alberta's ammonite mining industry.

- 4) It borders the US which comprises one of the world's premier markets for fossil and mineral specimens: border control officers accordingly require a good awareness of the legislature in order to be able to effectively police any trafficking of fossil and mineral specimens from Alberta to the US.

Prior to examining Alberta's regulatory measures in detail, it should be noted that whilst Canada as a whole has legislation restricting either the collection or ownership of palaeontological and mineralogical specimens, it does, however, have legislation controlling their export (and import), with such specimens being regarded as comprising an important part of Canada's cultural heritage.

## **7.2 CANADIAN CULTURAL PROPERTY EXPORT AND IMPORT ACT 1985**

Being in many respects similar in scope and approach to Australia's *Protection of Moveable Cultural Heritage Act* (see 6.2.1 above), Canada's *Cultural Property Export and Import Act 1985* (CPEIA) affords specific and comprehensive protection to cultural property both exported out of, and into, Canada's various provinces. The CPEIA comprises the current regulatory interpretation of Canada's 28<sup>th</sup> June 1978 ratification of the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (see 4.5.2 above). A breach of the provisions of the CPEIA is punishable by a maximum fine of CDN\$25,000 and/or a custodial prison sentence of up to five years. In view of the CPEIA's overall similarity to the Australian *Protection of Moveable Cultural Heritage Act* (see 6.2.1 above) in terms of its fundamental objectives, the Canadian CPEIA is - to avoid unnecessary duplicity - here primarily discussed in terms of its specific and detailed treatment of palaeontological and other geological specimens.

## **7.2.1 Control List**

In general terms, the Canadian system of cultural property export control can essentially be viewed as being similar to that currently in operation here in the UK (Zedde 1999), the major and crucial difference being that the Canadian system provides specific protection for geoheritage items.

The CPEIA Control List defines in detail that cultural property for which Federal Export Permits are required. Such permits are not required for any cultural objects not appearing on the List.

Group I 3 of the Control List specifically states which of those palaeontological and mineralogical specimens recovered from the soil of Canada, the territorial seas of Canada, or the inland and other internal waters of Canada require permits for export.

### **7.2.1.1 Palaeontological Specimens**

The following palaeontological specimens are included on the Control List.

- 1) A 'type' specimen of any value ('type' meaning any specimen or portion thereof of a biological species used in the original scientific study and published description of that species).
- 2) A fossil amber of any value.
- 3) Any fossil specimen (vertebrate or invertebrate) of a fair market value in Canada of more than CDN\$500.
- 4) Any vertebrate fossil or vertebrate trace fossils in bulk weighing 11.25kg or more, of any value.
- 5) Any invertebrate or plant fossils, or fossiliferous rock containing the same, in bulk weighing 22.5kg or more, of any value, and recovered from a specific outcrop, quarry, or other locality.

### **7.2.1.2 Mineralogical specimens**

The following mineralogical specimens are included on the Control List.

- 1) A 'type' mineral specimen of any value ('type' meaning any specimen or portion thereof of a mineral species used in the original scientific study and published description of that species).
- 2) A single specimen of a fair market value in Canada of more than CDN\$2,000.
- 3) A collection of ten or more specimens of a fair market value in Canada of more than CDN\$5,000 recovered from a specific mine, quarry, or other locality.



- 4) Specimens in bulk, recovered from a specific mineral occurrence, weighing 225kg or more, of any value.
- 5) Meteorites and tektites of any value.

## **7.2.2 Temporary Export**

A permit officer is also empowered under Section 12 (1) of the CPEIA to issue a temporary export permit for cultural property for a period not exceeding five years. It is incumbent upon an applicant for such a permit to establish to the officer's satisfaction that the specimen is to be removed from Canada for appraisal, authentication, conservation, exhibition, loan, processing, research, restoration/repair, or as personal effects.

## **7.2.3 CPEIA in Practice**

Having now clarified the intent and major provisions of the CPEIA, it is accordingly necessary to investigate the actual operation of the Act in practice.

### **7.2.3.1 Some Recent Statistics**

During the late-1990s the Department of Canadian Heritage received approximately 600 export permit applications (permanent and temporary) per year, the vast majority of which related to decorative art and ethnographic material. Only a small percentage of applications were for palaeontological specimens, and almost none for other geological items (with the exception of the occasional meteorite temporarily leaving the Canada for research purposes). In 1998, only one permit was refused for a palaeontological specimen (a mammoth tooth), and three for geological specimens (a specimen each of catapleiite and native antimony, and two significant geological collections) (Zedde 1999).

### **7.2.3.2 General Permits for Export**

Up until 1996, the volume of permit applications for palaeontological specimens had been much higher. This was attributable in the main to the export of ammonite fossil material and associated 'ammonite' gemstone/jewellery by two companies based in Calgary in Alberta (and see 7.4 below). These two companies have since been granted General Permits (for export) of that material (provided that the requisite Dispositions Certificates are obtained from the Alberta Government - see 7.3.3.4 and 7.3.3.5 below), which, as per the rationale underlying the introduction of such permits, has accordingly reduced the volume of applications. An applicant for a General

Permit must demonstrate a sufficiently high volume of exports which would otherwise represent a hardship to the applicant in terms of the administrative workload associated with individual export permits. A General Permit is only granted for a specific type of cultural property which is normally routinely approved for export, with General Permit holders furthermore being required to report on a quarterly basis concerning all materials exported under the terms of the General Permit (Zedde 1999).

### **7.2.3.3 Intent and Interpretation**

The principal aim of the CPEIA is to prevent the uncontrolled export from Canada of nationally significant or outstandingly important national cultural heritage property. The Control List simply specifies that range of cultural property to be effectively screened in order to prevent the export of such national treasures, and is in no way intended to hinder the free movement of the vast majority of relatively insignificant items. Essentially, the legislation therefore seeks to balance the need to protect Canada's patrimony whilst simultaneously allowing the legal movement of cultural property across international borders for economic, cultural, or scholarly purposes (but see 7.3.6.2 below).

Rather than to facilitate the confiscation of any items not deemed appropriate for export from Canada, the Canadian system of export control has instead been primarily put in place to create a sufficient delay in the export of an important item to allow a Canadian public institution ample opportunity to purchase it at a fair market price. Unlike some other federal nation states (e.g. Australia - see 6.2.1.1 above), there is no category of cultural property the export of which is prohibited from Canada.

It is claimed by some collectors and dealers that a significant number of Canadian and US customs officials frequently misinterpret the provisions of the CPEIA, and accordingly insist upon export permits being obtained prior to *any* geological specimens being openly exported out of Canada - even non-Canadian specimens such as fossil dinosaur eggs from China (Schmidt 1998a). Whilst such an exhaustive approach arguably prevents the loss of any important specimens by way of overly lax interpretation of the Act, it must also by necessity serve to increase administrative costs by a considerable margin.



#### **7.2.3.4 Enforcement**

Whilst Canadian cultural protection law - in common with many other laws - operates upon the basis of voluntary compliance, the effective operation of the CPEIA depends to a large extent upon the knowledge and efficiency of Customs border control officers. However, Alberta commercial fossil dealer Michael Schmidt asserts that border guards typically have no idea whatsoever that fossils and minerals are in fact controlled (Schmidt 1998b). (US collector Glen Kuban also comments that the Ontario border guards which he has previously encountered had never either raised any objection, or for that matter, even bothered to look at fossils when they were declared (Kuban 1998).)

At a recent auction of a private fossil collection in Quebec, it is alleged that none of the significant number of non-Canadian buyers present were notified by the auctioneers of the necessity for export permits prior to the removal of purchased specimens from Canada. Only several months later, and *after* they had left Canada with the specimens, were a number of these non-Canadian buyers contacted by the auctioneers and informed that they would need to retrospectively obtain the appropriate export permits (Schmidt 1998b).

The Dept. of Canadian Heritage is aware of such problems, and is therefore now actively endeavouring to raise the awareness of Customs border control officers as regards cultural property export controls. The principal problem faced in this regard is that officers handle a vast range of material, and accordingly administer a great many pieces of legislation on behalf of a multiplicity of different departments (Zedde 1999). The trans-border movement of cultural property in general, and fossils in particular, is proportionately small. Officers are therefore not by necessity sufficiently familiar with the provisions of the CPEIA. It is therefore unsurprising that the departure of fossils from Canada receives commensurately low priority status, or due to a lack of officer awareness is often ignored altogether.

#### **7.2.3.5 Recent Prosecutions**

Only one party has to date been charged and prosecuted for breaches of the CPEIA; Canada Fossils (also known as Korite Minerals and/or Rene Vandervelde) of Calgary, Alberta having been charged on two occasions with multiple counts of violations of the Act involving the actual or attempted illegal export of fossils. In one instance involving *Coelocanth* sp. fossil fish, the company pleaded guilty to three counts and were fined CDN\$4,000 in respect of each specimen. In another instance involving

ammonites and other fossils, the company was acquitted of five out of six charges brought, but were successfully prosecuted and fined CDN\$500 in respect of the remaining charge (Zedde 1999).

#### **7.2.4 Discussion**

The Control List established under the provisions of the CPEIA is notably specific in its treatment of palaeontological and geological items (see 7.2.1 above). However, in 1998, only four export permits were refused, suggesting that the legislation is implemented in such a way as to screen out only the most culturally significant items, without restricting the export of the majority of more abundant and/or less scientifically significant specimens. As a result, the Act is criticised by many scientists for allowing too much material out of Canada. By contrast - and somewhat expectedly - commercial collectors and dealers complain that the provisions of the Act are overly restrictive (Zedde 1999).

The vast majority of fossils exported from Canada comprise commercially mined ammonites and associated gemstone and jewellery products from the province of Alberta, the export of which is now more efficiently controlled by the granting of non-item-specific General Permits. In relying principally upon voluntary compliance, the efficacy of the CPEIA is certainly vulnerable to ignorance on the part of the wider public, whether deliberate or inadvertent. The inefficiency of the Act is further compounded by the apparent misunderstanding by the majority of the Customs border control guards as to its scope and application: the vast majority of the guards are apparently oblivious to the fact that the trans-border movement of geoheritage items is controlled at all, whilst a small number of guards conversely try somewhat over-zealously to apply the provisions of the Act to the movement of all geological items (Zedde 1999).

### **7.3 *ALBERTA HISTORICAL RESOURCES ACT 1978***

In 1978, the *Historical Resources Act* (HRA) (Revised Statutes of Alberta 1980, Chapter H8 with amendments in force as of 1<sup>st</sup> July 1996) declared provincial ownership by the Crown in Right of Alberta of all historic resources, whether located upon public or private land. (The HRA does not apply to that nine percent of Alberta's land which is managed by the Canadian Federal Government as National Park, First Nation Reserve, and Military Reserve.)



### **7.3.1 Definition of a Historical Resource**

For the purposes of the HRA, a historical resource is defined as meaning:

“Any work of nature or man that is primarily of value for its palaeontological, archaeological, prehistoric, historic, cultural, natural, scientific, or aesthetic interest including, but not limited to, a palaeontological, archaeological, prehistoric, historic or natural site, structure, or object”.

### **7.3.2 Interpretation and Application**

Interpretation of the wording of 7.3.1 above would seem to indicate that whilst palaeontological resources are afforded explicit protection, mineralogical resources (including meteorites and tektites) are not. The latter-mentioned are, however, implicitly protected, since they doubtless comprise natural objects which are frequently primarily of value due to their intrinsic natural, scientific, and aesthetic interest. It should nevertheless be borne in mind that the whole world - and everything in it - could ostensibly be categorised as being either a work of nature or of man, as well as primarily of scientific value depending upon one's viewpoint. It accordingly remains unclear precisely what degree of protection is afforded to mineralogical resources under the provisions of the HRA. It would at least appear, however, that certain mineralogical specimens could at least in theory be protected under the provisions of the Act should individual circumstances so necessitate.

### **7.3.3 Palaeontological Specimens**

The wording of the HRA defines a palaeontological resource as:

“A work of nature consisting of or containing evidence of extinct multicellular beings and including those works of nature or classes of works of nature designated by the regulations as palaeontological resources”.

The Act controls the collection and ownership of palaeontological specimens in Alberta, as well as their removal from the province.

#### **7.3.3.1 Surface Collection of Fossils**

The surface collection of fossils by hand is permitted both on Crown Land and private land with the landowner's permission. Surface collection is not permitted in Provincial and National Parks, on any otherwise protected lands, or on First Nations lands without the appropriate permit. It should be noted that any surface-collected fossils remain in the ownership of the Crown in Right of Alberta (except for Control List items

- see 7.3.3.4 below), even when placed in the private collections of Alberta citizens residing in Alberta.

### **7.3.3.2 Excavation of Fossils for Research Purposes**

The exposure, extraction, or removal of a fossil from its original context within the surrounding bedrock is by permit only. The *Palaeontological Resources Regulation* (Alberta Regulation 77/82) explains the process and requirements for obtaining such permits which are only available to qualified researchers. Permits are required both by Alberta-based researchers and researchers from outside the province: the latter must have received a prior undertaking from a major museum or university in Alberta (in practice usually the Royal Tyrrell Museum) to accept and care for any specimens collected, since non-Alberta researchers cannot permanently remove any materials collected from Alberta (see 7.3.3.5 & 7.3.6.2 below).

### **7.3.3.3 Excavation for Fossils for Commercial Purposes**

The excavation of fossils for commercial purposes is prohibited under Section 26 of the HRA. Exemptions from S26 are, however, available to commercial interests under specific terms and conditions. Such exemptions are normally only made in respect of certain specified items, these being ammonite shell (including all gemmological by-products thereof), oyster shell (typically utilised in the production of animal feeds), plant-leaf impressions, and fossilised wood (and see 7.3.3.4 2) below).

### **7.3.3.4 Ownership of fossils in Alberta**

As stated previously in 7.3 above, all fossils collected in the province of Alberta are owned by the Crown in Right of Alberta. However, a 1987 amendment to the Act called the *Dispositions Regulation* (Alberta Regulation 393/87 with amendments up to and including Alberta Regulation 85/89) allows for the transfer of ownership from the Crown to private individuals, albeit only in certain specified circumstances which can be summarised as follows:

- 1) All collections made *prior* to 31<sup>st</sup> July 1978 are eligible for such transfer providing that they are registered through Alberta's Royal Tyrrell Museum and an application for disposition completed. (The original deadline for registration was 31<sup>st</sup> December 1993, but it is understood that this deadline is currently in the process of being extended.)
- 2) The *Dispositions Regulation* also provides for the transfer of collections made *after* 31<sup>st</sup> July 1978, but only provided that items included in such collections



appear on the Control List. The Control List includes several categories of palaeontological materials; these being ammonite shell (and associated gemmological products derived therefrom - e.g. 'ammolite' - see 7.4.1 below), oyster-shell, plant-leaf impressions, and petrified wood. The aforementioned accordingly comprise the only fossil items that, if collected after 1978, are currently available for private ownership (these materials/specimens also being the only palaeontological resources for which commercial mining is permitted (see 7.3.3.3 above). The HRA therefore effectively prohibits the private ownership of all other fossils collected after 1978; even where collected from the surface only, for recreational/hobbyist purposes, and with the appropriate permission to collect.

#### **7.3.3.5 Removal of Fossils from Alberta**

Removal of *all* specimens collected in Alberta - including those specimens surface-collected with appropriate permission by resident recreational collectors - is prohibited under Section 29 of the HRA except where:

- 1) A Disposition Certificate has been issued under the provisions of the *Dispositions Regulation* (see 7.3.3.4 above).
- 2) A Provincial Export Permit has been issued under the *Palaeontological Resources Regulation* (see 7.3.3.2 above).
- 3) Fossils are being temporarily exported for research purposes for a period not exceeding three years. Such export must be co-ordinated through a recognised Alberta public institution.

This is another particular area of the Act that - along with restrictions on ownership of fossils by Alberta residents (see 7.3.3.4 above) - is considered by some Alberta collectors to be somewhat over-restrictive (Leuck 1998 and see 7.3.6.2 below).

#### **7.3.4 Penalties for Breach**

A breach of the provisions of the HRA is punishable with a maximum fine of CDN\$50,000 and/or a maximum custodial prison sentence of up to one year; with additional pecuniary penalties possibly including payment of damages in respect of site reinstatement, costs of having specimens returned etc.

#### **7.3.5 Alberta Historic Resources Foundation**

Part 3 of the HRA provides for the establishment and operation of the Alberta Historic Resources Foundation. The major remit of this body - which is partly self-financing and part-funded by the Alberta Provincial Government (as necessary) - is the

purchase of real or personal property/historic resources for the use, enjoyment, and benefit of the people of Alberta.

### **7.3.6 Discussion**

The HRA is ostensibly designed to protect Alberta's fossil resources from theft and/or damage resulting from the activities of unscrupulous and unskilled collectors; the permanent loss of specimens as educational and scientific objects through either export or placement in private collections; and the removal of specimens from the province by visiting researchers from outside Alberta.

#### **7.3.6.1 Illegal Collecting Activities**

Given the dearth of evidence/statistics pertaining to convictions for illegal collecting and export activities, the HRA would appear to be proving a success in many important respects, particularly in terms of ensuring that Alberta and its scientists are not deprived of important new specimens (Wilson 1988). It must be emphasised, however, that owing to the necessarily covert nature of illegal activities, it is extremely difficult to make any firm assumptions as to just how effective the Act really is practice as regards preventing the illicit collection and export of fossils. Although - and as previously stated above - little evidence is available as regards the actual efficacy of the Act in practice, whilst working in Alberta's Dinosaur Provincial National Park at Drumheller in 1992 palaeontologist Dave Trexler noted that illegal collecting activities were routinely being undertaken in the park by one particularly determined commercial collector. These events led Trexler to conclude at that time that government enforcement of the provisions of the Act was proving ineffective. (The commercial collector concerned was in 1999 still believed to be engaged in illegal collecting activities, having apparently both learned all the loopholes within the legislation and become adept at concealing his activities (Trexler 1999).)

#### **7.3.6.2 Research Activities**

Interestingly, some palaeontologists contend that research both in Alberta and outside the province has been hampered more than it has been assisted by certain provisions of the HRA (Wilson 1988).

First, the regulation of both excavation for research purposes (see 7.3.3.2 above) and removal of specimens from Alberta (see 7.3.3.5 above) results in an increased bureaucratic workload for Alberta's own researchers, who must accordingly devote considerable and valuable time to assessment and enforcement.



Secondly, the same regulations also result in the somewhat unfair 'one-way traffic' of research and display specimens into Alberta from both those Canadian provinces and other countries having less restrictive (and less parochial) regulation/no regulation, but *not* vice-versa. This situation has the practical effect of discouraging outside researchers from working in Alberta, since the majority will instead choose to work in those parts of the world where their efforts will augment the collections of their own institutions, as indeed do many of Alberta's own scientists when working outside Alberta. Such restrictions undoubtedly influence the research plans of palaeontologists, and as a result are arguably detrimental to world palaeontology in general, especially given that a great many issues of modern palaeontology require study on a continental or global scale (Wilson 1988).

Ten or fifteen years ago, the Alberta Government found the idea of non-Alberta researchers retaining and removing specimens from Alberta totally unacceptable. Further to recent persuasion from Alberta's scientists that such activities are in reality ultimately in the best interests of palaeontological site use and conservation, there are today some signs that the Government is beginning to relax this attitude. It still, nevertheless, remains difficult for researchers representing public institutions from outside the province to effectively work in Alberta (Wilson 1999).

#### **7.3.6.3 'Coyote Clause'**

Perhaps the most memorable restriction placed upon Alberta's own palaeontologists by the provisions and associated regulations of the HRA was what quickly became known as the 'coyote clause'. Comprising one of the 'special conditions' attached to the permit requirements for palaeontological research, this amusingly named and logistically spurious clause required researchers to both notify the Alberta Government of the discovery of, and permanently turn over to Alberta's Royal Tyrrell Museum, any more-than-half-complete fossil of any animal larger than a coyote! This clause was - along with the other 'special conditions' - viewed by the university community as little more than a governmental attempt to procure dinosaur fossils of display standard without having to fund the requisite collection and research activities (Wilson 1988). Continuing dissatisfaction with this clause, as well as other aspects of the permit system for research purposes, eventually led to the formation in the late-1980s of the Alberta Palaeontological Advisory Committee (including university, industry and amateur representatives) which now advises the Minister of Culture on regulatory matters and the permit system.

#### **7.3.6.4 'Clogging' of Alberta's Public Collections**

In terms of ensuring that Alberta's palaeontological heritage remains in the province, the HRA is actually adjudged by some observers as being over-effective to the point where Alberta's public institutional collections are now becoming 'clogged' with relatively mundane duplicate specimens. By way of response to this problem, the Alberta Government - acting under the advice of the Alberta Palaeontological Advisory Committee - is currently believed to be considering the possibility of surplus specimens being transferred to Alberta's schools and universities for educational purposes (Wilson 1999).

#### **7.3.6.5 Why So Rigorous?**

It has been suggested that Alberta originally chose to enact such particularly restrictive regulations for two principal reasons which can be summarised as follows:

- 1) First, due to a basic misunderstanding between palaeontology and archaeology. Palaeontology is in many respects more analogous with geology and biology than with archaeology (Raup *et al.* 1987). In contrast to archaeological sites and objects which typically occur close to the surface and which are relatively few in number, fossils frequently occur over significant depths and in vast numbers. Whereas those relatively small numbers of invariably vulnerable archaeological sites are frequently best conserved intact and *in situ*, fossils are usually best preserved by collection and satisfactory storage since the vast majority of fossils will, if not so recovered, rapidly fall victim to erosion and/or unskilled collecting activities (and see 9.3 below).
- 2) Secondly, in response to a still-lingering historical view held by many in Western Canada that outside collectors and researchers have traditionally plundered Alberta's fossil resources. This hypothesis is to some extent supported by the fact that during the 1970s the finest display specimens of Alberta's dinosaur fossils were to be found not in Alberta itself, but in Ottawa, Toronto, and New York (Wilson 1988).

### **7.4 COMMERCIAL AMMONITE MINING IN ALBERTA**

Alberta's commercial ammonite mining industry is centred on the town of Lethbridge which is situated just to the north of the Alberta's border with Montana. The ammonite beds in question comprise very loose iron oxide-rich marine sediments - known as the Bearpaw Shale - which were laid down during the late Cretaceous some 70m years ago. Whilst thought to underlie some 30% of Alberta's geographic area, the Bearpaw



Shale outcrops most significantly and accessibly in the Lethbridge area (Schmidt 1998c).

#### **7.4.1 Resource**

The Bearpaw Shale contains hard ironstone concretions which predominantly yield flattened and compacted shell remains of the ammonite *Placentiaceras meeki* preserved as gem quality 'opalescent' aragonite incorporating a small percentage of silica and titanium. This internationally recognised gemstone material known as 'ammonite' ranges in thickness from two millimetres up to three centimetres and displays striking iridescent green, red, yellow, and more rarely blue and violet colours. Whilst softer than similarly coloured opal, 'ammonite' is reportedly much more stable in air. In 1998, gem quality material fetched US\$14 per carat (US\$70,000/kg), the major export markets for the gemstone and its associated products being the US and Japan (Schmidt 1998c).

Although a small percentage of the nodules contain whole and partial ammonites, it is illegal to destroy such material for gemmological purposes, and these pieces are typically prepared, lacquered, and sold as fossil specimens. Individual ammonites can range from one centimetre to one metre in size, with a complete 30-50cm-diameter specimen currently fetching - depending on quality - some US\$5-10,000 on the open market (e.g. see Appendix I, Table 5, 6).

Approximately 95% of that portion of the Bearpaw Shale which yields gem quality 'ammonite' is located in Alberta, with much smaller occurrences also outcropping in neighbouring Saskatchewan and Montana.

#### **7.4.2 Commercial Permits and Agreements**

The commercial mining of ammonite nodules is permissible under S26 (2) of the Alberta *Historic Resources Act* (see 7.3 above). Two distinct types of permits are available in this regard: a permit or agreement (maximum terms of five and 15 years respectively - renewable) for picking by hand along river exposures; and an agreement (maximum initial term of 15 years - renewable) for mechanical mining. A 15 year agreement is accordingly required for most large-scale commercial operations.

Both types of permit/agreement may be obtained by application to the Alberta Department of Mines and Energy, and are subject to the provisions of the *Mines and Minerals Act - Ammonite Shell Regulation 59/89* (with amendments up to and

including *Alberta Regulation 85/89*). Under Section 7 of the *Ammonite Shell Regulation 59/89*, Alberta retains ownership of all ammonite shell collected or mined under permit/agreement, with ownership only passing to the permit/agreement holder pursuant to the provisions of the *Dispositions Regulation* (see 7.3.3.4 above). The Crown also has the right to retain any specimens collected or mined if adjudged to be of exceptional scientific or (more likely) display value.

An agreement for mechanical ammonite nodule mining is only granted further to the carrying out of the appropriate archaeological and palaeontological assessments, the undertaking of which inevitably serve to make the application process both protracted and costly. In fact, many applicants find the whole process to be so protracted and imbued with bureaucracy and expense that they simply give up and do not proceed (Schmidt 1998d). This in itself arguably comprises a conservation mechanism of sorts, in that many smaller operators are effectively discouraged from instigating mining operations. However, a contrasting viewpoint is that the discouragement of small operators simply leaves the resource to the mercies of the larger and often more unscrupulous operators (e.g. see 7.2.3.5 above).



## **8 REGULATION OF PALAEOLOGICAL RESOURCES IN GERMANY**

### **8.1 INTRODUCTION**

Along with the US and Japan, Germany comprises one of the major importers of fossil and mineral specimens in the world. Furthermore, German collectors have over the years earned something of a reputation for being amongst the most fanatical and determined in the world (e.g. see 3.2.2 above). The downside of such enthusiasm is that German collectors have frequently been associated with incidences of fossil theft (e.g. see 2.6.1.2/6 & 6.4.1.1 above) and smuggling activities all over the world. As recently as December 1998 and January 1999, two separate incidences were reported of German collectors illegally trafficking fossils across the Russian-Finnish border (Anon. 1999b). In summer 1999, a fossilised partial jaw of a *Tyrannosaurus rex* stolen from the Berkeley Museum in the US was traced by the FBI to Germany and returned to the museum (Davidson 1999).

Germany is analogous with the UK in that it is heavily populated in relation to its geographical area: both, as they do, accommodating some 230 individuals per square kilometre. Unlike the UK, however, Germany has relatively little coastline, and virtually none of that which it does have comprises cliff exposure. Germany's principal palaeontological sites therefore predominantly comprise inland quarry and pit exposures, both working and disused.

### **8.2 EXPORT AND IMPORT**

Although Germany has in fact ratified the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property (see 4.5.2 above), the German enabling legislation (along with its US equivalent - see 5.2 above) does *not* apply to palaeontological and mineralogical specimens. Germany therefore effectively has no national legislation specifically controlling either the export or import of fossils at the present time.

### **8.3 COLLECTING ACTIVITIES**

Germany has no national overarching legislation regulating the ownership and collection of fossils, with fossil resources instead enjoying only limited and indirect protection within the framework of biological resource protection (Wuttke 2001). However, Germany's inclusion for particular discussion here is nevertheless important since well over half of the 16 federal states (*Länder*) which comprise Germany have,

to differing degrees, each enacted their own legislation specifically regulating the collection and ownership of all or at least certain types of palaeontological resources.

The German Federal *Act on Nature Conservation* provides the framework within which each state can develop and enact their own laws, and Earth heritage sites in Germany can under the auspices of the afore-mentioned Act be protected as National Parks and/or Natural Monuments. One principal aim of the German nature conservation laws - which vary only slightly between different states - is to protect the whole site as a 'natural monument' *in situ*. The collection of specimens - even for scientific purposes - is accordingly strongly discouraged, even to the point of being forbidden altogether (Wild 1988). However, the vast majority of palaeontological sites which are regulated in this manner have acquired such protected status simply because they have, somewhat fortuitously, fallen into larger areas which have been designated principally for their fauna and flora. Whilst it is arguable that many palaeontological sites in Germany are important enough to warrant designation and protection as National Parks and Natural Monuments in their own right, no such areas protected specifically for their geoheritage significance have been created to date. Grube (1994) accordingly argues that a formal category of 'Geological Park' should be considered. Even where located in protected areas, palaeontological and mineralogical specimens cease to enjoy any protection once collected and removed from sites.

A number of German federal states have therefore chosen to protect 'scientifically interesting' fossil resources as 'cultural monuments' which comprise the property of the state under Monument Protection Law (MPL) (Wild 1988, 1986). Echoing the fact that Germany itself chose not to include fossils in its domestic legislation ratifying the 1970 UNESCO Convention (see 4.5.2 above), not all those federal states that have enacted their own MPL have opted to include fossils and/or minerals as cultural monuments for the purposes of the legislation.

The two Federal states chosen for discussion here are Baden-Württemberg and Bayern which notably include within their boundaries the internationally important Holzmaden and Solnhofen fossil localities respectively. Whilst both states have enacted MPL, Baden-Württemberg has included fossils as cultural objects for the purposes of the law, whilst Bayern has not. A brief comparative study of the existing situation in both of these two states is therefore useful in ascertaining the degree to which such an approach can provide genuine geoheritage conservation benefit.



### **8.3.1 Baden-Württemberg**

Baden-Württemberg's MPL was passed by the state on 25<sup>th</sup> May 1971 and came into effect on 1<sup>st</sup> January 1972. The MPL provides for the protection of fossils as 'cultural monuments' where their conservation for scientific interest is in the public interest (Wild 1993, 1988). More abundant fossil specimen types which are not of specific scientific interest - such as ammonites and belemnites - are neither categorised as cultural monuments nor protected (in the sense that their collection is monitored or restricted), and can be collected by anyone without a permit. Under the MPL, all fossils are theoretically treated as comprising 'ownerless goods' until actually discovered and collected.

#### **8.3.1.1 Scientific and/or Cultural Importance**

If a specimen is upon discovery or thereafter adjudged to be of scientific and/or cultural importance; is found during excavations conducted by the state; or is found in a Protected Excavation Area (an additional protective mechanism available under the provisions of the MPL - see 8.3.1.2 below), it automatically becomes the property of the state. Whilst neither the landowner nor finder have any legal claim to such a specimen, the finder does, however, receive a reward for finding the specimen *per se*, as well as compensation in respect of any excavation and preparation expenses incurred. The size of the finder's reward is decided by the museum authorities, and typically comprises between two and five percent of the eventual excavated and prepared open market value of the specimen. For fossils found in the Holzmaden Protected Excavation Area (see 8.3.1.2 below), the average reward paid to the finder of a protected fossil is currently DM2,000, although sums as high as DM6,000 may be paid to finders of extremely rare specimens such as pterosaurs and plesiosaurs (Wild 1999 pers. comm.).

All finds of rare or unique fossils must be reported to the Land Monument Office (Wild 1988). The state Museum in Stuttgart has the right to claim any specimen of exceptional scientific or cultural value. Such specimens can be either donated or sold to the state Museum, and a fund has been put in place to provide reasonable compensatory monies to finders in the case of the latter.

Any party wishing to collect scientifically and/or culturally significant (and accordingly protected) fossils must obtain prior approval before commencing operations on site. Applicants must demonstrate suitable expertise and experience, and must furthermore abide by a number of conditions including extent, duration, and

technique/s of excavation, as well as prompt notification of finds, cessation of operations in the event of a find, and the surrender of any find for expert appraisal if deemed appropriate (Wild 1986). In the event that a find is declared a 'cultural monument' under the provisions of the MPL, reasonable compensation is again payable to the collector.

### **8.3.1.2 Holzmaden Protected Excavation Area**

Baden-Württemberg's MPL also allows for the declaration of Protected Excavation Areas (PEAs) which are designated specifically for their scientific importance. Of the three thus far declared to date, it is the internationally important Holzmaden PEA declared in 1979 which has been chosen for brief discussion here. In addition to common invertebrate fossils, the Jurassic shales, marls, and limestones of Holzmaden contain plant, cuttlefish, crustacean, crinoid, and entire vertebrate fossils. Furthermore, specimens are on occasion so well preserved that even soft body parts are fossilised along with the typically present bones, teeth, and shells (Wild 1988). Fine Holzmaden specimens are highly sought-after by private collectors all over the world, and often realise prices measured in tens of thousands of dollars.

Although a number of specific directives came into force when the Holzmaden area was declared a PEA in 1979, full details pertaining to the majority of such directives are not directly pertinent to the purposes of this thesis, with such information being available elsewhere (e.g. see Wild 1988). What is of particular relevance here, however, is the control of collecting activities implemented under the provisions of the MPL in the six working quarries situated in the Holzmaden PEA.

#### **Quarrying Permission and Methods**

Permission for commercial quarrying must be obtained from the Land Monument Office, and a series of strict procedures adhered to as regards quarrying techniques, horizons worked, the prompt reporting of protected specimens as and when found, and the training of workmen in fossil identification, extraction, and preparation. Enforcement is achieved via random unannounced inspections by museum staff. Whilst a breach of laid-down procedures could theoretically result in permission to quarry being withdrawn, such a step is rarely taken in practice since a degree of realism and tolerance is in almost all such incidences sensibly exercised by all parties involved. Any costs associated with the collection, excavation, and preparation of specimens of cultural status/special scientific importance are borne by the state Museum in Stuttgart.



## Commercial Disposal of Holzmaden Fossils

Any specimen found and collected by quarry employees which is not deemed to be of special significance is given a final inspection once fully prepared, and granted a certificate of release, further to which the specimen can then be commercially disposed of by the quarrying firm. An official certificate of release is mandatory to the legal sale or acquisition of any Holzmaden specimen, and this system serves to deter any illegal trade in fossils from the Holzmaden PEA.

Falling demand for limestone flags coupled with the contemporary popularity of fossils means that fossil sales today accordingly comprise an increasingly important component of quarrying firms' incomes. This provides a working example of a set of circumstances whereby the commercialisation of fossils actually benefits the science of palaeontology, in that quarries will only be useful for the purposes of palaeontological research whilst they remain active, by far the major prerequisite for which is economic viability.

### **8.3.2 Bayern**

The Upper Jurassic lithographic limestones of the Solnhofen-Einstätt have been quarried for decorative stone since Roman times, and the numerous quarries still being worked today comprise world-renowned localities for some of the finest and best-preserved palaeontological specimens in the world. As well as having produced the ten known specimens of *Archaeopteryx* found to date, the Solnhofen localities routinely produce a wide range of fossil fauna including superbly preserved, aesthetically appealing, and commensurately commercially valuable fossil shrimps, dragonflies, and pterosaurs.

Although the state of Bayern has its own MPL, palaeontological specimens are not included for protection under the provisions of the same. An attempt made in 1988 to extend Bayern's MPL to include fossils was unsuccessful (Wild 1988).

The failure of Bayern to protect its palaeontological cultural heritage accordingly continues to cause a great deal of consternation within the academic palaeontological community. No information is available pertaining either to how many or what, if any, new specimens are being found, and the trade of Solnhofen fossils is not regulated in any way whatsoever. Museum display-quality Solnhofen fossils are both extremely sought-after by, and - perhaps more importantly - accessible to, private collectors. This coupled with the fact that fine Solnhofen specimens invariably command

extremely high prices on the commercial market means that relatively few important specimens are successfully acquired by museums either in Bayern or elsewhere, this being in stark contrast to the situation in the neighbouring state of Baden-Württemberg (see 8.3.1 above). As a result, many unique Solnhofen specimens of outstanding scientific importance are today housed in the private collections of wealthy collectors all over the world - including one of the only ten known specimens of *Archaeopteryx* sp.

#### 8.4 DISCUSSION

Whilst German Nature Conservation Laws can be used to provide extensive protection of palaeontological sites in all German federal states, they do not provide for the protection of the fossil specimens themselves. A number of states have therefore chosen to protect fossils as 'cultural monuments' under the provisions of Monument Protection Law. Such a system of regulation appears to work particularly well in the Holzmaden quarries of the Federal state of Baden-Württemberg, with all scientifically and/or culturally important palaeontological specimens being available to the scientific community for study, as well as for purchase at preferential rates by the state Museum in Stuttgart if deemed appropriate. A system of certification ostensibly prevents any illegal trade in Holzmaden fossils which have not been scientifically vetted. The Holzmaden approach is accordingly viewed by many palaeontologists around the world as an exemplary model of palaeontological resource management (Willis 1996).

By way of stark contrast, the Federal state of Bayern fails to afford any legal protection to fossils whatsoever. The resultant prospering and unregulated world trade in Solnhofen fossils effectively serves to keep rare and even unique specimens out of the domains of palaeontological research and public display.

On a final note, the Federal state of Hessen recently implemented new regulations much stricter even than those in force in Baden-Württemberg. In Hessen (which contains the internationally important Eocene oil-shale sites of Grube-Messel near Darmstadt), *all* fossils are now regarded under the MPL as being protected unless assessed otherwise. All forms of collecting *including that for the purposes of scientific research* require official permission. Such rigorous bureaucratic constraints upon fieldwork have led to lively and often fierce debate between professional palaeontologists and civil servants, as expressed in a constant flow of articles in *Palaeontologie aktuell* over recent years (Hungerbuhler 1999). The introduction of such a restrictive approach in Hessen was largely precipitated by the high incidence



of unauthorised collecting activities which occurred at the Grube-Messel sites during the 1980s. Today, and in contrast to the situation at Holzmaden in the state of Baden-Württemberg, evidence points to the existence of an extensive 'black market' for fossils from the Grube-Messel Lagerstätte. Indeed, some commentators argue that the existence of such an albeit legally correct but insensitive and unnecessarily restrictive conservation policy to some extent contributes to commercial collectors being pushed towards illegal activities (Hungerbuhler 1999 - and see 3.1.5.5 & 3.4.4.4 Regulatory Measures above).

## 9 REGULATION OF ARCHAEOLOGICAL RESOURCES IN ENGLAND AND SCOTLAND

Archaeological sites and the artefacts recovered therefrom are in many ways broadly analogous with their geological equivalents. Both comprise important cultural and heritage resources, with items recovered from sites frequently having considerable commercial value. In the latter regard, metal-detectorists seeking archaeological artefacts are much like commercial fossil collectors in that the frequently commercially motivated aspirations of both groups have over recent years been widely condemned by many in the scientific community. In common with geological sites and specimens collected therefrom, archaeological sites and objects recovered therefrom are vulnerable not only to irresponsible collecting activities, but also to insensitive development.

It is accordingly useful for the purposes of this thesis to examine the current system of archaeological resource protection in England and Scotland, and to assess its effectiveness or otherwise in achieving its aims, and to discuss to what extent either it, or at least certain aspects of it, might offer a model with which to secure enhanced protection of fossil resources.

### 9.1 **ARCHAEOLOGICALLY IMPORTANT SITES AND AREAS**

The current legislation for the protection of archaeological sites and areas in both England and Scotland is the *Ancient Monuments and Archaeological Areas Act 1979* (AMAAA). The AMAAA provides mainly for the protection of individual sites, although Part 2 of the Act also facilitates the protection of larger areas of land encompassing a number of important archaeological sites and/or features.

#### 9.1.1 **Individual Archaeological Sites**

Under the provisions of the AMAAA, individual sites can be scheduled as Ancient Monuments, but only where they are recognised as being of national importance and where such scheduling is adjudged to be the best available means of protection. It is also important to note that only deliberately created structures, features, and remains can be scheduled. Within this overreaching constraint upon inclusion, the term 'monument' encompasses the entire range of archaeological sites with over 200 distinct 'classes' of monument being included in the schedule. Sites include prehistoric standing stones and burial mounds through medieval sites such as castles, monasteries, abandoned villages, and farmsteads to more recent structures



such as collieries and wartime pillboxes. By the end of 1999 in England, for example, the schedule included approximately 18,400 entries affording protection to some 31,400 sites (EH 2000).

## **9.1.2 Areas of Archaeological Importance**

Part 2 of the AMAAA provides for the designation by central government of Areas of Archaeological Importance within which all development is statutorily notifiable. To date, five historic town centres have been designated as Areas of Archaeological Importance - all of which were designated under the leadership of the Thatcher administration.

### **9.1.2.1 Planning Policy Guide Note No.16**

In November 1990, the DoE issued Planning Policy Guide note No. 16 (PPG16) which says in effect that the responsibility for archaeological conservation *viz. a viz.* rescue lies not with central government, but with local planners. PPG16 also advises local planners how they should exercise their powers in this regard, which has in practice led to local planning authorities making developers responsible for the archaeological consequences of their planning applications. As a result, archaeological conservation costs have been largely transferred from local government to the private sector for whom such costs have effectively become a hidden 'tax' on development. Whilst PPG16 comprises guidance as opposed to law, the advice is nevertheless given 'teeth' in that one of its provisions stipulates that the Secretary of State will have regard to PPG16 when deciding appeals.

PPG16 also recommends a distinction between what it terms archaeological 'curators', and 'contractors'; the former being employed by local authorities to advise on planning applications, and the latter being employed by the developer to put their case to the local authority. It is also advised that local authority 'curators' maintain detailed Sites and Monuments Records, each of which comprises a database (for all archaeological finds made in a particular county) to act as guidance as to the potential archaeological significance of any given site.

### **9.1.3 Criminal Offences under the AMAAA**

An archaeological resource which has been scheduled under the terms of the AMAAA is ostensibly protected against disturbance and unauthorised metal detecting. The Secretary of State must be informed about any work which might

adversely affect the resource either above or below ground, and English Heritage advises the Government on each application. It is accordingly against the law to:

- 1) Damage a scheduled monument or Area of Archaeological Importance by carrying out works without prior consent.
- 2) Cause reckless or deliberate damage.
- 3) Use a metal-detector to find, disturb and remove - i.e. *collect* - an object *without permission* from the Secretary of State.

Summary conviction for any of the above offences can lead to fines of up to £5,000 whilst conviction upon indictment carries with it the threat of an unlimited fine.

In July 1999, Mr. John Hope, the owner of Wymondley Priory, was successfully convicted and fined £8,000 for four counts of causing reckless damage to the Priory which was scheduled by English Heritage as an ancient monument in 1952. The four charges related to excavation of a septic tank and associated drains, excavation of the moat surrounding the property, digging raft foundations for an outbuilding, and digging trenches for electric cables. In sentencing, the judge said that Mr. Hope took a course of action which was flagrant and which involved lying to English Heritage and refusing to stop work when asked. The level of fine had to be reduced beyond that appropriate for the gravity of the offences committed in order to reflect the wider financial predicament facing Mr. Hope at the time of sentencing (Anon. 1999c). This to date comprises the only case where a prosecution has been successfully brought for 'reckless damage' as opposed to the more usual charge of 'unauthorised works'; the principal distinction being that the former is carried out deliberately and in spite of knowing that such actions are illegal, whilst the latter typically occurs inadvertently or through negligence.

#### **9.1.4 Problems with the AMAAA**

##### **9.1.4.1 Irresponsible Metal-detectorists**

Though the majority of metal-detectorists act in a law abiding and responsible manner (and see 9.2.3.3 Contribution by Metal-detectorists below), it should be remembered that - as indeed is also the case with fossil and mineral collectors (see 2.6 above) - there will always be a significant minority who will not. Although compelling such individuals to comply with the AMAAA is an almost impossible task from a practical and economic point of view, certain effective measures *can* be taken to safeguard important archaeological sites. For example, further to a Roman bronze figurine having in 1996 been looted from his land - which covers a Roman settlement - and sold to a US museum, Mr. John Browning, a farmer at Ilkington in England, 'ring-



fenced' his land with an American electronic device which sounds an alarm should a metal-detector be activated within the protected area. Though costly, the device successfully repelled all subsequent attempts at looting the site. An alternative method of site protection would be to 'blanket' a vulnerable site with coin blanks in order to waste so much detectorists' time that they would abandon the site (Selkirk 1998). It is unfortunate to note, however, that neither of the two aforementioned methods of site protection would prove similarly effective in protecting palaeontological sites from unscrupulous collectors.

#### **9.1.4.2 Effect of PPG16**

It should be remembered that the AMAAA - including Part 2 thereof - of was drafted 21 years ago when local planners had little influence or bearing upon archaeology. In shifting the onus for archaeological conservation from central government to local planners, PPG16 (see 9.1.2.1 above) rendered the provisions of Part 2 of the AMAAA largely obsolete. Many observers therefore consider that the Act is due for reform, not only with regard to the aforementioned point, but also for a number of additional important reasons.

#### **9.1.4.3 Definition of an Ancient Monument**

Some observers argue that one of the most glaring weaknesses of the AMAAA is the narrow nature of its definition of what an Ancient Monument actually is. In so limiting its application to features which have been consciously fashioned or made, the Act affords no protection to sites which reflect patterns of behaviour such as peat bogs or caves (Morris 1998a).

#### **9.1.4.4 Works adjacent to Ancient Monuments**

Neither the AMAAA nor planning legislation afford an Ancient Monument any degree of protection from works undertaken in the immediate vicinity. By way of example, insensitive drainage works can result in loss of associated evidence or even damage to the monument itself (Morris 1998a).

#### **9.1.4.5 Recording of Finds**

It is obviously desirable that archaeologists possess a sound basis of local knowledge from which to work, with the setting up of databases of local archaeological knowledge having in fact been advocated in the provisions of PPG16 (see 9.1.2.1

above). That such systems of local recording have not as yet been initiated and/or satisfactorily completed remains a serious problem (Morris 1998b).

#### **9.1.4.6 Co-operation and Public Participation**

It is argued by some observers that there is a great deal more to local government archaeology than simply approving or refusing planning applications. It is surely desirable that local planners work more closely with local archaeological societies, utilising their expertise and enthusiasm whilst simultaneously encouraging local interest and involvement in archaeology. Such an approach would also foster the communication of news of archaeological finds to the wider community, who in any event ultimately pay for archaeological conservation in one way or another (Morris 1998b).

## **9.2 ARCHAEOLOGICAL ARTEFACTS**

In common with geological specimens, archaeological artefacts enjoy no *specific* regulatory protection as regards the control of their export and import out of and into the UK. However, and in contrast to exceptionally rare and unusual geological specimens, the *very* finest archaeological artefacts are at least afforded *some* degree of protection by virtue of the *Export of Goods (Control) Order* 1987. It is somewhat sad that fossils are not similarly afforded even this minimal level of protection, the apparent reason for this being that, unlike archaeological artefacts, they have not been manufactured or produced by man (see 4.5.1 above).

Archaeological artefacts - also more commonly referred to as portable antiquities - are, however, afforded a significant degree of protection in terms not only of their collection from sites scheduled as Ancient Monuments (see 9.1.1 above), but also their collection from *any* land with the current controlling legislation in the latter regard being the *Treasure Act* 1996 in England (and Wales and Northern Ireland), and the common law of Treasure Trove in Scotland. Whilst neither the *Treasure Act* nor the law of Treasure Trove *directly* control the *collection* of artefacts, they nevertheless *indirectly* do so in that they control the *ownership* of objects once collected. Prior to the *Treasure Act* coming into effect in late-1997, the English system regulating the ownership of portable antiquities was also based upon the centuries-old common law of Treasure Trove (see Bland 1996 for a detailed discussion of the former English Treasure Trove law).



It should at this point be emphasised that:

- 1) The *Treasure Act* 1996 is by far the most recent development in the law regulating the ownership (and therefore the collection) of archaeological artefacts in the UK.
- 2) The number of treasure finds declared annually in England has increased *six-fold* since late-1997 when the *Treasure Act* became effective (see 9.2.2.8 below).
- 3) Scotland has since 1996 also been giving serious consideration to adopting a version of the highly successful Portable Antiquities Scheme (PAS) (see 9.2.3 below) - an initiative closely connected with the introduction and implementation of the *Treasure Act* (Sheridan 1996 and see 9.2.2 below). This is perhaps not so surprising given that the PAS is, after all, simply in essence trying to achieve the same aims as the Scottish Treasure Trove law i.e. the reporting of *all* archaeological artefact finds (see 9.2.1 below). Although the PAS is on one hand seeking the *voluntary* bringing forward of finds whilst the Treasure Trove law is on the other *mandating* the same, both systems face the same the problem in that the authorities cannot effectively police the search for, and discovery of, objects of antiquity.

It is for the above reasons that the main discussion for the remainder of this Chapter focuses upon the *Treasure Act* and the closely connected Portable Antiquities Scheme (PAS), and the extent to which they offer useful models upon which future management tools regulating the use and conservation of palaeontological resources could hypothetically be based. Before embarking as aforementioned, it is useful to briefly discuss the current Scottish law of Treasure Trove, especially in view of the fact that the latter-mentioned differs slightly from its English equivalent (which remained in force up until the recent introduction of the *Treasure Act*).

### 9.2.1 Scottish Law of Treasure Trove

As mentioned in 9.2 above, the current law governing the ownership of portable antiquities found in Scotland is the common law of Treasure Trove. The doctrine of Treasure Trove would appear to be Germanic in origin, and its adoption in the UK goes back to well before the early medieval period. The law of Treasure Trove today survives in a particularly pure form in Scotland where, since 1846, all objects of antiquity whose original owners cannot be traced are regarded as comprising Crown property under the legal principle of *bona vacantia* (Bland 1996).

The Scottish common law of Treasure Trove can be more specifically distinguished from its pre-1997 English sibling (see 9.2.2 below) in that:

- 1) It covers *all* types of material (i.e. all metals, ceramics, stone, textiles etc.) instead of *only* those items made substantially (i.e. over 50%) of gold and silver.
- 2) It covers all objects *regardless* of how they were deposited (i.e. lost, abandoned, placed in a grave etc.) as opposed to just those which were deliberately buried with the intention of recovery.
- 3) Finders and landowners have *no* ownership rights, and there is no formal statute of limitations.

It is a legal requirement that all finds made must be reported to the Crown Office either directly, or through a number of channels such as local police, Procurator Fiscal, museums etc. Should the Crown choose to exercise its ownership rights by claiming an object, then the finder (though not the landowner and/or occupier) will normally be eligible to reward equivalent to the object's full market value. If an object is not claimed by the Crown, then ownership passes to the finder (Sheridan 1996). The system is administered by the Crown Office in the person of the Queen's and Lord Treasurer's Remembrancer who is advised by the Treasure Trove Advisory Panel (established in 1970). The Panel comprises four members (including three senior museum personnel) who meet two or three times a year to discuss cases and agree valuations for reward purposes. Although the law was originally (and effectively) used to swell the royal coffers, its more contemporary application has certainly served to benefit Scottish archaeology since as early as 1808 when the Crown Agent allocated over 100 base metal coins to the forerunner of the Royal Scottish Museum. Indeed, coins have always featured heavily in the history of Scottish Treasure Trove law. The practice of rewarding finders (but surprisingly *not* landowners) was introduced in 1859 in response to concerns that Scottish archaeology was losing an increasing number of important antiquities to private collections, the 'black market', and quite literally the melting pot (Sheridan 1996).

Despite past assertions by some Scottish observers that Scotland's Treasure Trove system - essentially a typically comprehensive 'nationalisation' law (Selkirk 1998) - comprises a commendable model (for protecting portable antiquities) suitable for emulation elsewhere (e.g. see Sheridan 1996); England, Wales, and Northern Ireland have chosen *not* to follow the Scottish model, choosing instead to introduce the *Treasure Act* with effect from late-1997 (see 9.2.2 below).



This is perhaps not so surprising given the many criticisms levelled at the Scottish system by many observers (e.g. see Selkirk 1998), the major of which can be summarised as follows:

- a) In not being entitled to any reward for objects found on their land, landowners are effectively discouraged from complying with the law, often choosing instead to collaborate with metal-detectorists with the consequence that many artefacts are illegally disposed of via the 'black market'. There accordingly exists a strong suspicion that Scotland's relatively few Roman sites continue today to be looted by irresponsible metal-detectorists (and see 9.1.4.1 above).
- b) The Scottish system is at least partially responsible for the general lack of amateur archaeology in Scotland today.
- c) Treasure finds tend typically to be allocated to the National Museum for Scotland in Edinburgh as opposed to, and much to the disgruntlement of, local museums.

### 9.2.2 Treasure Act 1996

The ownership of gold and silver archaeological artefacts - typically found by metal-detectorists - was up until 1997 governed by the common law of Treasure Trove. Notwithstanding issues of land ownership and permission to enter onto property and search for artefacts, the law of Treasure Trove - which had scarcely altered in six and a half centuries - imbued the finder with the legal right of ownership where it could *not* be proved that the item/s had been deliberately hidden rather than simply lost. Where it could be proved that an artefact had been deliberately hidden, the artefact was deemed to be owned by the Crown. In governing only those artefacts made substantially of gold or silver - the original purpose of Treasure Trove having been to augment the Royal coffers rather than preserve archaeological finds for the benefit of the public at large - no protection was afforded to important finds made of other materials (contrast with the Scottish law of Treasure Trove - see 9.2.1 above).

The *Treasure Act*, which came into force on 24<sup>th</sup> September 1997, comprises the first piece of legislation ever passed in the UK which *specifically* governs discovered archaeological objects. The first attempt to reform the centuries-old common law of Treasure Trove had been made in England as long ago as 1858, with the Council for British Archaeology (CBA) having much more recently sponsored two unsuccessful Private Members' Bills in 1979 and 1981. Further pressure for reform came in 1985 further to a metal-detectorist finding and subsequently being successful in claiming ownership of the 'Middleham Jewel' - a unique medieval pendant in perfect condition today estimated to be worth up to £5m - on the grounds that it had been lost rather

than deliberately and temporarily hidden. In 1993, the CBA - in partnership with other national bodies - promulgated a Statement of Principles on Portable Antiquities that set out the case for bringing artefacts found in England (and Wales and Northern Ireland) under the protection of the law. Although a Private Member's Bill drawing heavily upon the afore-mentioned statement and advocating the need for new legislation failed in 1994, a re-drafted version of the Bill was successfully passed in 1996.

#### **9.2.2.1 Principal Aims**

The Code of Practice accompanying the *Treasure Act* which was prepared by the Department of Culture, Media and Sport - and approved by Parliament on 18<sup>th</sup> March 1997 - summarises the Act as follows:

*"The Act removes the need to establish that objects were hidden with the intention of being recovered, except in a very few cases; it sets out the precious metal content required for a find to qualify as treasure; and it extends the definition of treasure to include other objects found in archaeological association with finds of treasure. The Act confirms that treasure vests in the Crown or the franchisee if there is one, subject to prior interests and rights. It defines the task of Coroners in determining whether or not the find is treasure, and it includes a new offence on non-declaration of treasure. Lastly, it states that occupiers and landowners will have the right to be informed of the finds of treasure from their land and they will be eligible for rewards."*

It could accordingly be argued that the *Treasure Act* therefore essentially constitutes something of a compromise between the more narrowly developed pre-1997 English law of Treasure Trove and its far more rigorous and all-encompassing (and still in force) Scottish counterpart. Although expanding protection to include lost and abandoned objects and broadening the definition of treasure, the *Treasure Act* - unlike Scottish Treasure Trove law - does not go so far as to explicitly cover *all* discovered archaeological objects or deny landowners rights to share rewards with finders.

#### **9.2.2.2 Definition of Treasure**

The *Treasure Act* gives a rather complex definition of treasure, defining it as:

- 1) Any object *other than a coin* provided that it contains at least 10% gold or silver and is at least 300 years old when found.



- 2) Any find of two coins or more from the same find provided that they contain at least 10% gold or silver and are at least 300 years old when found.
- 3) Any find of ten or more coins over 300 years old when found regardless of whether or not they coins comprise 10% gold or silver.
- 4) Those associated objects - regardless of nature of material from which made - found on sites at which items in categories 1) - 3) above had previously or simultaneously been discovered.
- 5) Any object which would have previously comprised Treasure Trove but does not fall within the above categories, providing such an object be made substantially of gold or silver, was buried with the intention of recovery and the owner/s of the object (or their heirs) cannot be traced.
- 6) The Secretary of State has the power to widen the definition of treasure to include any objects over 200 years old providing that they are of outstanding historical, archaeological, or cultural importance.

It is particularly notable in the context of this thesis that *un-worked* natural objects including fossils and minerals are expressly excluded from the Act's definition of treasure. The purpose of the Act is accordingly to protect our *cultural* as distinct from our *natural* heritage (and see 4.5.1 above). Of further interest here - being analogous with fossils found in beach shingle - is the fact that any objects from the foreshore (which are defined in the provisions of the Act as 'wreck') are not included in the Act's definition of treasure. Lastly, although the Act's definition of treasure includes artefacts made other than of gold or silver where found in specified circumstances (see 9.2.2.2 4) above), it would be almost impossible to prove that such circumstances applied were any case to come to court.

### 9.2.2.3 Ownership of Treasure

Where found, treasure is held under the provisions of the Act to belong either to that person with a prior interest or right, or to the Crown (or a franchisee thereof) irrespective of where found *and whether or not it was lost or abandoned* (contrast with previous Treasure Trove common law - see 9.2.2 above). Any find not coming within the definition of treasure will belong either to the landowner or to the finder. The Code of Practice also states:

*"Notwithstanding that an object may come within the definition of treasure, it will not belong to the Crown if the original owner or his successors can be traced in title."*

#### **9.2.2.4 Jurisdiction and Reporting of Finds**

As was previously the case with the common law of Treasure Trove, the Coroner - by virtue of Section 30 of the *Coroners' Act* 1988 - continues to have jurisdiction in all matters pertaining to the *Treasure Act* 1996. A find must be reported to the local Coroner's office within 14 days of either the discovery of the find, or the day upon which the finder subsequently suspected that the find actually comprised treasure for the purposes of the Act. Finds may be reported in person, by fax, or by telephone. Any finder failing to report a find of treasure (or potential treasure) is guilty of an offence, and will be liable upon summary conviction to a fine of up to £5,000 and/or a custodial sentence of up to three months. It is a legitimate defence for the defendant to show that he had, and continues to have, a reasonable excuse for not reporting the find to a Coroner. The onus will always be upon the Prosecution to prove their case beyond reasonable doubt.

Finds are normally delivered direct either to the local museum curator or to the Local Authority Archaeological Officer or, where this is for some reason not possible/practicable, finds can as a last resort also be delivered straight to the Coroner's Office.

#### **9.2.2.5 Public Rights of Way**

In general terms, a right of public access will not confer upon the general public any right to metal-detect or dig up the land; only to merely pass and repass over the right of way (and see 4.3 above).

#### **9.2.2.6 Rewards**

Where the item found comprises treasure for the purposes of the Act and is to be placed in a museum, the size of the reward payable to the finder - assuming no complicity and/or disputes - is assessed by the Treasure Reviewing Committee as being that sum which, taking into account all relevant factors:

“...May be paid for the object/s in a sale on the open market between a willing buyer and a willing seller.”

Interestingly, the Act does *not* preclude the payment of a reward to a trespasser, though the Secretary of State is empowered to reduce or remove the entitlement to a reward where the finder was trespassing.



It should be noted that whereas only the finder was eligible for a reward under the previous common law of Treasure Trove, the *Treasure Act* also provides for the payment of rewards to those parties - typically landowners and/or occupiers - holding any interests in the land upon which the find was made. Any holder of an interest in land is advised to enter into a written agreement setting out and agreeing how any reward received is to be split between him/herself and the finder prior to permission to enter the land being granted.

Finally, it should be stressed that, as with the preceding common law of Treasure Trove, the payment of *any* reward is strictly an *ex gratia* payment - i.e. the payment of a reward is *not* enforceable against a museum or the Secretary of State (although in reality any non-payment of rewards would rapidly result in a dramatic decrease in the number of finds being brought forward by finders and landowners).

#### **9.2.2.7 Accompanying Information and Careful Recovery**

The finder is required to provide accompanying information with finds pertaining to location (as indeed is similarly desirable with fossils - see 3.4.4.1/2 above) and details as to the owner and/or occupier of the land upon which the find was made. Note: if the finder does *not* make *all* required accompanying information available, such an omission will be taken into account when determining any reward.

The Code of Practice accompanying the Act also stresses the need for care in recovering items, stating that:

*"If a finder does not remove the whole of the find from the ground but reports it, thus affording the opportunity for the archaeological excavation of the remainder of the find, the original finder will normally be eligible for a reward for the whole find, and not just that part which he himself has removed from the ground."*

(Note: were new regulatory management measures to be introduced controlling the ownership and collection of palaeontological resources, the application of a similar provision to the finding of large vertebrate fossils would also in theory provide significant benefit since specimens would not be otherwise hurriedly and likely irresponsibly excavated.)

#### **9.2.2.8 Results**

Speaking at the British Archaeological Awards in late-1998, Arts Minister Allan Howarth announced that the *Treasure Act* (which had at that time been in force for just over a year) had already led to a *six-fold* increase in treasure cases, with the

number of declared finds having risen from around 25 a year previously to 165 in the first year during which the new Act had been in force (DCMS 1998a). Howarth claimed that these results were particularly notable given that many observers had previously claimed that the new Act would either deter people from reporting their finds, or alternatively result in the swamping of the system by encouraging finders to report too many of their finds. Neither scenario appeared to have materialised since all but five of the aforementioned treasure cases comprised finds of gold and silver objects which would have been caught under the old law of Treasure Trove; the logical conclusion being that the new Act was achieving its aims in fostering increased reporting of archaeologically significant finds. This dramatically improved reporting and recording of important finds has continued up until the time of writing, with Roger Bland of the Department of Culture and British Museum confirming on 28<sup>th</sup> March 2000 - at the Press Launch for the Portable Antiquities and Annual Treasure Reports held at the British Museum - that there had up until that date been 420 cases of treasure (under the provisions of the *Treasure Act*) during the two and a half years since which the Act had become effective. As regards the number of objects actually acquired by museums, the *Treasure Annual Report 1997-98* (released in March 2000) specified that of the 193 cases of treasure discovered between September 1997 and September 1998, 101 were acquired by museums, 75 were disclaimed, whilst 17 remained undecided (Mills 2000).

Other new archaeological insights have also arisen as a result of the introduction of the *Treasure Act* in that it requires the reporting of items such as bronze coins and copper brooches (see 9.2.2.2 3) & 4) above), whereas the previous English law of Treasure Trove did not require the reporting of such base metal finds.

It should be noted that, as was the case prior to the introduction of the *Treasure Act*, the vast majority of treasure finds are made by metal-detectorists (DCMS 1999a). This is perhaps not so surprising given that those archaeological finds which survive hundreds and thousands of years are typically made of metal, and have over time invariably become buried out of sight. Metal-detectors are therefore virtually the only practical means of discovering and recovering such objects (and see 9.2.3.3 Contribution by Metal-detectorists below).

A review of the *Treasure Act* was held in Autumn 2000 affording all those parties consulted prior to and during the drafting of the Act an opportunity to participate in discussions as to how the Act might be further refined to better achieve its aims. The



responses to the resulting consultation paper on the review (DCMS 2000) will form the basis upon which to formulate proposals for ministers by early summer 2001.

### **9.2.3 PORTABLE ANTIQUITIES SCHEME**

#### **9.2.3.1 Background and Aims**

On 16<sup>th</sup> December 1996, and concurrent with discussions surrounding the drafting of the *Treasure Act*, Iain Sproat MP - the then Minister of State for the Dept. of National Heritage - announced the establishment of the Portable Antiquities Scheme (PAS); a two year programme of pilot schemes (as in fact referred to in Appendix VII of the *Treasure Act*) designed to promote the *voluntary* reporting - and recording where appropriate - of *all* archaeological finds made by members of the general public.

The PAS was devised mainly in recognition of the fact that the *Treasure Act*, no matter how much of an improvement it would prove over the previous law of Treasure Trove, would still only bring a small proportion of archaeologically significant finds within its scope (DCMS 1998a).

The principal aims of the PAS are to:

- 1) Advance our knowledge of the history and archaeology of England (and Wales).
- 2) Initiate a system for the recording of archaeological finds and to encourage and promote better recording practice by finders.
- 3) Strengthen links between metal-detector users and archaeologists.
- 4) Estimate how many objects are being found across England (and Wales) and what resources would be needed to record them.

#### **9.2.3.2 Funding**

The PAS has been funded by the Dept. for Culture, Media, and Sport, the Heritage Lottery Fund, and the British Museum via the Museums and Galleries Commission. Also involved in the Steering Group for the PAS were English Heritage, the Royal Commission on the Historical Monuments of England, the National Museums and Galleries of Wales, the Royal Commission on the Ancient and Historical Monuments of Wales (with support from the Association of Local Government Archaeologists), the Council for British Archaeology, and the Society of Museum Archaeologists. The PAS has also had the full support of the National Council for Metal-detecting (and see **9.2.3.3 Contribution by Metal-Detectorists** below).

Six 'finds liaison officer' posts - funded by the Dept. for Culture, Media, and Sport and the British Museum - were established in museums in Kent, Norfolk, North Lincolnshire, the North-west of England, the West Midlands, and Yorkshire, and the PAS commenced proper from September 1997. Finds liaison officers provide a first point of contact for the general public bringing forward finds, as well as inspecting and assessing the importance of such finds and recording them as required. Data gathered by finds liaison officers is passed on to the relevant Sites and Monuments Record, and is also available as a Portable Antiquities database via an Internet website.

### **9.2.3.3 Results**

The PAS has unarguably proved a great success with the six finds liaison officers seeing over 13,500 archaeological objects between September 1997 and September 1998 that would not otherwise have been examined and recorded. Furthermore, finds brought forward included some of great archaeological and historical importance such as a rare gold and garnet cross dating from the seventh century (DCMS 1999a). It is particularly relevant to note that in those instances where statistics had been kept before the finds liaison officers had taken up their posts, the PAS had at least doubled the number of finds being seen and recorded by museum archaeologists. It was accordingly decided in 1998 not only to extend the duration of the PAS from September 1999 to April 2000 (DCMS 1998a), but that the Heritage Lottery Fund should fund an additional five pilot schemes in Hampshire, Northamptonshire, Somerset and Dorset, Suffolk, and the whole of Wales, together with a sixth post for an Outreach Officer for eighteen months from early-1999 (DCMS 1998b).

During the year commencing September 1998, the results of the PAS were even more impressive than were those for the previous year with 20,968 archaeological objects having been logged by finds liaison officers (DCMS 1999b). By the end of 1999, pilot recording schemes covered over half of England and Wales. During 1998/9 (the second full year of the PAS's operation), finds liaison officers recorded objects found by over 1900 finders - double the first year's total of 994 - and also maintained contact with 95 metal-detecting clubs as opposed to just 47 in the first year. Finds liaison officers also met with increased success in obtaining precise location details from finders with 59% of finds logged during 1998/9 being recorded to the nearest 100 square metres or better (DCMS 1999b).



Finally, finds liaison officers record *all* archaeological objects brought forward - i.e. not just those made of metal - and during the first year of the PAS accordingly recorded 848 stone and 1,723 pottery objects (DCMS 1998b).

### Outreach

Outreach comprises an initiative introduced to raise public awareness as to the importance of recording finds for our archaeological heritage. The initiative is led by a designated Outreach Officer, with the Heritage Lottery funded post having been created effective from early-1999. Since the commencement of the Outreach initiative, 224 organised talks have been given about the PAS (140 to metal-detecting clubs and 84 to other bodies), 166 'finds days' and exhibitions have been staged, and 114 media items relating to the PAS have been produced for publication and/or broadcast.

### Contribution by Metal-Detectorists

Although archaeological objects can be found and brought forward by any member of the general public, it is metal-detectorists who have been responsible for finding and bringing forward some 90% of objects examined and recorded by finds liaison officers (DCMS 1998b). Speaking on 28<sup>th</sup> March 2000 at the Press Launch for the Portable Antiquities and Annual Treasure Reports at the British Museum, Robert Anderson of the British Museum reiterated this fact stating that practically all the finds recorded under the PAS to date had been found by the use of metal-detectors (Mills 2000). The importance of the contribution made to archaeology by *responsible* metal-detectorists had, of course, always been recognised prior to the introduction of the PAS, with metal-detectorist Dennis Jordan - the then President of the National Council for Metal-detecting - having in fact received a four year appointment to the Treasure Valuation Committee in 1997 (DCMS 1997 and see 9.2.2.6 above).

That metal-detectorists *find* such a high proportion of objects is not so surprising: what is perhaps surprising is that they so *willingly* bring their finds forward for inspection and recording, especially given the degree of mutual hostility and distrust which has traditionally existed between detectorists and archaeologists (much like that which has often in the past existed between commercial fossil collectors and palaeontological scientific community - see 2.5.2 above). Of undoubted assistance in this regard is that no attempt is made to claim ownership of any object brought forward by a metal-detectorist from him or her (and see 3.1.4.1 Ownership of Fossils above), in addition to which the finds liaison officers provide detectorists with

accurate - in so far as possible - identification of frequently difficult-to-identify objects, thereby affording detectorists finding objects confirmed as being rare and/or important a significant degree of kudos as regards their detecting 'expertise'. Furthermore, in receiving a reward equivalent to the *full* open market value, finders whose artefacts are retained for placement in a public collection actually receive more financial benefit than if they sold to a dealer who would obviously wish to take a substantial 'cut' for his/her involvement.

### **9.3 ARCHAEOLOGICAL-STYLE PROTECTION FOR FOSSILS?**

Having discussed UK archaeological resource protection in some detail, it is necessary for the purposes of this thesis to assess whether or not any of the regulatory (and/or voluntary) management measures implemented offer suitable models with which to procure better use and conservation of fossil resources. This can perhaps be best achieved by recapping the principal measures deployed, and considering whether or not they might be suitable for fossil resources - particularly in the context of how the two resource categories and their users differ from each other.

#### **9.3.1 Ancient Monuments and Archaeological Areas Act 1979**

The *Ancient Monuments and Archaeological Areas Act* provides for the protection both of individual sites as Ancient Monuments and - albeit far less often in practice - those areas containing a number of sites as Areas of Archaeological Importance. A palaeontological SSSI could arguably be similarly viewed as comprising a *geoheritage monument* of national importance, whilst a larger geographical area encompassing a number of palaeontological SSSIs - such as the North Yorkshire coast (see 3.2.1 above) - could also be viewed as an *area* of national geoheritage importance.

The AMAAA is particularly notable in terms of the discussion here in that it effectively illegitimatises the 'collecting' of archaeological artefacts from protected sites; this being analogous with banning the collection of fossils from palaeontological SSSIs. Few, if any, observers would argue for the application of such a rigorous approach to palaeontological site protection. Virtually all archaeological sites - and more particularly the resources which they contain - are *extremely* finite in nature. By comparison, many English and Scottish (predominantly coastal) fossil sites contain what can for practical purposes be regarded as an almost infinite resource, the fossiliferous horizons being as they are spatially extensive in nature (and see 2.3 above). This is perhaps unsurprising given that archaeological resources have 'only'



had between 50 and 50,000 years to accumulate in relatively small and specific areas of human habitation, whereas fossil resources have typically been deposited over many millions of years across vast areas of the globe. It does not therefore seem unreasonable to conclude that the archaeological approach of scheduling sites as monuments to facilitate enhanced site protection only offers an interesting alternative means for protecting palaeontological sites and resources for those integrity sites (see 2.3 above) such as Cheese Bay in East Lothian in Scotland (see 2.6.1.1 above).

Maybe the most significant weakness of the AMAAA is that it affords sites scheduled as Ancient Monuments no protection from potentially damaging works being undertaken on adjacent lands. As such, the application of the AMAAA method of protection to palaeontological sites would prove similarly problematic - e.g. where coastal defence works result in the loss of sites situated slightly further down the coast (see 2.5.3.1 above).

The AMAAA is in any event today criticised by many archaeologists as being out of date; this perhaps being not so surprising given that the legislation is now over 20 years old. Planning Policy Guide note 16 (introduced in 1990) has, however, arguably provided some additional degree of protection in that developers are today largely responsible for undertaking and financing any archaeological rescue work deemed necessary by local government archaeologists. In so introducing a hidden tax on development, the system has not only ensured that developers are today more aware of the issues connected with archaeological conservation, but has also to some extent transferred the costs of archaeological conservation (albeit rescue) from the public sector to the private sector. There would ostensibly appear to be no reason why such measures could not achieve similar benefits if applied to fossil resources.

### **9.3.2 Scottish Law of Treasure Trove**

Although, and as stated previously (see 9.2 above), the principal focus within this Chapter is the *Treasure Act*, it is nevertheless also useful to briefly assess whether or not the Scottish Treasure Trove law could be similarly and beneficially applied to palaeontological specimens. A direct application of the Scottish archaeological artefact protection approach to fossils would result in *all* specimens *hypothetically* belonging to the Crown once collected. One would assume that such ownership would only be enforced in the case of particularly rare and unusual specimens, with any finder of such items being entitled to the payment of a reward based upon the full open market value of the same. The ownership of all other specimens - i.e. the vast majority of those found and collected - would pass to the finder. Whilst this appears

to comprise a theoretically equitable and workable system, it nevertheless (in addition to facing other specific criticism - see 9.2.1 a) to c) above) faces one major fundamental problem in practice. Palaeontological specimens are thousands of times more abundant than are archaeological artefacts. Assuming that *all* collector groups declared their finds, then museums and other declaration points would accordingly be permanently deluged with tens of thousands of unimportant specimens (and see 7.3.6.4 above). Combating this problem by specifying that only particular specimen types should be reported would require that vast sums of money be spent in an almost impossible attempt to educate the general public in this regard. It is essentially the very different nature of both the resource and those collecting it that effectively renders any wider application of Scottish Treasure Trove law to palaeontological specimens as largely unworkable in reality (and see 9.3.3.1 & 9.3.3.3 below).

### **9.3.3 Treasure Act 1996**

Like geoh heritage objects, archaeological objects are afforded little or no protection as regards their export and import out of and into the UK (see 4.5 above).

The *Treasure Act 1996* is, however, of particular interest here in that it regulates the *ownership* - and therefore the *collection* - of a wide range of archaeological objects from *all* land in England (but not Scotland - see 9.2.1 above) - i.e. not just from certain statutorily protected sites and areas as does the *Ancient Monuments and Archaeological Areas Act 1979* (see 9.1 above).

#### **9.3.3.1 Controls upon Collecting**

The Act requires that the discovery and collection of certain categories of archaeological object *must* be reported to the local Coroner's office, further to which objects can, if deemed appropriate, be acquired for placement in recognised public collections. There is ostensibly no reason why certain rare categories of palaeontological specimens could not in theory be similarly treated.

However, archaeological artefacts are *all* relatively rare and are buried out of sight below ground. As such they are typically sought-after and found by a fairly small army of dedicated and experienced individuals using metal-detectors. Uncommon palaeontological specimens, on the other hand, are far more likely to be more inadvertently happened upon by *any* member of the wider public since they can be spotted and collected without the aid of expensive electronic equipment. Unlike artefacts, rare fossils are furthermore unlikely to be recognised as such by the vast



majority of the general public. The two resources are therefore very different in a number of important respects, and whilst those measures which facilitate the protection of specified categories of archaeological objects could in theory also afford similar benefits for the protection of certain geoh heritage resource categories, it is quite another matter to say with any certainty that such an approach would in fact succeed in practice.

Were new legislation controlling the ownership and therefore collection of rare fossils developed and introduced utilising the *Treasure Act* as a model in the strictest sense, it is interesting to note that specimens collected from beach shingle would continue to remain largely unprotected (see 9.2.2.2 above).

### **9.3.3.2 Definition of Treasure**

The Act primarily seeks to regulate the ownership of those collected archaeological objects containing a significant proportion of gold and silver. It would arguably be much more difficult to categorise fossils as being of 'gold' or 'silver' from a rarity and/or scientific significance viewpoint. However, just as many palaeontologists would argue that *all* fossils are important and should accordingly have their collection controlled, it is likely that many archaeologists would argue that *all* archaeological artefacts are similarly important. The argument for only controlling the collection of certain key categories of object is perhaps based upon the logic that it is infinitely more practicable to do that rather than to toil away fruitlessly and vainly seeking to protect the collection of *all* objects. Nevertheless, were legislation similar to the *Treasure Act* ever to be introduced in an attempt to more effectively control the collection of fossils, then the task of identifying and agreeing those categories of specimen to be protected would likely prove difficult to say the least. Furthermore, many more people can readily discover a fossil than an archaeological relic, with the consequence that the former will often not be recognised by those with little geological experience as falling within certain established categories (and see 9.3.3.1 above).

### **9.3.3.3 Ownership Rights of Landowners and Occupiers**

Although the Act is also notable in that it totally clarifies the position as regards the *ownership* of objects found, such provisions could not reasonably be similarly applied to palaeontological specimens since the latter are invariably far more ancient, as a consequence of which they have neither been manufactured for, nor - more importantly - *owned* by, human individuals or groups.

However, and more importantly for the purposes of the discussion here, the Act does state that occupiers and landowners have the right to be informed of the finding of certain categories of archaeological object from their land, and that they are also eligible for rewards in connection therewith. One might argue that similar measures should also apply to fossils, although once again, such an assertion is perhaps difficult to justify - especially from a philosophical viewpoint - given that palaeontological specimens almost always existed long before the appearance of mankind and the relatively modern concept of land ownership.

#### **9.3.3.4 Public Rights of Way**

As regards sites crossed by public rights of way - and as is the case with fossils (see 4.3 above) - the *Treasure Act* asserts that finders gaining entrance to archaeological sites via right of public access (as opposed to being granted express permission) have no rights to any objects subsequently found and recovered.

#### **9.3.3.5 Rewards**

In the event that one of a category of archaeological objects defined for the purposes of the Act as treasure is found, declared as required and subsequently retained for placement within a recognised public collection, the finder of the object is entitled under the provisions of the Act to an *ex gratia* or discretionary reward (usually in practice shared with the occupier and/or landowner) based upon the open market value of the said object. Such a provision is arguably fair and reasonable given the time and expense involved in both researching and searching sites. Furthermore, the efficacy of the Act is in practice directly reliant upon metal-detectorists actually declaring their finds: there would in reality be a drastically reduced incentive to do so in the absence of reward payments to those metal-detectorists whose finds were not returned to them.

The size of the reward paid is dependant upon the care with which the object has been both recovered and recorded. Especially notable in the context of the discussion here is that any finder declaring a large or multiple find *prior* to the subsequent recovery of the find in its entirety, will be entitled to a reward based upon the open market value of the *entire* find, and not just that part or portion recovered or revealed at the time of declaration. This provision makes sound sense in that it effectively discourages finders from recovering objects in a hurried and potentially damaging manner in an attempt to maximise their eventual reward should the find be subsequently retained for placement in a museum collection. Fossil vertebrates are



especially analogous with archaeological objects in this regard; a large specimen of which will often take several days or weeks to properly recover.

It is therefore not unreasonable to conclude that those provisions of the Act concerning rewards payable for certain specified categories of archaeological object could accordingly be equally well applied to fossils, were similar legislation to be introduced controlling the collection and ownership of the latter. It is unfortunately likely, however, that UK museums will for the foreseeable future continue to have rather less of an acquisition budget for palaeontological specimens than that available for archaeological artefacts and art history items in general (Taylor 1988).

#### **9.3.4 Portable Antiquities Scheme**

Today encompassing over half of England as well as the whole of Wales, the Portable Antiquities Scheme (PAS) is a voluntary management measure which was devised and introduced in conjunction with the *Treasure Act* in recognition of the fact that the latter would only target a relatively small number of albeit important archaeological objects, as a result of which the vast majority of more mundane finds would go unrecorded. Although arguably less important on an individual basis, the large numbers of previously unrecorded common finds brought forward have proved archaeologically significant in that they cumulatively offer a more detailed insight into how social groups lived and coexisted in the past.

Whilst one might similarly argue that the recording of increased numbers of abundant fossils would also similarly benefit palaeontology, severe problems would be faced given the huge numbers of both specimens and collectors involved (and see 9.3.2, 9.3.3.1 & 9.3.3.3 above). Whilst it is also beyond doubt that the PAS has proved a great aid in cultivating and fostering a more positive and mutually beneficial relationship between metal-detectorists and museums, it would prove a monumental task to educate the vast army of recreational and educational palaeontological collector groups in a similar context. However, it should at this point be stressed that a similar scheme could prove much more workable and accordingly be of great benefit, if restricted to commercial collectors and a similarly small number of those amateur collectors known to possess substantial experience and expertise. Indeed, initiatives based along such lines have already been instigated - albeit upon a local level - in certain parts of England (e.g. see 3.1.4.3 & 3.2.4.3 above).

## **10 CONCLUSIONS**

### **10.1 CURRENT UK SITUATION**

#### **10.1.1 Export and Import**

The UK currently has no controls whatsoever regulating the export and import of geoheritage objects. Given that an albeit relatively small number of scientifically and arguably culturally important fossils undoubtedly leave the UK each year bound predominantly for the US, Germany, and Japan, it is accordingly argued by many observers that the UK should and must introduce some form of export restrictions, even if only to ensure that at least the very best specimens remain here in the UK. Two readily available options already exist in this regard. First, the provisions of the *Export of Goods (Control) Order 1987* could be widened to include works of nature, although this would, however, be of limited use given that it only in effect affords protection to a handful of nationally and often internationally important objects. Secondly, the UK could accede to the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. However, the UK has traditionally shown no great interest in implementing the necessary legislation in order to give effect to the Treaty, and whether or not the current labour administration will seek to accede to the Convention in the foreseeable future remains to be seen (and see 10.2.3.1 below).

#### **10.1.2 Collecting Activities**

The UK has no national overriding legislation specifically regulating the collection of fossils, with EN and SNH only being able to restrict collecting on certain protected areas such as SSSIs. It accordingly follows that all fossils which are otherwise legitimately owned cannot be seized into public ownership under UK law, with the collection of specimens (from a site not otherwise protected by virtue of its designation as a SSSI) being largely a private matter between the landowner and collector.

The available evidence suggests that the current combination of the statutory notification of sites as SSSIs and several recently introduced voluntary management initiatives is adequate as regards controlling the collection of fossil specimens from the vast majority of English and Scottish palaeontological sites. Voluntary management initiatives are also more likely to succeed in practice owing to the fact that they by implication necessitate full stakeholder involvement/participation (and



see 10.2.2 below). It is therefore arguable that additional *regulatory* controls upon palaeontological collecting are neither required nor desirable at the present time. However, it must be remembered that not only would many of those working within the field of palaeontology strongly disagree, but the current situation might well change in the future should, for whatever reason/s, the fossil resource or part thereof face dramatically increased collecting pressure. It has therefore been necessary for the purposes of this thesis to examine a number of alternative regulatory management measures as implemented elsewhere in the world. These measures include not only those regulatory approaches designed to control the export and import, collection, and ownership of palaeontological specimens elsewhere in the world, but also that legislation currently controlling the ownership and collection of archaeological artefacts in England, and to a lesser extent Scotland.

## **10.2 OVERSEAS APPROACHES TO REGULATION**

### **10.2.1 Strategic Differences**

Whilst it is clear that a wide and varied range of approaches regulating fossil resources have been implemented throughout the world in recent years, there is, however, no uniformity of approach either globally or in many instances even nationally. Whilst the lack of such an internationally co-ordinated approach is in many ways lamentable, it has to be said that to formulate and implement the same would prove enormously difficult given the geographic, demographic, socio-economic, and cultural differences which exist throughout the world from a national and regional point of view. Leaving aside countries such as China and Russia - about which relatively little information is available for the purposes of the discussion here - let us consider for a moment the federal nation states of the US, Australia, and Germany. The US is a resource-rich and geographically vast federal nation state with a relatively high population. Australia is similar in many respects, but with the important difference that it has some thirty times less inhabitants. Germany is geographically far smaller than Australia and the US, yet is nonetheless densely populated and has a far older industrialised culture than either. The nature of the sites themselves also varies widely from country to country and from region to region. Sites in the US and Australia typically comprise natural exposures which are remote, vast, arid, and fast-eroding in nature, whilst German sites consist mainly of small artificial and temporary exposures such as quarries and road-cuttings - owing not least to that federal nation state's relative lack of coastal exposures. It is not therefore unreasonable to surmise that effective regulatory measures seeking to protect fossil resources need to be as

different as the countries, sites, and resources themselves. This is particularly true with respect to the control of collecting activities, although it also equally applies, albeit to a lesser extent, to the control of exports and imports.

### **10.2.2 Stakeholder Involvement in Policy Formulation**

The politicisation of geoh heritage issues is essential to the future promotion and well being of the earth sciences in general. However, recent experience from the US shows that great care must be taken during the regulatory process to prevent one-sided political lobbying resulting in draft measures which, in effectively disenfranchising certain stakeholder groups, will accordingly be doomed to fail at an early stage once these other stakeholder groups subsequently become enlightened, involved, and inevitably opposed. It is furthermore arguable that recent difficulties in this regard in the US have been made transparently clear for all to understand as a result of the psychology of the American people i.e. their obsession with the freedom of the individual. One has to suspect that many of the systems of regulatory control introduced elsewhere in the world have equally been driven primarily by the wishes *viz. a viz.* value judgements of one stakeholder group (frequently the scientific community), and as a result might well have also similarly failed if attempts had been made to introduce and implement them in the US. Furthermore, even where new regulatory management measures have been *passively* 'accepted' by all stakeholder groups where introduced outside the US, it is arguable that many of the subsequent problems or limitations experienced in enforcing the controls from a practicable point of view have arisen as a result of the fact that *all* stakeholders were not properly involved in the formulation of regulatory policies *from the outset*.

Indeed, evidence from the US in particular suggests that perhaps the most fundamental failing of regulatory control measures is that they can be formulated and introduced *without* the involvement of, and consultation with, all stakeholder groups. This situation exists in direct contrast with voluntary management measures which can by implication *only* be formulated and introduced *with* the involvement of, and as a result of consultation with, *all* stakeholder groups. This perhaps comprises one reason why relatively few English and Scottish stakeholder group representatives questioned in connection with the case studies included in this thesis favoured the introduction of regulatory controls - as opposed to voluntary controls or to a lesser extent a combination of the two.



### **10.2.3 Export and Import**

Certain administrative areas such as the Canadian province of Alberta have enacted their own specific legislation to regulate the export and import of palaeontological specimens. However, the vast majority of countries - e.g. the federal nation states of the US, Australia and Canada - have chosen to control the export and import of cultural heritage items by implementing domestic legislation giving effect to the provisions of the 1970 UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property.

#### **10.2.3.1 Limitations of UNESCO Convention**

Examination of overseas experience demonstrates that the UNESCO Convention has two serious fundamental limitations in practice which can be summarised as follows:

1. First, accession to the Convention is not mandatory, with many economically powerful nations including France, Switzerland, Japan, and the UK having not yet chosen to ratify the provisions of the Treaty. Since the afore-mentioned nations are also leading market countries for cultural property, fair play accordingly has to rely rather too heavily upon goodwill rather than properly laid down rules and regulations. The fact that many wealthy importing nations have not thus far chosen to ratify the Convention is perhaps not so surprising. Given that such nations have long traditions of amassing overseas-sourced cultural heritage items in both public and private collections, they might well come under a degree of political pressure to repatriate some of their more illustrious acquisitions as a result of acceding to the Convention.
2. The full provisions of the Convention are not self-implementing even when a state opts for ratification. The efficacy of the Convention relies instead upon each state enacting the requisite supporting legislation. Problems arise when an acceding state's domestic enabling legislation does not accord with the provisions of the Convention itself. By way of example, although the US and Germany *have* ratified the Treaty, their domestic legislation implementing the Convention makes no provision for the protection of fossils.

These and other problems connected with the bilateral nature of the Convention and the fact that only accessioned and documented specimens can be successfully repatriated, makes it abundantly clear that accession to the Convention is far from being a panacea for all problems pertaining to the illegal export and import of fossils. It is accordingly arguable that regulation of the world trade in geoheritage objects is best enforced at the national level through specific export and import regulations.

However, the obvious temptation here is for countries to enact one-sided legislation controlling exports but not imports - South Africa, for example, having in fact done just that over thirty years ago when it enacted legislation - the *National Monuments Act* 1969 - regulating the *export* of palaeontological specimens, but not the *import* of the same.

#### **10.2.3.2 Historical Perspective**

It is interesting to note that federal nation states such as Australia and Canada (as well as other countries such as South Africa, Kenya, Papua New Guinea and New Zealand) which *have* enacted legislation regulating the export of their geoheritage, also comprise those areas of the globe which have historically experienced economic exploitation including a degree of cultural plundering as a consequence of imperial or colonial domination. Such countries are today particularly sensitive with regard to their cultural heritage, and their latter-day enactment of legislation can to some degree be considered a damage-limitation exercise. Conversely, those countries such as France who in common with the UK have no legislation regulating the export and import of geoheritage objects, comprise those very powers which have historically conquered and dominated much of the globe and commensurately plundered much of its cultural heritage, much of which they still retain to this day. It is furthermore notable that such countries also tend to hold manmade archaeological and artistic cultural heritage in greater esteem than natural geoheritage objects, as a consequence of which proportionately less emphasis is placed upon the protection of palaeontological and mineralogical specimens. Moreover, those countries having the most rigorous legislation controlling the export and import of geoheritage objects, e.g. the federal nation state of Australia and the Canadian province of Alberta, also comprise those countries with relatively low domestic market demand for specimens, and vice-versa.

#### **10.2.3.3 Paradox of Regulation**

Another indirect advantage - albeit a somewhat immoral one - to countries such as the UK and Germany in having no domestic legislation effectively regulating the *export and import* of geoheritage objects, is that much of the demand from their own commercial markets for specimens are satisfied by material sourced and imported - either legally or often otherwise - from countries such as China, Russia, Lebanon, Madagascar, and Morocco - thus placing less demand - and hence collecting pressure - on their own palaeontological sites.



#### **10.2.3.4 Problems of Over-Zealous Regulation**

The available evidence suggests that particularly rigorous systems of regulating the export and import of palaeontological specimens can create certain problems as well as solve them. For example, it is argued by some observers that, in addition to creating increased bureaucracy and administration costs, restrictions upon the trans-border movement of specimens can actually stifle palaeontological research. In Alberta, for example, particularly strict regulation of the export of fossils out of the province has effectively deterred foreign researchers from working in Alberta, as a direct consequence of which researchers from Alberta are not accommodated so generously elsewhere in the world. It accordingly appears that international research can certainly be hindered by overly restrictive parochialism, and given that palaeontology is, after all, a global science, it can reasonably be argued that this constitutes a wholly undesirable state of affairs.

Finally, strict export controls will serve little or no purpose if customs officials - who have in today's increasingly sophisticated world to follow and abide by a plethora of legislation, rules, procedures, and regulations - are not aware, or fully conversant with, of the provisions of the same.

#### **10.2.3.5 Regulation as a Last Resort and the Requirement for Funding**

Legislation regulating the export of geoheritage items can in theory be relied upon as something of a last resort as regards resource protection in countries having vast and largely unpopulated sites (e.g. Australia) where excessive commercial collecting activities are difficult if not impossible to control, in order to endeavour to ensure that collected material at least remains in its country of origin. However, in the final analysis, fossils are today frequently worth high sums of money, and criminally-minded individuals will accordingly always - as has consistently proved to be the case with drugs - attempt to smuggle valuable specimens, no matter how onerous the consequences of being caught might potentially be. In these circumstances, legislation can never be effective to any significant extent in the absence of considerable funds for enforcement and administration.

#### **10.2.4 Collecting Activities**

Although many countries seek - in common with the UK and in broadly similar ways - to regulate the use and conservation of palaeontological resources on a *site-specific* basis only, many others instead attempt to regulate collecting activities/pressure on a

*federal nation state or state/province-wide* basis by controlling the *ownership* of palaeontological specimens both before and after collected. In the UK, the ownership of fossils occurring on privately owned land is a strictly private matter between the landowner and collector. However, many other administrative areas adopt a radically different ideological approach, with the Australian state of Queensland, the German state of Hessen, and the Canadian province of Alberta, for example, effectively treating *all* fossil specimens - i.e. collected from public *and private* land - as state/provincially-owned cultural treasures. The US state of South Dakota and the German state of Baden-Württemberg have both also adopted a similar approach, but only with regard to 'scientifically significant' specimens. Some evidence exists suggesting that the latter-mentioned (and less restrictive) approach operates more effectively in practice, since it does not to any significant extent disenfranchise any stakeholder group having an interest in using palaeontological sites. Such disenfranchisement can be greatly destructive with, for example, commercial collectors being steered towards illegal and irresponsible collecting activities and the disposal of specimens via the 'black market', and young recreational collectors being discouraged from becoming interested and actively involved in palaeontology. It is interesting to note that the ideology underlying the treatment of a resource as being state-owned - to retain specimens for the benefit of that state - actually contradicts the next logical step in the extension of that same ideology i.e. 'world-ownership' of the resource (and see 10.4.1 below).

State-ownership of fossil resources certainly in some cases appears to provide at least some tangible degree of resource protection. Very few Albertan specimens are in evidence on the international commercial market for specimens, and Baden-Württemberg's system of state-ownership of palaeontological resources, when allied with mandatory official certification of specimens disposed of on the commercial market, effectively legitimises and vets the sale of all fossils from the quarries of Holzmaden.

It is arguable that state-ownership of fossil resources is more appropriate when applied to geographically small and heavily populated countries with predominantly small sites. However, whether or not it is suitable, or even desirable, to extend the principle of state geoheritage resource ownership to countries having characteristically vast and rapidly eroding sites such as badlands and extensive coastline is open to debate. That regulatory measures are difficult if not impossible to enforce in such localities is well evidenced by the continuing loss of specimens as a



result of their theft from many sites in the US and Australia, and their subsequent sale to private collectors via the 'black market' (and see 10.4.3 below).

Even accepting the argument that fossils should constitute public property, a potential problem arises whereby small children could hypothetically be 'criminalised' when collecting and keeping abundant small fossils. Perhaps the only way to avoid this undesirable scenario would be to set down those types of fossil deemed to be of particular scientific significance - and therefore in genuine need of protection via state-ownership - on a list of 'proscribed' fossil types. Only the finding of 'proscribed' fossil types would have to be reported to the relevant authority. However, from a purely ideological perspective, in the absence of the provision of substantial public resources for public education, it is arguably both impractical and unjust to enforce such a system upon the wider public since the vast majority of them would neither understand the system, nor would they appreciate the extent of the required information with which any 'proscribed' fossil type would need to be submitted. Furthermore, it is likely that the vast majority of recreational collectors would not recognise a 'proscribed' fossil type even if they found one.

Finally, it is interesting to note that state-ownership of fossil specimens can actually result in public collections becoming 'clogged' with an excess of abundant and scientifically unimportant specimens, as has recently argued by some observers to have been the case in the Canadian province of Alberta. Furthermore, the administrative costs associated with receiving and documenting such specimens puts additional and unnecessary strain upon already stretched museum budgets.

### **10.3 ARCHAEOLOGICAL RESOURCE PROTECTION IN ENGLAND AND SCOTLAND**

The UK regulatory approach to archaeological resource protection ostensibly provides an interesting comparative model as regards resource ownership and collection. However, archaeological sites are *always* spatially small and commensurately vulnerable, whereas the majority of palaeontological sites are spatially extensive and essentially non-vulnerable in nature. Furthermore, those individuals seeking archaeological artefacts are relatively few in number and typically possess considerable expertise, whereas those individuals visiting palaeontological sites for recreational purposes are large in number, the vast majority of who have relatively little expertise or collecting experience. Furthermore, an archaeological artefact hunter *viz. a viz.* metal-detectorist requires expensive equipment and must undertake time-consuming site research, whereas a recreational fossil collector only requires a hammer (although this in itself is debatable) and a pair of strong boots. An

archaeological comparative analysis, whilst relevant and necessary, would accordingly upon initial consideration appear to be of limited value in the context of this thesis.

However, it is also clear that a number of useful parallels exist between archaeological and geoh heritage resource protection. First, archaeological sites are remarkably similar to vulnerable integrity-type palaeontological sites in that both are typically spatially small and contain a rare and finite resource. Secondly, metal-detectorists seeking and collecting archaeological artefacts are in many ways directly analogous to commercial fossil collectors in that both groups, whilst relatively expert in their respective fields, nevertheless have a history of confrontation and disagreement with scientific researchers. It therefore follows that several important lessons can be learnt from archaeological resource protection in the UK. It is certainly possible that the relatively few *genuinely* vulnerable palaeontological integrity sites could be afforded additional protection by scheduling them as 'Geological Monuments' in much the same way as archaeological sites are scheduled as Ancient Monuments. Palaeontological site conservators and museum researchers can also learn much from the Portable Antiquities Scheme, securing as it does both enhanced recording of finds, and perhaps more importantly, an increasingly positive relationship between scientific researchers and metal-detectorists.

Lastly, in effectively 'nationalising' the ownership of *all* archaeological artefacts, the Scottish Treasure Trove law is in some ways analogous with those regulatory approaches utilised in Alberta and parts of Germany for the protection of fossils. Whilst it is in many ways difficult to argue against the ideology underlying state-ownership, the actual implementation of such an approach is from a practical point of view typically fraught with problems related to enforcement, education of the wider public (and see 10.2.4 above), disenfranchisement of certain collector groups, the stifling of amateur scientific pursuits, and the discouragement of international co-operative research (and see 10.2.3.4 above).

## **10.4 WIDER ISSUES**

### **10.4.1 National or World Resource Ownership and the Meaning of Culture**

It remains debatable from a philosophical viewpoint whether or not the people of any country - as opposed to of the world - actually either *own*, or indeed have the inherent right to categorise as *nationally cultural* in nature, those palaeontological (and mineralogical) resources which were invariably deposited many millions of years prior



to the appearance of humankind, and since which that land yielding such resources has itself roamed the surface of the globe.

With the exception of human and food-animal cave fossil remains and industrially altered mineral specimens, the typically ancient processes of deposition and formation of fossil and mineral specimens have had nothing whatsoever to do with culture in the more generally accepted meaning of the word. It is accordingly arguable that the vast majority of geoh heritage objects stand outside the domain of cultural objects, comprising as they do the remains or products of truly ancient natural events and processes which occurred long before the appearance of man and his subsequent delineation of ownership of the globe. It is therefore arguable that it might be more ideologically sound to categorise only those fossils directly and indirectly associated with man and his activities since his first appearance on Earth as truly *cultural* in nature, with all other specimens being instead separately regarded and treated as 'natural Earth history objects'.

#### 10.4.2 Need for Collecting

Any regulation of the collection and ownership of specimens ultimately serves to some extent to discourage collecting activities. This in turn increases the likelihood that specimens at many spatially extensive and fast-eroding sites will, if not collected, be instead sacrificed to the processes of weathering. The science of palaeontology *needs* new specimens, and this fundamental requirement is best facilitated by encouraging *responsible* collecting activities through the development and introduction of suitable voluntary management measures. This is especially true given that the scientific community themselves are few in number, and are furthermore only able to spend relatively little time out collecting in the field.

The education and encouragement of the many thousands of keen and willing amateurs, as well as the cultivation of mutually beneficial partnerships with reputable commercial collectors, is therefore essential to the study of the earth sciences. Ironically, it is the law-abiding majority of these two groups of enthusiasts who are likely to adhere to regulations and be discouraged from collecting where deemed scientifically inappropriate, rather than that group who the controls are arguably most targeted at i.e. those relatively few unscrupulous and irresponsible individuals collecting for financial gain *only*.

### 10.4.3 Supply and Demand

Even in those relatively few cases where it *is* possible to regulate against the activities of those most hardened of profit-motivated collectors, a new problem can arise in that the resultant reduced supply of certain protected and sought-after specimens can lead to escalating prices for those few specimens which are still available (often via the 'black market'). Greater financial rewards in turn attract increased attention from ever more unscrupulous and criminally minded collectors wishing to supply those wealthy private collectors who are unconcerned as to the legality and/or morality of how and where the specimens were collected. It is of particular concern that those specimens disposed of via the 'black market' will almost certainly *never* be made available for any form of scientific study and/or documentation either prior or subsequent to their sale. The higher prices created by falls in supply of regulated specimens also financially disadvantages those museums seeking to purchase such specimens on the commercial market for research and/or display purposes.

As regards extremely rare fossils - such as a Solnhofen archaeopteryx - which are of both exceptional scientific importance and colossal commercial value, it is arguable that the international trade in such geoheritage specimens could be controlled by specific international agreement, as is the international trade in rare animals and plants (and associated products such as furs, herbs etc.) by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). (CITES controls the export and import of certain categories of species by way of a licensing system. Some 150 countries have acceded to CITES since the Convention came into force on 1<sup>st</sup> July 1975 - including the UK, the US, Australia, Canada, and Germany (all of which acceded during the first two years during which the Convention was in force).) It should be noted, however, that such a Treaty pertaining to the international trade in geoheritage specimens would, if introduced, *not* control the trade of those specimens sold to purchasers resident in that country in which the specimens were found. Furthermore, it is in any case arguable that acceding to the 1970 UNESCO Convention (on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property) by enacting appropriate domestic legislation affording specific protection to geoheritage specimens would perhaps be simpler and would achieve the same objectives (but see 10.2.3.1 above). It is also arguable that the market for *rare and scientifically important* fossil specimens is far less 'mainstream' than that for animal and plant products such as furs, aphrodisiacs, herbs etc. As a result, the contemporary 'greening' of the social conscience would not



reduce the demand for scientifically important geoheritage specimens in the same way which it undoubtedly has for animal and plant products. In addition, more stringent export and import controls married with the secretive and obsessive nature of many wealthy fossil collectors would simply result in extremely important fossil specimens being sold via the 'black market' as a consequence of which they would never be known to science at all. If nothing else, the largely unregulated commercial market as existing in, for example, the UK and the US at least facilitates a degree of transparency/visibility as regards what is being found and from where and by whom.

#### **10.4.4 Site-by-Site Basis**

The available evidence would appear to suggest that the regulation of collecting activities is largely impracticable, and arguably even unnecessary, for the vast majority of spatially extensive and resource-rich sites as epitomised not only by the arid desert/badland/outback areas found in Australia and the US, but also parts of the extensive coastline of England and Scotland. Any benefit obtained in the few instances where restrictions *are* successfully enforced in such areas will invariably be outweighed by the loss of uncollected specimens both to erosion and the 'black market'. It is therefore logical to conclude that the regulation of collecting activities should be implemented only where *genuinely* required and where *genuinely and realistically* enforceable and/or practicable - i.e. to protect, for example, vulnerable and typically inland integrity sites such as the Wren's Nest at Dudley in England and Lesmahagow in Scotland. Any national or, for that matter, international approach to the regulation of collecting activities must therefore - where introduced - be flexible in its approach and implementation. Sites should perhaps be graded into distinct categories, each of which would benefit from different and appropriate levels of protection if and as required.

It is also arguable that any form of 'blanket policy' for site protection and/or regulation of collecting activities - e.g. via state-ownership of fossil resources - could never ultimately prove truly effective for the simple reason that *all* sites are *different*, and as such should be used and conserved on a case-by-case basis with vulnerable sites being most zealously protected - and even excavated of their contents as a last resort if deemed absolutely necessary. It is accordingly arguable that any new nationally overreaching legislation regulating the use and conservation of palaeontological sites would be perhaps better directed at controlling the export and import of specimens rather than the collection thereof, although this option is itself also far from being free of problems (see 10.2.3 & 10.4.3 above).

#### **10.4.5 Need for Political Support and Public Awareness**

The formulation and successful implementation of any truly effective, equitable, and well-balanced national approach to the regulation of collecting activities will require considerable resource allocation. Adequate funding and support for any such scheme will require political awareness, a prerequisite for which is the support and interest of the electorate. It is therefore not only the co-operation of the wider public which is required to make any management measures a success in practice, but the general public's interest in, and concern for, fossil resources in the first place. It is accordingly arguable that the success of any management measures seeking to control collecting activities depends at least as much upon increased public education and awareness as upon the provisions of the measures themselves.



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## PERSONAL COMMUNICATIONS

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## LIST OF ABBREVIATIONS AND ACRONYMS

ALAA	American Lands Access Association
AMAAA	<i>Ancient Monuments and Archaeological Areas Act 1979</i>
BHI	Black Hills Institute
BLM	Bureau of Land Management
BMNH	British Museum of Natural History
CBA	Council for British Archaeology
CHCC	Charmouth Heritage Coast Centre
CPEIA	<i>Cultural Property Export and Import Act (Canada)</i>
CPIA	<i>Cultural Property Implementation Act (US)</i>
CROW	<i>Countryside and Rights of Way Act 2000</i>
DCMS	Department of Culture, Media, and Sport
DETR	Department of the Environment, Transport and the Regions
DOI	Department of the Interior (US)
EN	English Heritage
EN	English Nature
FBI	Federal Bureau of Investigation (US)
FPA	<i>Fossil Preservation Act 1996 (US)</i>
FWS	Fish and Wildlife Service (US)
GCG	Geological Curators' Group
HRA	<i>Heritage Resources Act 1978 (Alberta)</i>
HWM	High Water Mark (mean ordinary spring tides)
JNCC	Joint Nature Conservancy Council
LWM	Low Water Mark (mean ordinary spring tides)
MPL	Monument Protection Law (Germany)
NAS	National Academy of Sciences (US)
NCHC	National Cultural Heritage Committee (PMCHA -see below)
NFC	National Fossil Council (US)
NNR	National Nature Reserve (UK)
NPS	National Park Service (US)
OLD	Operation Liable to cause Damage (WCA - see below)
PAS	Portable Antiquities Scheme
PEA	Protected Excavation Area (Germany - Baden-Württemberg)
PMCHA	<i>Protection of Movable Cultural Heritage Act 1986 (Australia)</i>
PPG16	Planning and Policy Guidance Note No. 16
PRCA	<i>Paleontological Resources Conservation Act 1983 (US)</i>
PRPA	<i>Paleontological Resources Preservation Act (US)</i>
QTTC	Queensland Tourist and Travel Corporation
RIGS	Regionally Important Geological Sites
RNE	Register of the National Estate (Australia)
SAFE	Save America's Fossils for Everyone
SNH	Scottish Natural Heritage
SOAEFD	Scottish Office for Agriculture, Environment and Fisheries Dept.
SO	Scottish Office
SSSI	Site of Special Scientific Importance (WCA - see below)
SVP	Society for Vertebrate Paleontology (US)
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNSW	University of New South Wales (Australia)
US	United States of America
USFS	United States Forestry Service
USGS	United States Geological Survey
VPRPA	<i>Vertebrate Paleontological Resources Protection Act (US)</i>
WCA	<i>Wildlife and Countryside Act 1981</i>
YDCP	Yorkshire Dinosaur Coast Project



## APPENDIX I

### **Fossils under the Hammer: Recent US Natural History Auctions** by MIKE FORSTER

**ABSTRACT.** High sale prices currently being achieved for many rare and fine fossils results in increased pressure being placed upon both sites and museum acquisition budgets. Since the existence of a commercial market for palaeontological specimens is an inescapable reality for the foreseeable future, conservators and museum curators accordingly need to be aware not only of fossils' value as heritage items, but also their prevailing open market value in commercial terms. Over the last four years, many important specimens, including a small number originating from the UK, have been included in a number of natural history auctions held in New York. In common with other forms of upmarket interior decoration, certain fashions and media-led trends dictate which items are most in demand at any given time. The vast majority of fossils are sold to private buyers as opposed to publicly funded institutions. This is due not least to the fact that many museums tend to stay away from such sales in the belief that their attendance could be construed as an endorsement of what they perceive to be the recent and undesirable increase in the commerciality of fossils. It is therefore perhaps somewhat ironic to discover that a significant number of consignors comprise not commercial collectors and dealers, but palaeontologists selling specimens to fund their ongoing research activities. It is vital that the recent increase of awareness amongst the general population as regards the commercial value of fossils must be accompanied by a commensurate increase in awareness as regards the scientific, educational, and cultural importance of palaeontological sites and specimens.

Whatever one's views regarding the acceptability or otherwise as regards the existence of a commercial market for fossils, the indisputable reality today is that one possible future for many fossil specimens is that they will be bought and sold for profit. The commercial trade in palaeontological specimens is a well-established international business worth tens of millions of pounds per annum (Chure 1994). An increasingly broad spectrum of fossil material is available for sale today, both legitimately and via the black market, ranging from small cut and polished ammonites to entire vertebrate skeletons preserved in opal. Despite the fact that fossils have been collected commercially for centuries, the contemporary nature of the commercial market constitutes a source of great concern for many within the palaeontological community (e.g. see Shelton 1997). Truly phenomenal prices have recently been achieved at auction for particularly rare and fine specimens as epitomised by the 1997 sale of 'Sue' the T.Rex by Bonhams in New York for US\$8.36m. Such elevated prices owe more than a little to the recent burgeoning public and media interest in fossils in general, and dinosaurs in particular, as epitomised by the popularity of the recent television series *Walking with dinosaurs* and commercial success of the films *Jurassic Park I* and *Jurassic Park II*. No longer just fashionable interior decoration items for the home and office, fine fossils have, over recent years, acquired an element of investment value previously reserved for manmade fine arts, furnishings and collectibles. Indeed, fossils showed higher growth in price (15 times) between 1970 and 1990 than did English antique furniture and classic automobiles (Chure 1994).

The increasing financial value of fossils in general, and certain specimens in particular, has major implications for both site conservation and museum acquisition and curation (Shelton 1997). When even a single isolated dinosaur tooth can currently fetch hundreds or even thousands of dollars, illegal collectors in pursuit of a 'fast buck' can be sorely tempted to simply vandalise a skull for the teeth (rather than expend money, time and effort in responsibly and properly excavating and preparing the entire specimen) such as occurred recently in Montana when the skull of what is believed to be the largest Tyrannosaurus on record was seriously damaged by unscrupulous collectors (Day 1997). Furthermore, irresponsible, covert and hurried collecting activities invariably result in specimens being collected without the essential accompanying scientific information. Spiralling values also present palaeontologists



with an additional number of problems. Landowners (particularly in the US) realising the high monetary value of fossils located within their ownership can be tempted to restrict access for scientific investigative purposes, choosing instead to undertake potentially ineffectual and destructive attempts to retrieve specimens themselves for personal pecuniary gain. From a museum perspective, elevated fossil prices and values result in acquisition budgets becoming increasingly inadequate; specimens being at greater risk from theft once placed in collections; and increased costs being incurred to secure and insure museum collections, serving in turn to further strain already tight budgets. Museum staff must also maintain a keen and up-to-date awareness of both the availability and prevailing open market values of specimens in order to avoid paying excessive acquisition sums for pieces being touted by unscrupulous dealers as rarer than they actually are.

### **Recent natural history auctions**

Whilst fossils are available for sale from an increasingly diverse variety of commercial outlets ranging from tourist souvenir shops to home shopping television channels, this paper focuses instead upon the upper end of the commercial market for palaeontological specimens, and more specifically, those Natural History auctions held by Phillips Auctioneers in New York between 1996 and 1998. Phillips have never held such auctions here in the UK, and only commenced holding them in the US in June 1995. Comprehensive information was kindly made available by Phillips as regards their four most recent auctions held between June 1996 and May 1998 (although information on the previous three auctions held between June 1995 and June 1996 was not). Although fossils were included in natural history specimen auctions held in the UK during the early-1990s, it is the US which has recently seen the greatest activity in this relatively new commercial arena, with Phillips having being the major player. Although Bonham's auctioneers have also in the recent past conducted natural history auctions (including the above-mentioned sale of 'Sue' the T.Rex in 1997), they have not conducted any major natural history catalogue auctions in either the US or the UK since 1994. Another US auction house, Butterfield & Butterfield, recently held its first natural history auction simultaneously in San Francisco and Los Angeles in May 1998. Whilst the results of the same were not made available to the writer, the catalogued lots were extremely similar in format, number, and nature to those entered in those Phillips natural history auctions discussed here.

### **Analysis of the four auctions under consideration**

Phillips' last four major natural history auctions realised a combined sales total of approximately US\$2.1m, almost US\$1m of which was specifically attributable to the sale of fossils (Table 1).

The various lots included for sale in each of the four auctions can be readily grouped into four broad categories; these being fossils, mineral specimens, meteorites (including tektites) and other (lapidary, carvings, zoological items, and historic pieces such as old drawings and antique microscopes etc.). Fossils accounted for almost half the total proceeds of each auction (Table 1), and the results in terms of percentages do not demonstrate any particular trend either up or down in this regard since 1996.

It perhaps comes as little surprise that some 53% of fossils entered into the auctions under consideration originate from the US (Table 2). After the US, the top contributors comprised Germany (with specimens originating predominantly from Holzmaden, Solnhofen, and Messel), Morocco, China, and Russia. The four auctions in question included no fossils at all from South Africa, and Canadian material entered was limited to several pieces from old collections and three examples of the opalescent ammonite



*Placenticerias meeki* from Alberta (where this ammonite can be mined commercially under license from the provincial government of Alberta). With the exception of small opalised bivalves, belemnites, and partial vertebrate bones (which being both relatively abundant and well studied in scientific terms are accordingly deemed appropriate for export), Australian specimens were also notable by their relative absence (but see discussion pertaining to Ediacaran fossils below).

Auction Date	Total US\$000	Fossils ← -----US\$000 and % of Total-----	Minerals	Meteorites	Other
08/06/96	641.7	318.1 (49.6%)	92.8 (14.5%)	172.1 (26.9%)	57.9 (9%)
21/06/97	326.4	149.6 (45.8%)	48.3 (14.8%)	86.6 (26.5%)	41.8 (12.9%)
11/01/98	511.5	211.2 (41.3%)	60.9 (11.9%)	63.0 (12.3%)	176.4*(34.5%)
17/05/98	<u>613.6</u> 2093.2	<u>301.0</u> (49.1%) 979.9 (46.8%)	<u>39.1</u> (6.4%) 241.1 (11.5%)	<u>218.5</u> (35.6%) 540.2 (25.9%)	<u>55.0</u> (8.9%) 331.1 (15.8%)

Table 1. The results of the last four major Phillips natural history auction (\* includes one unusual and atypical item - a collection of carved mineralogical eggs - sold for US\$160k).

	Total for all four auctions	auction of 8 <sup>th</sup> June 96	auction of 21 <sup>st</sup> June 97	auction of 11 <sup>th</sup> Jan 98	auction of 17 <sup>th</sup> May 98
US	247 (42)	93 (10)	78 (28)	36 (4)	40
Germany	50 (6)	18 (4)	12 (2)	11	9
Morocco	48 (6)	19 (2)	11 (3)	10 (1)	8
China	30 (9)	9 (2)	13 (7)	4	4
Russia	15 (2)	8 (2)	2	1	4
Australia	15 (6)	1	10 (5)	4 (1)	-
France	10	2	1	2	5
Argentina	9	-	5	1	3
Canada	8	4	1	1	2
Brazil	6	2	1	2	1
UK	6 (1)	-	3	1 (1)	2
Italy	5 (1)	2	2 (1)	-	1
Madagascar	4 (1)	2 (1)	2	-	-
Lebanon	3	-	-	-	3
Bolivia	2	1	-	1	-
Romania	2	1	1	-	-
Uruguay	1	-	-	-	1
Peru	1 (1)	1 (1)	-	-	-
Indonesia	1	1	-	-	-
Switzerland	1	-	-	-	1

Table 2: Number of lots comprising palaeontological specimens entered into the auctions under consideration by country of origin (no. of unsold lots shown in brackets).

The comparative absence of material from Alberta, Australia, and South Africa seems to suggest that the stringent controls relating to the export of palaeontological specimens implemented by these countries are meeting with a significant degree of success, at least in so far as the more legitimate and openly public area of the market



is concerned. With the notable exception of Germany, comparatively little fossil material from Europe was in evidence in the auctions under consideration, with those specimens which did appear typically comprising fossil scallops, sand dollars and sea urchins from France, ammonites from the UK (and see Table 4), and fossil crabs from Italy.

Whilst far less auction lots originate from Germany (11% of total lots) and China (6%), than from the US (53%), lots from the former two countries nonetheless have a far higher average dollar value than do lots from the US (Table 3). Fossils from Germany and China accordingly play a far more significant role in Phillips natural history auctions than the number of lots (by country of origin entered into sales) would otherwise suggest. This is principally because lots from the former two countries consist mainly of visually dramatic (and contemporarily fashionable) vertebrate material such as marine reptiles, pterosaurs, and bats etc. (from Germany), and dinosaur skeletons, eggs or egg-nests, and birds (from China), whereas lots from the latter include a high proportion of less commercially valuable invertebrate material such as trilobites, ammonites, crustaceans etc. At the same time it is also notable that a number of fossils originating from China (e.g. items 16 & 17 in Table 5) appeared to achieve low sale prices relative to their pre-auction estimates. This perhaps suggests that the market is currently experiencing something of a glut of material from China, where the true extent of the abundant fossil wealth has only relatively recently come to be fully appreciated. Additionally, purchasers are wary of the fact that many Chinese specimens are exported illegally: Chinese government officials have been known to track down illegally exported specimens to their eventual owners/destinations (D. Uddo 1998 pers. comm.).

	Number of lots sold	Total value of lots sold (US\$000)	% of total fossil sales proceeds	Average value per lot (US\$)
US	205	423.2	43.2	2064
Germany	44	229.7	23.4	5221
Morocco	42	34.7	3.5	827
China	21	131.6	13.4	6264
Russia	13	26.1	2.7	2008
(UK	5	3.2	0.3	645)

Table 3 : Analysis of sales of palaeontological lots from the five most popular countries of origin (plus UK for comparative purposes).

### UK fossils

Those palaeontological lots included in the auctions in question originating from the UK (Table 4) comprised mainly ammonites plus one nautilid and a partial ichthyosaur rostrum. Amounting to US\$3225, the total price achieved for these six lots equates to a mere 0.33% of the total combined sale value of fossils for the four auctions. It is therefore apparent on the basis of this evidence that relatively few UK fossils have recently been entered into US natural history auctions. Given that the UK both undoubtedly possesses a variety of commercially valuable palaeontological specimens and has little or nothing in the way of measures effectively restricting the export of such material, this apparent dearth of UK fossils in US auctions is somewhat surprising. The reasons behind this are not readily apparent, and Phillips themselves are unsure as to why this should be the case (D. Uddo 1998 pers. comm.). Further research may accordingly prove revealing in this regard.

<u>Auction Date</u>	<u>Item no and brief description of lot</u> (Quote marks indicate extracts from Phillips' auction catalogues)	<u>Pre-auction estimate</u> (US\$000)	<u>Price achieved</u> (US\$000)
08/06/96	----- (no UK fossils were included in----- this particular auction)		
21/06/97	1 "Pair of mother-of-pearl ammonites", <i>Caloceras johnstoni</i> , Lower Lias, Somerset, England. The larger specimen measuring 4" in diameter; both specimens displaying "brilliant colours of green and red" and presenting on a 12" x 7.5" grey slate matrix.	0.3 - 0.4	0.35
	2 "A suite of British ammonites", <i>Asteroceras obtusum</i> , Lower Lias, Lyme Regis, Dorset, England. Three examples to 3.5" in diameter, one of which comprising two cut and polished halves.	0.4 - 0.6	0.6
	3 "Ammonite cluster", <i>Arnioceras cruciforme</i> , Lower Lias, Yorkshire coast, England. A 5" x 5" 'multi-block' displaying in excess of 20 prepared specimens.	0.6 - 0.7	0.4
11/01/98	4 "A collection of British ammonites", Lower Lias, Lyme Regis, Dorset, England. One large 11.5" x 10" block displaying over 50 small prepared <i>Promicroceras planicosta</i> and two smaller pieces displaying 3 <i>Asteroceras obtusum</i> specimens reaching 3" in diameter.	0.5 - 0.7	0.375
17/05/98	5 "Polished Mesozoic nautilid", species not given, 195-210m years old Humberside, England (the writer would suggest that the specimen is probably from the Lower Lias Frodingham Ironstone of the now inactive Connesby quarry the near Scunthorpe). "A 13" diameter ammonite standing 17" tall on its customised iron stand".	3.5 - 4.5	not sold
	6 "Ichthyosaur snout", <i>Ichthyosaurus</i> sp., Jurassic, Lyme Regis, Dorset, England. A 24 inch-long 3D piece with 10 original and intact teeth.	2.0 - 2.5	1.5

Table 4 : UK palaeontological specimens included in the last four Phillips natural history auctions held in New York between 1996 and 1998.

### Prevailing fashions and trends

By way of a further breakdown of available data, a number of particularly fine/aesthetically appealing and/or scientifically important specimens were chosen from each of the four auctions by the writer for detailed investigation (Table 5).

Those fossils which appear to be currently most in vogue at auctions are the 'showy' visually impressive pieces such as trilobites, crinoids, ammonites, starfish, agatised coral, opalised and opalescent fossils, dragonflies, fish, sea-scorpions, petrified wood, pine cones, leaves/fronds and flowers, as well as 'coffee-table conversation' items such



as dinosaur material (bones, teeth, coprolites, eggs and tracks), mammal skeletons/skulls and shark's teeth. Especially popular are the 'refined' i.e. decoratively mounted and/or framed items as epitomised by Wyoming Green River Formation (GRF) Eocene fossil stingrays, all three examples of which sold by Phillips since June 96 comfortably exceeded pre-auction estimates (items 3,12 and 21 in Table 5). A framed GRF palm frond (item 13 in Table 5) also sold for approximately double the pre-auction estimate, whereas impressive but unframed GRF fish and Holzmaden crinoid fossils (items 20 & 36 in Table 5) only made about half their pre-auction estimates. An auction sale relatively lacking in particularly aesthetically appealing and/or 'refined' items is accordingly likely to meet with limited sales success, as was the case for the auction of 21/06/97 (Uddo pers. comm. 1998) where only 47% of the catalogued lots selected by the writer were in fact sold. On a more general note, the market for fossils is, in common with other contemporary markets, significantly affected by prevailing fashions and trends. Amber prices, for example, soared in the wake of the films *Jurassic Park I* and *Jurassic Park II* (much in the same way that Hollywood's present-day pre-occupation with asteroids is currently stimulating demand for meteorite specimens) (D. Uddo 1998 pers. comm.).

### **Museums versus private parties as purchasers at auctions**

Many observers within palaeontology are concerned that scientifically important, rare, and visually dramatic fossils are increasingly being purchased by wealthy private collectors and commercial concerns rather than by museums. There is little doubt as to the museum display/research importance of many fossils entered into natural history auctions - see for example Phillips' descriptions for items 1,3,10,19,22,24,27,28,29,30, 34&36 in Table 5 (which also provides details as to whether specimens sold in the four auctions under consideration were purchased by private parties or museums). Given that especially expensive specimens bought by wealthy private parties are often secreted away, and as such are typically unavailable either for scientific study or public education and appreciation as museum exhibits, it is therefore somewhat alarming to discover that only one of the 40 items detailed in Table 5 was actually purchased by a museum as opposed to by a private party. Phillips themselves suggest that this is largely due to the fact that museums refrain from attending natural history auctions for two principal reasons. First, museums are concerned that their attendance at such auctions might be construed as an acceptance, or even an endorsement of the commercial market for fossils. Secondly, publicly funded museums typically face severely constrained finances and are accordingly unable to compete with wealthy private collectors. Conversely, and somewhat ironically, museums may also mistakenly overestimate their inability to afford to acquire certain rare and dramatic fossils at auction. A 70% complete, superbly restored, and mounted 36 inch-long *Allosaurus* skull (see item 10 in Table 5) does not in the writer's opinion seem to be prohibitively expensive at US\$40k. Whilst these reasons will hardly prove to be a revelation to most observers; what will perhaps prove somewhat surprising is the identity of many of those parties consigning specimens into US natural history auctions.

### **Palaeontological academics: the auctioneers friend or foe?**

Phillips' natural history auction coordinator purports that approximately 60-65% of the majority of consignors to their natural history auctions somewhat ironically comprise not commercial dealers, but professional palaeontologists who are disposing of surplus items from their research collections (these presumably being private collections as opposed to public, but the precise position in this regard remains unclear and difficult, if not impossible, to establish with any degree of certainty) in order to ameliorate their lack of funding (D. Uddo 1998 pers. comm.). Whilst all those involved within palaeontology worldwide are well aware of the prevailing general scarcity of research



funding, it nevertheless seems somewhat hypocritical on one hand that scientists as a group tend to regard the existence of a commercial market for fossils with concern and suspicion, but on the other hand quietly and surreptitiously fuel the same.

Irrefutable proof of such activities is extremely difficult to obtain, but the appearance of certain specimens in auction catalogues for the sales in question does perhaps lend some credence to this scenario. For example, the sale catalogue for the auction of 11<sup>th</sup> January 1998 included two lots (unsold on the day of the auction) comprising rare Ediacaran PreCambrian *Dickinsonia* sp. and *Rugonocites* sp. fossils from Australia's protected Ediacara Fossil Reserve. Correspondence with Ben McHenry, Collection Manager of Earth Sciences at the South Australia Museum, revealed that all Ediacaran material currently appearing on the open market could have only reached there by two ways: either by being illegally collected and exported (unlikely since Phillips insist upon fossils consigned for auction being accompanied by any requisite paperwork (D. Uddo pers. comm. 1998)), or legally collected (or donated by Australian palaeontologists) and exported, and then unethically sold by whichever party (i.e. *non*-Australian palaeontologists) had originally persuaded Australian palaeontologists to allow export in the first place (McHenry 1998). It must be noted, however, that it is also possible that the specimens in question might have been collected and exported before Australia's Protection of Moveable Cultural Heritage (1986) Act became effective in 1987. The hypothesis that a number of palaeontologists are selling surplus research specimens is not that untenable, given the fact that in recent years, even scientists themselves have come under scrutiny in connection with a number of thefts of rare and valuable specimens from the Russian Palaeontological Institute in Moscow (Harrigan 1998). A legal inquiry into this matter is currently in progress (Benton 1998).

<u>Item no and brief description of lot</u> (Quotation marks indicate extracts from Phillips auction catalogues	<u>Pre-auction estimate</u> (US\$000)	<u>Price achieved</u> (US\$000)	<u>Purchaser</u> P (private) M (museum)
<b><u>Auction of 08/06/96</u></b>			
<i>(Of the fourteen lots selected by the writer, ten (71%) were sold on the day)</i>			
1 'A complete fossil snake skeleton', <i>Boidae</i> unnamed species, Eocene, Messel, Germany, - described in catalogue as an 'important research specimen.'	5.0-6.0	8.0	P
2 'An important mosasaur skull', <i>Tylosaurus prorigor</i> , Cretaceous, Niobrara formation of Kansas, US. 36.5" long. Collected in 1900s by George F. Steinberg.	15.0-18.0	16.0	P
3 'A giant fossil stingray', <i>Heliobatis radians</i> , Early Eocene, Green River Formation (GRF), Wyoming, US. Claimed to be the largest ever GRF specimen at 38.5" long by 18.5" wide. Mounted and framed.	9.0-12.0	13.0	P
4 'Huge pterosaur wing', <i>Pteradon p. sternbergi</i> , Cretaceous, Niobrara Formation, Kansas, US. 'An extremely rare almost complete 8 ft wing including hand and three claws'. Mounted.	9.0-12.0	9.0	P
5 'An extremely rare flying dinosaur', <i>Pterodactylus kochi</i> , Jurassic, Solnhofen, Germany. Displayed on a 13.5" x 18.5" matrix slab. Collected in 1981 and subsequently retained in a private collection in Germany.	30.0-60.0	55.0	P



- |   |            |      |   |
|---|------------|------|---|
| 6 'Large opalescent ammonite', <i>Placenticerus meeki</i> , Cretaceous, Bearpaw Formation, Alberta, Canada. 24.5 " in diameter.   | 7.0-9.0    | 7.5  | P |
| 7 'An extremely large shark tooth', <i>Carcharodon megalodon</i> , Miocene, Morgan River, South Carolina, US. The 7" long tooth 'is one of only a handful of this size ever discovered.'  | 4.0-6.0    | 3.5  | P |
| 8 'A superb fossil bat', <i>Hassianyeteris messelensis</i> , Eocene, Messel Formation, Germany. 3" x 2.75" and mounted on a polymer block.  | 2.6-3.1    | 2.0  | P |
| 9 'A rare fossil bird' <i>Phalacrocorax filyawi</i> , Pliocene, Richardson Formation, Sarasota County, Florida, US.   | 3.5-4.0    | 2.0  | P |
| 10 'An extremely rare carnivorous dinosaur skull', <i>Allosaurus fragilis</i> , Jurassic, Morrison Formation, Albany County, Wyoming, US. 39" x 19.5" x 23 ", 70% complete with 12 original teeth. Excellent preservation and mounted on custom steel frame and oak base. | 70.0-100.0 | 40.0 | P |

**Auction of 21/06/97**

*(Of the seventeen lots selected by the writer, only eight (47%) were sold on the day)*

- |   |           |      |   |
|---|-----------|------|---|
| 11 'An exceptional ichthyosaur fossil', <i>Stenopterygius quadriscissus</i> , Jurassic, Holzmaden, Germany. 54" in length and embedded in a slab of Holzmaden slate.  | 25.0-30.0 | 17.0 | P |
| 12 'A fine fossil stingray', <i>Heliobatis radians</i> , Early Eocene, GRF, Lincoln County, Wyoming, US. 17" long x 7.5" across and mounted and framed.   | 2.2-2.6   | 5.5  | P |
| 13 'A superb opalised fossil clam', species not given, Cretaceous, Coober Pedy, Australia. A 'solid red opal' clam measuring 1.25" x 1.0" x 0.5" weighing 45 carats.  | 4.0-6.0   | 3.25 | P |
| 14 'Trilobite' <i>Psychopyge elegans</i> , Devonian, Hamar Laghdad Formation, Mount Issamour, Morocco. 'An excellent example' measuring 4" x 3" x 0.75".  | 3.5-5.0   | 1.5  | P |
| 15 'Opalescent ammonite', details as for 6 above, but 10.5" in diameter.  | 2.8-3.2   | 4.0  | P |
| 16 'An exceptional dinosaur skeleton', <i>Psittacosaurus meileyingensis</i> , Cretaceous, Jiufotang Formation, Liaoning Province, China. Virtually complete and well preserved skeleton on a 35" x 20" matrix slab. 'Only six other specimens described in journals' up until sale. | 20.0-30.0 | 13.0 | P |
| 17 'A rare raptor egg', <i>Oviraptor</i> sp., Cretaceous, Nanchao Formation, Henan, China. Complete with most of the original shell and some 7" in length.  | 6.0-8.0   | 3.5  | P |
| 18 Two saltosaurus eggs', species not given, Cretaceous, Lecho Formation, Salta, Argentina. One egg unhatched and subsequently replaced with agate, the other egg hatched and somewhat compressed.  | 6.0-8.0   | 3.75 | P |

**Auction of 11/01/98**

*(Of the thirteen lots selected by the writer, nine (69%) were sold on the day, including one lot originating from the UK - see item 4 in Table 2 above).*

<b>19</b> 'A fossil death track!', <i>Mesolimulus walchi</i> , Jurassic, Solnhofen, Germany. Horseshoe crab fossil 7.5" long complete with pre-death track-way. 'Only four similar pieces in European museums.'	3.5-4.5	3.75	P
<b>20</b> 'A complete armoured fish fossil', <i>Lepisosteus simplex</i> , Eocene, GRF, Wyoming. A virtually complete 26" x 10" skeleton with heavily enamelled scales of one of the rarest of the GRF fishes.	5.5-7.5	2.5	P
<b>21</b> 'A well-preserved fossil stingray', details as for 12 above, but 23" x 14" in size.	2.8-3.5	4.5	P
<b>22</b> 'An extremely rare woolly rhinoceros horn', <i>Coelodonta antiquitatis</i> , Pleistocene, Siberian Permafrost, Russia. A large piece at 38" long, up to 8.5" deep and 1.5" wide. 'Only two other specimens are on display in European museums with none at all known to be in US private collections.'	25.0-30.0	15.0	P
<b>23</b> 'Outstanding Holzmaden crocodile specimen', <i>Stenosaurus</i> sp., Early Jurassic, Posidonienschiefer Formation, Holzmaden, Germany. A 92" long specimen 'of the highest museum quality.'	50.0-60.0	45.0	P
<b>24</b> 'Dinosaur mother and egg nest', <i>Oviraptor</i> sp., Late Cretaceous, China. Two limb bone elements with a partial clutch of eggs. A 'superb museum piece' measuring 14" long and 12" high.	45.0-50.0	32.0	P
<b>25</b> 'An impressive Allosaurus claw', <i>Allosaurus fragilis</i> , Jurassic, Morrison Formation, Moffat county, Colorado. 'Beautifully preserved and complete from tip to claw' and 8" long across the top curve. 'An exceptionally rare piece.'	10.0-12.0	7.0	P
<b>26</b> 'A carnivorous dinosaur jaw', <i>Carcharadontosaurus saharicus</i> , Cretaceous, Kem-Kem area, Taouz, Morocco. A complete 18" long right dentary with 15 teeth and 3 alveoli for the three posterior teeth. A 'magnificent rare specimen.'	9.0-10.0	6.0	P
<b>27</b> 'A baby pterosaur', <i>Pteridactylus antiquus</i> , Jurassic, Solnhofen, Germany. A tiny skeleton only 3" long which 'may qualify as the world's smallest pterosaur skeleton' and 'only one other Solnhofen specimen exists (housed in the Munich museum) making this remarkable specimen extremely rare and important in the study of developmental growth rates in fossil pterosaurs.'	26.0-29.0	24.0	P
<b><u>Auction of 17/05/98</u></b>			
<i>(Of the fifteen lots selected by the writer, thirteen (or 87%) sold on the day, including one lot originating from the UK - see item 6 in Table 4 above).</i>			
<b>28</b> 'Colossal petrified tree trunk', species unspecified Jurassic, Chinle Formation, Arizona, US. Halved vertically and polished with each polished face measuring 59" high by 22" wide. 'No finer specimen is available.'	14.0-16.0	19.0	P
<b>29</b> 'Gigantic petrified wood slice', <i>Araucarioxylon arizonicum</i> , Jurassic, Chinle Formation, Arizona, US. 'This is the largest (at 70" x 49") intact cross section of Arizona petrified wood. No museum has a specimen as massive. Can be used as a desk or table top.'	35.0-40.0	22.0	P



30	'The finest cycad in the world', <i>Cycadeoidea</i> sp., Cretaceous, Patagonia, Argentina. 'The first known specimen from South America' and 'the most complete cycad known.' A 31" x 17" specimen 'complete with main root and two broken branches and showing 'superb surface articulation. This 220 lb. trunk would be the centrepiece in any palaeobotany exhibit at any museum'	18.5-24.0	18.0	P
31	'A spectacular fossil palm frond', <i>Palmacites</i> or <i>Sablites</i> sp., Early Eocene, GRF, Lincoln County, Wyoming, US. 'Only a handful of fronds are as captivating as this specimen.' A wood-framed shale matrix plate 6' high x 5' wide.	20.0-25.0	43.0	P
32	'A fine Jurassic dragonfly', <i>Stenophlebia latreilli</i> , Jurassic, Solnhofen, Malm, Germany. A 4.5" x 3.0" specimen on a trimmed 8" square slab.	0.9-1.2	0.9	P
33	'A grotesque rare Russian trilobite', <i>Hopliolichas furcifer</i> , Ordovician, Volchov Formation, St. Petersburg, Russia. 'Perhaps the largest known example of this rare Russian species' and 'one of twenty known from this locality.'	2.5-3.0	2.0	P
34	'The obelisk: a rare and spectacular fossil starfish slab', <i>Pentasteria longispina</i> , <i>Ophiomuseum gagnebini</i> , and <i>Ophiopetra oertlii</i> , Upper Jurassic, Wessenstein, near Solothurn, Switzerland. Collected in 1979 by Solothurn museum. With over 50 brittle stars and starfish including 'the finest specimen of <i>Ophiopetra oertlii</i> ever collected.'	8.5-9.5	7.0	P
35	'A chic New York trilobite', <i>Arctinurus boltoni</i> , Silurian, Rochester Shale Formation, Middleport, New York. A large and ornate trilobite 6" in length. 'Only two others have been unearthed of similar quality.'	3.5-4.5	4.5	M(I)
36	'An exquisite Jurassic flower', <i>Seirocrinus subangularis</i> , Lower Jurassic, Posidonienschiefer Formation, Holzmaden, Germany. A complete crinoid specimen measuring 53" in length preserved intact on a 63" x 31.5" trimmed matrix slab and 'one of the finest examples ever unearthed.'	65.0-80.0	29.0	P
37	'A very rare moon fish fossil', <i>Mene rhombeus</i> , Early Eocene, Monte Bolca, Italy. 'This singular specimen measuring 11.5" x 9.5" was exhibited for more than 60 years at the Natural History Museum at Eton College.'	4.0-6.0	5.0	P
38	'An extinct marine crocodylian from the age of dinosaurs', <i>Stenosaurus bollensis</i> , Early Jurassic, Posidonienschiefer Formation, Holzmaden, Germany. 'This rare impressive specimen contains most of the skull and lower jaw and at least eleven vertebrae, as well as articulated cervical ribs and other bones.'	14.0-17.0	6.0	P
39	'A superb turtle skeleton', <i>Trionychidae</i> sp., Early Eocene, GRF, Lincoln County, Wyoming, US. 'A remarkably well-preserved turtle with its dorsal side exposed' and having 'an undistorted and intact 16" carapace'. Mounted and framed so as to comprise a 'superlative example of decorative natural history.'	55.0-75.0	40.0	P

40 'Dinosaur egg nest - an outstanding aesthetic example', Possibly *Hadrosaur* sp., Late cretaceous, Xixia Formation, Henan Province, China. 'A visually arresting clutch of eggs' with four and one retaining 90% and 50% of their shell respectively and averaging 4.25" in length. 8.0-12.5 9.0 P

Table 5. Lots selected by the writer from the four auctions in question, along with their respective pre-auction estimates, sale prices realised, and whether purchased by a public institution/museum or a private collector.

## Conclusions

All those involved with the use and conservation of the UK's fossil heritage must, at least for the foreseeable future, both accept the reality of, and keep up to date with, developments within the commercial fossil market. Whilst it appears that only a small number of UK fossils - and relatively modest ones at that in terms of scientific significance, display quality, and price - have recently been included in US natural history auctions, UK scientists and conservators nevertheless accordingly need to stay fully informed as regards trends and prices within the commercial market. Any future increase in commercial demand for certain fossil specimens will inevitably result in greater collecting pressure being placed upon localities holding such specimens, as well as a greater risk of specimens being subjected to scientifically irresponsible and/or illegal collecting activities. Perhaps of most concern to conservators and curators is the fact that the vast majority of auctioned specimens are purchased not by museums but by private parties, and as such are permanently lost from the public domain. This undesirable situation is possibly being exacerbated by scientists themselves, who it is alleged are disposing of surplus research specimens through auction sales.

It is arguable that the palaeontological community must resign itself to accepting the increased commercial value of fossils, but it does not have to accept the currently relatively low level of public information pertaining to the other intrinsic values of our fossil heritage. Indeed, active public support and funding for palaeontology are unlikely to grow unless the general public are made more fully aware of the wider scientific, educational, cultural, historical, and entertainment value of the fossil resource as opposed to the value of certain high-profile specimens in commercial terms only. Fossils are also fun, and palaeontologists must determinedly strive to first stimulate, and then satisfy, public demand for the wonders and fascination of ancient environments and their inhabitants, the variety and strangeness of which challenge and fire the imagination as much as any works of science fiction or fantasy. Given the recent media popularisation of dinosaurs, it would appear that there has never been a better time for all those having an interest in the use and conservation of the UK's palaeontological sites to set about undertaking this vital task.

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## APPENDIX II

### WEST DORSET COAST QUESTIONNAIRE

(Using a pen coloured other than black, please tick the relevant box and/or circle the appropriate number to indicate your chosen response)

#### VALUE JUDGEMENTS

1. Listed below are the major values typically associated with fossil resources. Please weight each value to reflect its importance according to your own particular viewpoint - 1 being of minimum importance through 5 being of maximum importance.

• Scientific value	1	2	3	4	5
• Educational value	1	2	3	4	5
• Cultural heritage value	1	2	3	4	5
• Artistic/aesthetic value	1	2	3	4	5
• Recreational/hobbyist value	1	2	3	4	5
▪ Commercial value	1	2	3	4	5

2. Can you think of any other significant value intrinsic to the fossil resource which is not listed above?

No

Yes - if so, please state why \_\_\_\_\_

3. In broad terms, do you consider fossils to be of greater overall value if extracted from the ground (*ex situ*) or left in the ground undisturbed (*in situ*)?

*Ex situ*

*In situ*

Both

#### ISSUES AND CONFLICTS

4. Listed below are a number of issues and/or conflicts which have in recent years been identified by various interest groups as compromising the best use and conservation of English palaeontological sites. Please weight each issue/conflict to reflect its significance according to your own particular viewpoint - 1 being of minimum importance through 5 being of maximum importance.

• Loss of important scientific information as a result of inappropriate/irresponsible collecting activities	1	2	3	4	5
• Lack of wider public awareness regarding issues connected with the use and conservation of fossil resources	1	2	3	4	5
• Indiscriminate hammering of fossils by educational and recreational collectors	1	2	3	4	5
• Excessive commercial exploitation of the fossil resource	1	2	3	4	5
• Contemporary increase in geologically oriented tourism resulting in greater pressure being placed upon fossil resources	1	2	3	4	5
• Lack of political interest in, and government funding for, the conservation of fossil sites and specimens	1	2	3	4	5
• Loss of UK fossils abroad through unregulated export	1	2	3	4	5
• Lack of site signage/interpretation offering public information/guidance	1	2	3	4	5
• Lack of widely available fossil collecting guidance for educational and recreational collectors	1	2	3	4	5

(Continued)



**DORSET JURASSIC COAST PROJECT - FOSSIL COLLECTING CODE OF CONDUCT**

5. Listed below are the five primary objectives as set out in the recently introduced Code. To accurately reflect your own particular viewpoint, please rate the five objectives in terms of how well the Code is working to date in terms of achieving the same - 1 indicating no success through 5 denoting a high degree of success.

- Promotion of safe and responsible fossil collecting  
1            2            3            4            5
- Restriction of excessive digging of, or prospecting for, fossils along fossil-rich strata  
1            2            3            4            5
- Clarification of ownership of fossil  
1            2            3            4            5
- Promotion of better communication between all those user groups having an interest in fossils from the West Dorset coast  
1            2            3            4            5
- Promotion of the acquisition of key scientifically important fossils within recognised museum collections  
1            2            3            4            5

6. In more general terms, do you feel that the Code successfully balances/accommodates the interests of all user groups having an interest in fossils from the West Dorset coast?

- Yes
- No - please comment: \_\_\_\_\_  
\_\_\_\_\_

7. Do you feel that your own concerns and opinions were both fully heard and taken account of during the consultation process preceding the introduction of the Code?

- Yes
- No - please comment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Do you personally feel that the Code could be improved upon in any way?

- No
- Yes - please comment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**DORSET JURASSIC COAST PROJECT - SCIENTIFICALLY IMPORTANT FOSSILS RECORDING SCHEME**

9. Do you feel that the Recording Scheme is meeting with a satisfactory response from collector groups?

- Yes
- No - please comment: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Continued)

10. Do you feel that the fossils recorded to date are attracting a satisfactory level of attention and interest from the scientific community?

Yes

No - please comment as to why do you consider this to be the case: \_\_\_\_\_

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11. Do you feel that your own concerns and opinions were fully heard and taken account of during the consultation process preceding the introduction of the Recording Scheme?

Yes

No - please comment: \_\_\_\_\_

---

---

12. Do you consider that the Recording Scheme could be further refined and/or improved upon in any way?

No

Yes - please comment: \_\_\_\_\_

---

### NEED FOR ADDITIONAL MANAGEMENT MECHANISMS

13. Are you of the opinion that additional regulatory and/or further voluntary management mechanisms - i.e. in addition to the current system of SSSI notification and the recently introduced Code and Recording Scheme - are required to ensure adequate protection of the West Dorset coast's fossil resources?

No

Yes - please comment: \_\_\_\_\_

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### GENERAL

14. In the event that you witnessed/were aware of local fossil collecting activities of an irresponsible and even destructive nature, who would you first think of alerting in order to instigate remedial action?

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15. Further to your response to 14. above, do you feel that any remedial action could in practice be undertaken quickly and effectively enough to comprise a realistic deterrent to irresponsible collectors?

Yes

No - please briefly state why not: \_\_\_\_\_

---

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16. Do you feel that the UK requires new legislation restricting/controlling the export (and import) of fossils?

Yes

No - please comment: \_\_\_\_\_

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(Continued)





## APPENDIX III

### YORKSHIRE DINOSAUR COAST PROJECT

#### **AIM**

To conserve the exceptional geological heritage of the area by raising peoples' awareness and understanding.

- Geological heritage is seen to include:
  - The landscape and exposures along the coast.
  - Museum collections.
  - The local history of the science of geology.
- The project is focused on the coastal area from Staithes to Filey Bay.

#### **OBJECTIVES**

1. Organise and deliver a programme of geological events (guided walks, workshops, talks etc.).
2. Produce a popular guide to the geological heritage of the area.
3. Produce semi-permanent site-based interpretation materials for specific locations within the area (sign-boards, trail leaflets etc.).
4. Produce displays for a variety of venues.
5. Work with Scarborough and Whitby Museums to maximise and integrate the use of their geological collections.
6. Convene a working group of all interested parties to discuss the pressures on the fossil resource of the area and to explore the need for a formal protocol.
7. Participate in more traditional conservation of the geological heritage of the area, in particular work with the local RIGS group to designate and develop inland sites to reduce the pressure on coastal localities.
8. Consider long-term future of the project.

#### **GENERAL PRINCIPLES**

The following principles underlie the project and the above objectives.

- Take an imaginative and innovative approach. In particular, explore new avenues wherever possible, including new venues, new target audiences etc.
- Work in partnership with interested parties to maximise (rather than duplicate) the use of time, effort and resources.
- Integrate the geological heritage with associated themes: flora, fauna, history, archaeology etc.
- Utilise community facilities and local businesses as venues wherever possible.
- Encourage visitors to stay longer at any chosen site (taking advantage of local businesses and reducing car mileage) and also stay longer in the area (supporting local hotels, B&Bs and restaurants).
- Take due regard of the pressures on the fossil resource of the area and ensure that all interpretation highlights this sensitive issue.
- The basic audience of the project are the members of the local community and visitors to the area, particularly family groups.
- Geological knowledge, expertise and connoisseur-ship underpins the project.
- Promote the project and its outputs.

#### **PROJECT PARTNERS**

European Union (European Regional Development Fund), Yorkshire and Humberside Museums Council, Scarborough Museums and Gallery (Scarborough Borough Council), Whitby Museum (Whitby Literary & Philosophical Society) & North York Moors National Park.

11/01/00 (version 1<sup>st</sup> December 1999)



## APPENDIX IV

# GUIDANCE FOR FOSSIL COLLECTORS

*“Enjoying RESPONSIBLE and SAFE fossil collecting along the North Yorkshire coast”*

This Guidance Note has been produced by the North Yorkshire Coast Fossil Forum which comprises a working group including representatives from conservation agencies, landowners, museums, universities, geological societies, and local commercial fossil collectors. The Forum's principal task is to ensure the best use and conservation of the nationally and internationally important North Yorkshire coast fossil resource. The Forum accordingly seeks to promote:

## **RESPONSIBLE fossil collecting activities AND SAFE fossil collecting practice**

### **THE NORTH YORKSHIRE COAST AND ITS FOSSIL HERITAGE**

The North Yorkshire coast stretches over 40 miles from Staithes in the north down through Whitby, Scarborough, and Filey to Speeton in the south. The aesthetic appeal and cultural heritage of this visually dramatic stretch of coastline attracts large numbers of tourists throughout much of the year, a significant number of whom visit the area to both look for and learn more about fossils.

Much of the North Yorkshire coast's extensive cliff and foreshore exposures comprise horizontal layers of rock laid down as marine and estuarine sediments between 190 and 130m years ago. These geological sequences offer scientific researchers and other fossil collecting groups a wide range of often extremely well-preserved marine fossils: these include common finds such as ammonites and belemnites as well as rarer and more scientifically important finds such as reptiles and fish. Moreover, certain localities yield dinosaur footprints, with such occurrences having led to the North Yorkshire coast having recently become more popularly known - particularly in media circles - as the 'Yorkshire Dinosaur Coast'.

### **WHY OUR FOSSIL HERITAGE IS IMPORTANT AND SHOULD BE CONSERVED**

Fossils provide us with tangible evidence of how life has evolved since it first appeared on Earth billions of years ago. Without fossil evidence, we would know nothing about many now-extinct creatures such as the dinosaurs which so readily capture everyone's imagination. Fossils also in many ways record the changes in ancient environments thereby affording us a greater understanding of how the Earth's climate has changed throughout the ages. It is therefore clear that fossils constitute a major scientific and educational resource. As public and media interest in fossils continues to grow, available fossil resources come under increasing pressure from an ever-growing number of collectors. It is for this reason that the North Yorkshire coast's fossil heritage must be carefully managed and responsibly collected from, so that it can provide maximum benefit for all those groups of individuals interested in using and conserving it, whether their interest be for scientific, educational, recreational, or commercial reasons.

### **THE ROLE OF FOSSIL COLLECTING**

Many locations along the North Yorkshire coast are subject to rapid natural erosion with new fossils being exposed on an almost day-to-day basis. Fossil collecting accordingly has a useful role to play at such localities in that newly revealed specimens are quickly retrieved before they are damaged or destroyed by the sea. Furthermore, recreational fossil collecting in particular also offers a wide variety of people an opportunity to participate in discovering and learning about Earth's ancient past, and also on occasion to directly contribute to the furtherance of scientific study by reporting the finding of rare and unusual specimens. However, whilst fossil collecting doubtless has a useful role to play in the general furtherance of palaeontology, it cannot be over-emphasised that all collecting activities must be undertaken in a **RESPONSIBLE** and **SAFE** manner.

(Continued)

## **RESPONSIBLE fossil collecting**

The following comprises a general list of practical advice for *RESPONSIBLE* fossil collecting.

- **ONLY COLLECT FOSSILS FROM LOOSE BEACH DEPOSITS**

Fossils are most easily found in beach shingle deposits which are constantly being both turned over by tidal movements and replenished by frequent falls of new material from nearby cliffs.

- **ONLY COLLECT A SMALL NUMBER OF FOSSILS**

This will help ensure that everyone visiting the North Yorkshire coast for its fossil interest has an opportunity to enjoy the thrill of finding his or her own fascinating piece of Earth's ancient past.

- **KEEP HAMMERING TO A MINIMUM**

In particular, collectors should refrain from hammering at fossils which are wholly or partly encased in foreshore rock-layers and large boulders. This is only likely to result in the damage and destruction of such specimens, thereby denying all subsequent visitors to the coast the opportunity to also enjoy looking at them. Furthermore, piles of loose and often sharp rock fragments resulting from excessive hammering activities are both unsightly to look at, and can constitute a risk to the bare feet of others wishing to enjoy the coastline for recreational pursuits other than fossil collecting.

- **ALWAYS KEEP DETAILED RECORDS**

Collectors should always record precisely the locality and date where and when each fossil collected was found, and also ensure that all such written information is cross-referenced and kept with the collection to which it relates. Not only is the recording and documenting of finds in this way correct from a strictly scientific point of view, it also serves to enhance the future enjoyment of the fossil collection both by the finder and all other parties who see it subsequently.

Furthermore, collectors will occasionally encounter exciting finds which are of key scientific significance. It is vital that any extremely rare and/or scientifically important fossils be registered on the North Yorkshire coast *VOLUNTARY RECORDING SCHEME* - more specific details of which can be found below in the latter section of this Guidance.

- **ALWAYS PROTECT SPECIMENS COLLECTED BY WRAPPING THEM IN PAPER OR CLOTH PRIOR TO PLACING THEM IN A STURDY BAG FOR SAFE TRANSPORT HOME**

- **AVOID DISTURBANCE TO WILDLIFE**

- **JOIN A RECOGNISED GEOLOGICAL ORGANISATION**

Any collectors who are still in any way unsure as to how to collect responsibly should consider joining a recognised national or local geological society or voluntary group. Joining such a group will help to increase your knowledge of rocks and fossils and the amount of interest and pleasure you get from collecting, will offer you opportunities to go out on expert-led group collecting trips, and will afford you an opportunity to more fully familiarise yourself with issues connected with the responsible use and conservation of the North Yorkshire coast's fossil heritage. Should you wish to so become further involved, then please contact your local museum who will be pleased to advise you.

## **SAFE fossil collecting**

The following comprises a general list of practical advice for *SAFE* fossil collecting.

- **CONSULT LOCAL TIDE TABLES BEFORE UNDERTAKING ANY COLLECTING ACTIVITIES**

(Continued)



It is strongly advisable that collecting activities be undertaken on a falling tide. Tide tables can be found on sale at many local newsagents, and if collectors are unable to get hold of a copy in this way, then they should seek local advice or as an absolute last resort telephone the coastguard's office.

- **STAY WELL AWAY FROM THE BASE OF STEEP CLIFFS WHEN COLLECTING FOSSILS**

Owing to constant erosion, the North Yorkshire coast's many stretches of often sheer cliffs are prone to continual crumbling and slippage. Even small falling rock fragments can cause serious injury, and uninformed or irresponsible collectors searching close to the base of cliffs not only put themselves in great danger, but also encourage younger and other less informed collectors into mimicking their activities and in turn placing themselves in great danger.

- **LET SOMEONE KNOW WHERE YOU ARE AND AT WHAT TIME THEY CAN EXPECT YOU TO RETURN**

Collectors should always take care, so far as is practicable, to advise someone not out collecting with them - such as a friend, neighbour, landlady, hostel worker etc. - as to precisely where they are going to collect, and at what time they can be expected to safely return.

- **WEAR SENSIBLE BOOTS, GLOVES, AND CLOTHING.**

Collectors should bear in mind the often rugged and slippery nature of the foreshore upon which they will be walking, and should furthermore be careful to pay attention to local weather forecasts before embarking upon collecting trips.

## **VOLUNTARY RECORDING SCHEME**

As stated previously in *RESPONSIBLE fossil collecting* above, collectors will occasionally encounter exciting finds which are of key scientific significance. It is vitally important that the discovery and/or collection of any such fine and/or rare specimens is made known to scientists as quickly as possible to enable them to more effectively carry out their research. The Yorkshire Coast Fossil Forum has accordingly established a *VOLUNTARY RECORDING SCHEME* to provide scientists with a means by which they can become aware of new and exciting fossil finds made along the North Yorkshire coast. The written copy of the record is kept at Scarborough Museum, whilst an Internet web-site version will soon be accessible to scientists located all over the world.

### Fossils Suitable for Recording

The following list offers some general guidance as to which fossil types should be brought forward for recording.

- Any fossil specimen which might possibly represent a new species - regardless of which group of creatures to which it belongs, whether it be vertebrate, invertebrate, or plant.
- Extremely rare fossils which although not new species are nonetheless of great scientific significance. Examples include: pterosaurs, plesiosaurs, certain species of ichthyosaurs and crocodylians, sharks and other large fish, crustaceans such as crabs and lobsters, nautiloids, and echinoids such as starfish, brittle-stars, and sun-stars.
- Any fossil specimen exhibiting exceptional preservation and/or size. Examples include: 3D uncrushed ichthyosaur skulls, ammonites and belemnites showing traces of soft body parts such as arms and ink sacs, and any unusually large ammonites.
- Any fossil displaying an unusually large multiple grouping of specimens within the same piece of rock - particularly if such a fossil comprises either specimens of more than one species, or a grouping of extremely large and well-preserved specimens of the same species.

(Continued)

- Any already known and documented species occurring within a stratigraphic horizon within which it has never before been previously found.

Whilst only a relatively small number of specimens brought forward will ultimately prove suitably rare and/or fine for recording, it should nevertheless be remembered that the willingness of collectors to participate in the VOLUNTARY RECORDING SCHEME is important in itself, contributing, as it does, to a greater degree of mutual co-operation between all those groups of individuals involved in the pursuit and enjoyment of palaeontology.

**Notes:**

1. All records held within the VOLUNTARY RECORDING SCHEME should include a positive identification of the specimen; the precise location - including an Ordnance Survey Grid Reference - from which the find was made; details of the stratigraphic horizon from which the specimen was collected if applicable (i.e. where not recovered from beach shingle/cliff-fallen material); the date of the find, and any other related observations. The identity of the collector will also be retained with the record, the availability of which within the public domain will rest with the wishes of the collector.
  2. Scarborough Museum will both photograph and hold the paper record for the specimen, a version of the record also being available on the Museum's Internet web site. The Museum will also, as and where necessary, act as an intermediary between those collectors holding recorded specimens and other interested parties wishing to see and/or study them.
  3. Where a large specimen - such as an articulated vertebrate skeleton - has been found in situ, and is accordingly being recovered over a protracted period of time, details pertaining to the finding of the specimen can still be recorded, although the exact location of the site and other associated details may be withheld. Such withholding of location details will serve to protect the specimen from damage by irresponsible collectors and also to protect the finder's interest in the specimen until it has been fully and properly recovered.
  4. The final cleaning and preparation of fossils which are deemed suitable for recording should only be undertaken by expert fossil preparators, and then only after consultation with appropriate academics or museum curators.
  5. Any finder/collector intending to sell a recorded specimen on the private market is strongly encouraged only to do so after having first offered the specimen to registered museums for a period of six months. The record should be suitably amended following the disposal of any recorded specimen to a private purchaser as regards the date of the sale, the financial consideration involved, and preferably details of the identity and address of the new owner/keeper of the specimen.
  6. Those individuals with private collections containing recorded specimens are strongly encouraged to make provision for the ultimate placement of such specimens within a registered museum collection.
  7. It should finally be noted that whilst establishing and endorsing the VOLUNTARY RECORDING SCHEME, the North Yorkshire Coast Fossil Forum in no way seeks to attempt to interfere with the ownership - or transfer thereof - of any specimens brought forward for recording, although it is obviously desirable that mutually acceptable arrangements be made wherever possible to ensure that any fossils of prime scientific importance ultimately be placed in a museum collection; both for safe keeping, and to afford scientists ready access to specimens for research purposes.
-



## APPENDIX V

### NORTH YORKSHIRE COAST QUESTIONNAIRE

(Using a pen coloured other than black, please tick the relevant box and/or circle the appropriate number to indicate your chosen response)

#### VALUE JUDGEMENTS

1. Listed below are the major values typically associated with fossil resources. Please weight each value to reflect its importance according to your own particular viewpoint - 1 being unimportant through 5 being very important.

- |                               |   |   |   |   |   |
|-------------------------------|---|---|---|---|---|
| • Scientific value            | 1 | 2 | 3 | 4 | 5 |
| • Educational value           | 1 | 2 | 3 | 4 | 5 |
| • Cultural heritage value     | 1 | 2 | 3 | 4 | 5 |
| • Artistic/aesthetic value    | 1 | 2 | 3 | 4 | 5 |
| • Recreational/hobbyist value | 1 | 2 | 3 | 4 | 5 |
| • Commercial value            | 1 | 2 | 3 | 4 | 5 |

2. Can you think of any other significant value intrinsic to fossil resources which is not listed above?

No

Yes - if so, please state: \_\_\_\_\_

3. In broad terms, do you consider fossils to be of greater overall value if extracted from the ground (*ex situ*) or left in the ground undisturbed (*in situ*)?

*Ex situ*

*In situ*

Both

#### ISSUES AND CONFLICTS

4. Listed below are a number of issues and/or conflicts which have in recent years been identified by various interest groups as compromising the best use and conservation of English palaeontological sites. Please weight each issue/conflict to reflect its significance according to your own particular viewpoint - 1 being unimportant through 5 being very important.

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| • Loss of important scientific information as a result of inappropriate/irresponsible collecting activities               | 1 | 2 | 3 | 4 | 5 |
| • Lack of wider public awareness regarding issues connected with the use and conservation of fossil resources             | 1 | 2 | 3 | 4 | 5 |
| • Indiscriminate hammering of fossils by educational and recreational collectors  | 1 | 2 | 3 | 4 | 5 |
| • Commercial exploitation of the fossil resource  | 1 | 2 | 3 | 4 | 5 |
| • Contemporary increase in geologically oriented tourism resulting in greater pressure being placed upon fossil resources | 1 | 2 | 3 | 4 | 5 |
| • Lack of political interest in, and government funding for, the conservation of fossil sites and specimens               | 1 | 2 | 3 | 4 | 5 |
| • Loss of UK fossils abroad through unregulated export  | 1 | 2 | 3 | 4 | 5 |
| • Lack of site signage/interpretation offering public information/guidance  | 1 | 2 | 3 | 4 | 5 |
| • Lack of widely available fossil collecting guidance for educational and recreational collectors                         | 1 | 2 | 3 | 4 | 5 |

(Continued)

## SITE PROTECTION BY NOTIFICATION AS A SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

5. Do you consider that the wider provision of information relating to which sections of the North Yorkshire coastline are currently notified as SSSIs has to date been:
- Good?
  - Reasonable?
  - Poor?
6. What does the designation SSSI mean to you as regards the types and extent of fossil collecting activities permitted?
- No restrictions upon collecting
  - No collecting whatsoever without a permit
  - No commercial collecting
  - No hammering
  - Surface-collecting of loose material only
  - No digging/excavation of specimens
  - Collecting for scientific/academic purposes only
  - Not sure
7. Generally speaking, do you feel that the North Yorkshire coast's fossil sites are adequately protected by the current system of SSSI notification?
- Yes
  - No

### PERCEIVED NEED FOR ADDITIONAL MANAGEMENT MECHANISMS

8. Do you think that additional management mechanisms are required to ensure adequate protection of the North Yorkshire coast's fossil resources?
- Yes
  - No
  - Undecided
9. Do you think that any new management mechanisms should, if introduced, be either regulatory or voluntary in nature, or a combination of the two?
- Regulatory
  - Voluntary
  - A combination of regulatory and voluntary
  - Undecided
10. Please indicate with a tick those **regulatory** controls suggested below which you yourself consider would facilitate better use and conservation of the North Yorkshire coast's fossil resources:
- Prohibition of any particular type of collecting activity: please specify: \_\_\_\_\_

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  - Regulation of all collecting activities
  - Regulation of all non-scientific collecting activities
  - Regulation of all collecting for commercial purposes

(Continued)



- Regulation of all non-scientific collecting involving digging/excavation
- All forms of collecting by permit only
- The licensing of commercial collectors
- State-ownership of fossils both prior to, and after, collection
- Strict control of exports and imports of fossils out of and into the UK

11. Please indicate with a tick those **voluntary** controls suggested below which you yourself consider would facilitate better use and conservation of the North Yorkshire coast's fossil resources:

- Voluntary Registration Scheme for New Finds
- Voluntary Code of Conduct/Practice for Commercial Collectors
- Voluntary Warden Schemes
- Increased provision of site signage (interpretation and collecting guidelines)
- Local fossil shops and/or museums offering a fossil identification service to the general public
- The provision of readily/widely available Information and guidance packages/leaflets targeted at school and educational groups
- An increase in voluntary conservation initiatives such as the protection of locally significant fossil sites as RIGS (Regionally Important Geological Sites)
- The introduction of a widely available information leaflet outlining the legalities of collecting from intertidal and cliff exposures
- Any other - please specify:

12. Do you think that any such new management tools should, if introduced, apply to ALL sites, or only to those sites selectively adjudged to be at particular risk from irresponsible collecting activities?

- ALL sites - please specify why: \_\_\_\_\_  
\_\_\_\_\_
- Selected sites only - please specify why: \_\_\_\_\_  
\_\_\_\_\_

## LEGALITY OF COLLECTING ACTIVITIES

13. Speaking from your own experience, do you consider that the wider provision of information regarding the legality or otherwise of fossil collecting activities from the North Yorkshire coast's foreshore/intertidal-zone has to date been:

- Good?
- Fair?
- Lacking?

14. Speaking from your own experience, do you consider that the wider provision of information regarding the legality or otherwise of fossil collecting activities from the North Yorkshire coast's cliff exposures has to date been:

- Good?
- Fair?
- Lacking?

(Continued)

# COMMERCIAL MARKET FOR FOSSILS

15. What are your views regarding the exploitation of fossils for commercial purposes?

- Fossils should not be exploited in this manner
- The commercial market for fossils has a useful role to play in stimulating public interest in fossils, and the responsible collection of fossil material to supply the market is accordingly acceptable in principle.
- Only common invertebrate fossil types should be exploited for commercial purposes .
- Only *ex situ* as opposed to *in situ* fossils should be so exploited

## GENERAL

16. In the event that you witnessed/were aware of local collecting activities of an irresponsible and even destructive nature, who would you first think of alerting in order to instigate remedial action? Please comment:

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17. Further to your response to 17. above, do you feel that any remedial action could in practice be undertaken quickly and effectively enough to comprise a realistic deterrent to irresponsible collectors?

- Yes
- No - please briefly state why not: \_\_\_\_\_  
\_\_\_\_\_

SHOULD YOU SO WISH, PLEASE FEEL FREE TO ADD ANY ADDITIONAL INFORMATION, VIEWS, AND OPINIONS - EITHER IN RESPONSE TO ANY OF THE ABOVE QUESTIONS OR OF A MORE GENERAL NATURE - USING THE SPACE PROVIDED BELOW. THANKYOU VERY MUCH FOR TAKING THE TIME AND TROUBLE TO TAKE PART IN THIS IMPORTANT RESEARCH.

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## APPENDIX VI

### NORTHEAST SKYE COAST QUESTIONNAIRE

(Using a pen coloured other than black, please tick the relevant box and/or circle the appropriate number to indicate your chosen response)

#### VALUE JUDGEMENTS

1. Listed below are the major values typically associated with fossil resources. Please weight each value to reflect its importance according to your own particular viewpoint - 1 being unimportant through 5 being very important.

- |                               |   |   |   |   |   |
|-------------------------------|---|---|---|---|---|
| • Scientific value            | 1 | 2 | 3 | 4 | 5 |
| • Educational value           | 1 | 2 | 3 | 4 | 5 |
| • Cultural heritage value     | 1 | 2 | 3 | 4 | 5 |
| • Artistic/aesthetic value    | 1 | 2 | 3 | 4 | 5 |
| • Recreational/hobbyist value | 1 | 2 | 3 | 4 | 5 |
| • Commercial value            | 1 | 2 | 3 | 4 | 5 |

2. Can you think of any other significant value intrinsic to the fossil resource which is not listed above?

No

Yes - if so, please state: \_\_\_\_\_

3. In broad terms, do you consider fossils to be of greater overall value if extracted from the ground (*ex situ*) or left in the ground undisturbed (*in situ*)?

*Ex situ*

*In situ*

Both

#### ISSUES AND CONFLICTS

4. Listed below are a number of issues and/or conflicts which have in recent years been identified by various interest groups as compromising the best use and conservation of Scottish palaeontological sites. Please weight each issue/conflict to reflect its significance according to your own particular viewpoint - 1 being unimportant through 5 being very important.

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| • Loss of important scientific information as a result of inappropriate/irresponsible collecting activities               | 1 | 2 | 3 | 4 | 5 |
| • Lack of wider public awareness regarding issues connected with the use and conservation of fossil resources             | 1 | 2 | 3 | 4 | 5 |
| • Indiscriminate hammering of fossils by educational and recreational collectors  | 1 | 2 | 3 | 4 | 5 |
| • Commercial exploitation of the fossil resource  | 1 | 2 | 3 | 4 | 5 |
| • Contemporary increase in geologically oriented tourism resulting in greater pressure being placed upon fossil resources | 1 | 2 | 3 | 4 | 5 |
| • Lack of political interest in, and government funding for, the conservation of fossil sites and specimens               | 1 | 2 | 3 | 4 | 5 |
| • Loss of Scottish fossils abroad through unregulated export  | 1 | 2 | 3 | 4 | 5 |
| • Lack of site signage/interpretation offering public information/guidance  | 1 | 2 | 3 | 4 | 5 |
| • Lack of widely available fossil collecting guidance for educational and recreational collectors                         | 1 | 2 | 3 | 4 | 5 |

(Continued)

## SITE PROTECTION BY NOTIFICATION AS A SITE OF SPECIAL SCIENTIFIC INTEREST (SSSI)

5. Do you consider that the wider provision of information relating to which sections of Skye's coastline are currently notified as SSSIs has to date been:
- Good?
  - Reasonable?
  - Poor?
6. What does the designation SSSI mean to you as regards the types and extent of fossil collecting activities permitted?
- No restrictions upon collecting
  - No collecting whatsoever without a permit
  - No commercial collecting
  - No hammering
  - Surface-collecting of loose material only
  - No digging/excavation of specimens
  - Collecting for scientific/academic purposes only
  - Not sure
7. Generally speaking, do you feel that the Skye coast's fossil resources are adequately protected by the current system of SSSI notification?
- Yes
  - No

## PERCEIVED NEED FOR ADDITIONAL MANAGEMENT MECHANISMS

8. Do you think that additional management mechanisms are required to ensure adequate protection for the Skye coast's fossil resources?
- Yes
  - No
  - Undecided
9. Do you think that any new management mechanisms should, if introduced, be either regulatory or voluntary in nature, or a combination of the two?
- Regulatory
  - Voluntary
  - A combination of regulatory and voluntary
  - Undecided
10. Please indicate with a tick those regulatory controls suggested below which you yourself consider would facilitate better use and conservation of the Skye coast's fossil resources:
- Prohibition of any particular type of collecting activity: please specify: \_\_\_\_\_
  - Regulation of all collecting activities
  - Regulation of all non-scientific collecting activities
  - Regulation of all collecting for commercial purposes
  - Regulation of all non-scientific collecting involving digging/excavation

(Continued)



- All forms of collecting by permit only
- The licensing of commercial collectors
- State-ownership of fossils both prior to, and after, collection
- Strict control of exports and imports of fossils out of and into the UK

11. Please indicate with a tick those voluntary controls suggested below which you yourself consider would facilitate better use and conservation of the Skye coast's fossil resources:

- Voluntary Registration Scheme for New Finds
- Voluntary Code of Conduct/Practice for Commercial Collectors
- Voluntary Warden Schemes
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- An increase in voluntary conservation initiatives such as the protection of locally significant fossil sites as RIGS (Regionally Important Geological Sites)
- The introduction of a widely available information leaflet outlining the legalities of collecting from intertidal and cliff exposures
- Any other - please specify: \_\_\_\_\_

12. Do you think that any such new management tools should, if introduced, apply to ALL sites, or only to those sites selectively adjudged to be at particular risk from irresponsible collecting activities?

- ALL sites - please specify why: \_\_\_\_\_
- Selected sites only - please specify why: \_\_\_\_\_

### LEGALITY OF COLLECTING ACTIVITIES

13. Speaking from your own experience, do you consider that the wider provision of information regarding the legality or otherwise of fossil collecting activities from the Skye coast's foreshore/intertidal-zone has to date been:

- Good?
- Fair?
- Lacking?

14. Speaking from your own experience, do you consider that the wider provision of information regarding the legality or otherwise of fossil collecting activities from the Skye coast's cliff exposures has to date been:

- Good?
- Fair?
- Lacking?

### COMMERCIAL MARKET FOR FOSSILS

15. What are your views regarding the exploitation of fossils for commercial purposes?

- Fossils should not be exploited in this manner

(Continued)

- The commercial market for fossils has a useful role to play in stimulating public interest in fossils, and the responsible collection of fossil material to supply the market is accordingly acceptable in principle
- Only common invertebrate fossil types should be exploited for commercial purposes
- Only *ex situ* as opposed to *in situ* fossils should be so exploited

**GENERAL**

16. In the event that you witnessed/were aware of local collecting activities of an irresponsible and even destructive nature, who would you first think of alerting in order to instigate remedial action?

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17. Further to your response to 18. above, do you feel that any remedial action could in practice be undertaken quickly and effectively enough to comprise a realistic deterrent to irresponsible collectors?

Yes

No - please briefly state why not: \_\_\_\_\_

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SHOULD YOU SO WISH, PLEASE FEEL FREE TO ADD ANY ADDITIONAL INFORMATION, VIEWS, AND OPINIONS - EITHER IN RESPONSE TO ANY OF THE ABOVE QUESTIONS OR OF A MORE GENERAL NATURE - USING THE SPACE PROVIDED BELOW. THANKYOU VERY MUCH FOR TAKING THE TIME AND TROUBLE TO HAVE BECOME INVOLVED IN THIS IMPORTANT RESEARCH.

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