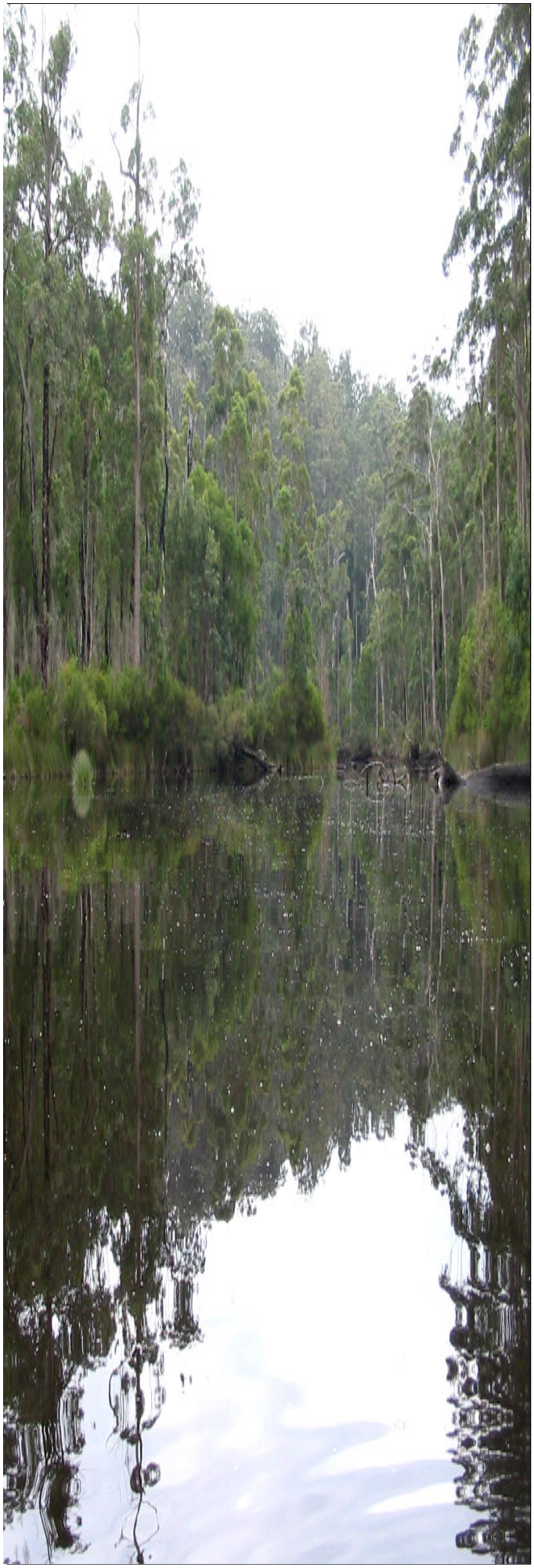
WA Native Fish Strategy:

Freshwater fish distribution database and website



Department of Fisheries
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Australian Government

Natural Resource Management (NRM) Office

Fish for the future

Department of Fisheries
Government of Western Australia

Summary

The WA Native Fish Strategy was funded by the State NRM office. Research was carried out by the Department of Fisheries (Biodiversity and Biosecurity Branch) and Department of Water (Drainage and Waterways Branch and Water Science Branch).

The Department of Fisheries role in this project was to review and compile survey data on the distribution of native and feral fish populations and review management options. The outcomes of this were, the development of a database and a public website both containing distributional information on native and introduced freshwater fish and invertebrate species in Western Australia.

The database was developed to improve data management, accessibility and collaboration between institutions. The system is designed to capture and consolidate all available historical and future freshwater species distributional information. Existing freshwater species distributional data were sought from various sources and entered into the database. While the project obtained all available distributional information, not all known historical datasets were provided.

The database will continue to be expanded via the information collected through the scientific exemption process and collaboration with other research organisations. The existing exemption process requires that individuals or organisations wishing to undertake research on freshwater fauna must first apply for a scientific research exemption from the Department of Fisheries. The Department has recently made it a condition of the exemption for researchers to provide a record of native and feral fish species sampled during the course of their research. This will, for all future research overcome the aforementioned limitation of some datasets not being provided for inclusion in the *Freshwater Fish Distribution in Western Australia* database and website.

The website *Freshwater Fish Distribution in Western Australia* is intended to complement the database and serve as an information source for the general public on freshwater fish and invertebrate species which inhabit their local waterways.

The Department of Fisheries is confident that the Freshwater Fish Distribution Database and website will prove to be essential tools for the strategic management of native freshwater fish and invertebrates in Western Australia.

Acknowledgements

We would like to acknowledge the Natural Resource Management Office for the provision of funding for this project, Rob Tregonning for his work on the initial funding application, Laurie Caporn for assistance with stakeholder group liaison, Cameron Hugh for his work on data entry and Richard Silk and Julian Lee for their assistance with IT issues. Thanks also to Kay Smoljak at Clever Starfish Designs for her graphic design work, Rohan Salt at Hillcrest Computer Services for developing the applications for the website and database. Thank you also to staff of the Department of Water, Drainage and Waterways, and Water Science Branches.

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General Introduction

WA NATIVE FISH STRATEGY VISION: The vision of the WA Native Fish strategy is to conserve the native fish populations and their habitats in our WA waterways through habitat rehabilitation, providing adequate passage for native fish, managing the spread of introduced species and improving water quality and water flow regimes.

As a result of funding from the State Natural Resource Management (NRM) Office, research was carried out by the Department of Fisheries and Department of Water (Drainage and Waterways Branch, and Water Science Branch) on the WA Native Fish Strategy: Key Freshwater Habitats, Fishways and Feral Fish Management. The outcomes of the research by Department of Fisheries are outlined in this report. The outcomes of the work carried out by the Department of Water (Fish Barrier Prioritisation Decision Tool and Fish Barrier Database) are presented in a separate report.

Background

Western Australia has a unique assemblage of freshwater fish and invertebrates. For example 80% of the native fish species and all of the native crayfish species found in the south-west are endemic. Two of these endemic south-west fish species, the western trout minnow *Galaxias truttaceus* and the Balston's pygmy perch *Nannatherina balstoni* are listed in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) list of threatened species.

A decline in native fish communities can often be a key indicator that the overall health of an aquatic ecosystem is at risk. Despite the high endemism of our native fish and their importance to river health, there has been a lack of focus on maintaining freshwater biodiversity in Western Australia. More specifically, the status, impacts and management options, for native fish populations have received little attention.

There are many processes, which threaten native freshwater fish populations in this state, the effects of which are ill-managed because many aspects of the biology and ecology of native fishes are still poorly known. Some of the key threats to native fish populations are summarised in Table 1. Changes in water flow regimes (e.g. as a result of water extraction), installation of man-made barriers (e.g. dams), and reduced water quality (e.g. salinisation and eutrophication), are the driving forces behind reduced habitat availability and degradation. Coinciding with these pressures, is the establishment of non-native (feral) fish and crustacean species that often aggressively out-compete native species. These species may be predatory, have a higher fecundity, compete for food and/or dominate available habitat and can consequently have a detrimental effect on the river ecosystem as a whole.

Table 1 Key threats to native fish in south-western Australia

Threat	Process
Changes to flow regime	Water loss via extraction (i.e. for irrigation, drinking water), restricted or complete loss of flow, redirection of water course, increase or reduction in flow velocity
Barriers	Construction of dams, weirs, culverts etc, restrict the passage of native fish
Lowered water quality	Salinisation, eutrophication, contamination (e.g. chemical residue from waste disposal sites and storm water run-off), increased turbidity, sedimentation
Habitat degradation/loss	Damage/loss, overgrazing of catchment vegetation, water loss, erosion of riparian zones, draining and infill of waterbodies
Introduced species	Competition for food, habitiat and/or predation by cichlids, carp, goldfish, swordtails, guppies, rosy barbs, perch (redfin, golden, silver), short finned eels, eastern mosquitofish, one spot livebearers, rainbow trout and brown trout and non-native invertebrate species, Australian yabbie and redclaw crayfish

Once introduced species have become established in freshwater systems it is extremely difficult, or often impossible to eradicate them. To date, there have been uncontrolled illegal releases of several species in Western Australian freshwater systems including various popular aquarium fish such as cichlids and cyprinids (carp and goldfish). Redfin, golden and silver perch and various other fish species have also been found in our local waterways (Table 1). Non-native invertebrate species in our waterways include the eastern Australian yabbie and redclaw crayfish. The controlled release of rainbow and brown trout for the benefit of recreational fishing also occurs.

There is limited information available on the distribution of feral fish species and for that matter the overall distribution of native fish. This shortfall of information, has given rise to the need to compile all available information on the distribution of both native and non-native species, which is the basis of this study. This information can then be used to:

- Identify regions where freshwater biodiversity research is inadequate;
- Identify waterbodies and ecoregions that have the greatest risk of losing aquatic biodiversity and use this information to focus recovery and rehabilitation efforts;
- Track changes over time in the distribution of native and introduced species;
- Develop a plan to manage the spread of feral species, systematically eradicate feral species and protect those areas free of feral species, from invasion.

OBJECTIVE: Review and compile survey data on native and feral fish populations and review of management options.

1 Introduction

The Department of Fisheries is the state government agency responsible for Freshwater Fish in Western Australia. Consequently the Department has a long history of research and management of freshwater species, including documenting freshwater fish and invertebrate distributions in this state. Additionally, the Department of Fisheries is tasked with providing scientific exemptions to enable research organisations or individuals to collect freshwater fish fauna without prosecution.

To date there has been no single resource available for tracking the distribution of W.A native and introduced fish species. Freshwater datasets for W.A species are dispersed and of varying quality, which limits data accessibility and data sharing. It is logical that as the custodians of freshwater fish in WA, the Department of Fisheries undertakes the role as the state repository for this distributional data so that researchers, managers and the community can access it. Therefore it was necessary to develop a system for capturing and consolidating this information in the form of a fish distribution database and public website. This project has allowed these two sources of freshwater fish distributional data to be electronically compiled in such a way that they can be made available to stakeholders both now and in the future as they are expanded with additional data.

The concept of this project has been to develop a website, containing all available data, that can be easily accessed by the public, research managers, government departments and research organisations. This will enable the data to be used to focus and prioritise conservation, rehabilitation, feral species eradication and native fish restocking efforts on those waterbodies and species identified to be at greatest risk.

This report describes the process by which the Freshwater Fish Distribution database and associated public website were developed, the function and components of the two applications and the benefits these applications will have on future Freshwater fish management in Western Australia.

2 Development process

Staff employed on this project, compiled much of the Department of Fisheries freshwater fish distributional data into an *Excel* database, with each entry providing a collection date, GPS coordinate, description of location (i.e. drainage division, catchment and water body), data source, rank of data quality (i.e. high, medium or low) and a list of native and introduced fish and invertebrate species sampled.

Other organisations holding similar data were also approached to provide their data in a similar format, for the purpose of making it available to other users. Not all of the organisations that were approached were prepared to cooperate for this purpose. Some organisations were prepared to provide their data at a cost. However the payment requested to purchase their data was beyond the scope of the project budget.

In cases where researchers or organisations were not prepared to freely provide data, published material was sought. Data were manually entered into the spreadsheet either from tables, which provided latitudes and longitudes for sampling sites or by estimating sampling locations from points provided on distribution maps (i.e. by cross-referencing with a GIS map of Western Australian waterbodies). In some instances, just a general locality was provided in the text, so a conservative default location such as the river or tributary mouth, was recorded for those sampling sites. Due to the varying quality of different datasets, each record was assigned a rank:

- High - specific x,y coordinates available for collection sites;
- Medium – no coordinates available but a detailed distribution map provided with collection points shown;
- Low - no specific collection site information available but details provided for general sampling area.

Once records from historical, published and unpublished datasets and reports had been entered, they were cross-referenced with the GIS map of Western Australian waterbodies for validation. Several members of staff then reviewed the records to as far as possible ensure the elimination of errors.

To make the freshwater fish distributional database as functionally interactive as possible, there was a need to be able to link the database to a public website. Specialist IT expertise was obtained by outsourcing this role to Hillcrest Computer services and Clever Starfish (www.cleverstarfish.com) to create these applications. Under direction from project staff, Hillcrest computer services developed the internal application for the database and the operational components of the externally hosted public website and Clever Starfish designed the interface for the public website.

3 Internal database

3.1 Function and components

The internal Freshwater Fish Distribution database is a system designed to capture, consolidate and report freshwater fish distribution records. The database is also linked to, and controls, the content published on the public Freshwater Fish Distribution website.

The database opens to a main search interface used to search for database records. There are also links, which appear at the top of the main page (see area circled in red in Figure 1), these include:

- a link back to the **Home** search page,
- a **Help** link to direct users to the database developer for enquiries,
- a **Lists** link, which directs administrators to reference lists used for system maintenance (Figure 2) and
- a **Query** link, this is for administrator use only, to query the developer on database searches which cannot be carried out using the standard search criteria (Figure 3).

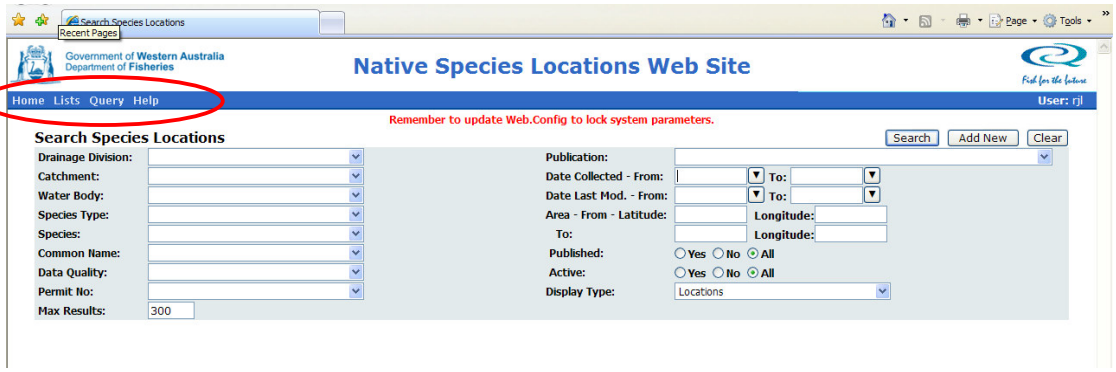


Figure 1 Screen grab of database search interface with links to other pages in the database circled in red.

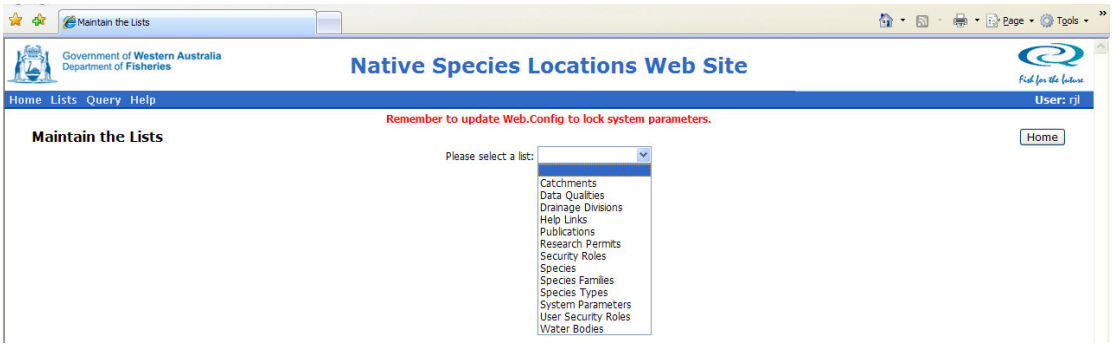


Figure 2 Screen grab of the **Lists** page, displaying the system maintenance drop down list.

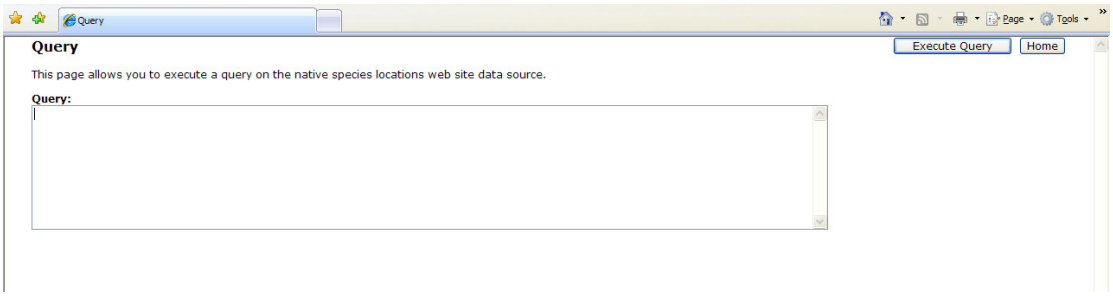


Figure 3 Screen grab of **Query** page.

3.2 Security and accessibility

The database requires a login (username and password) and has two levels of security, 'read only' and 'system administrator access'. Users with read only access, can search, view and export data. Users with system administrator access, have complete access to the system, which allows them to export, edit, add and remove data. Administrators also control which records and variables are published on the public website (i.e. if it is not selected to export to website then the information remains hidden from the public site).

The Department may provide stakeholders with distributional data and/or read only access to the database upon approval (for more detail see research permit conditions in section 5). Researchers and agencies will be encouraged to provide existing datasets for inclusion in the database and will be obliged to include new data where scientific exemptions have been granted. The source of all data will be acknowledged at the level of sampling locality and species captured so that anyone utilising the data can acknowledge the contribution of the collectors of that data. Any datasets submitted will be subject to an internal review process prior to addition to the database.

3.3 Performing a database search

When performing a search in the internal database all record parameters can be used as search criteria to tailor a wide or narrow search, this includes:

- Drainage division *e.g. South West*
- Catchment *e.g. Blackwood River*
- Water body *e.g. Blackwood River*
- Species type *e.g. feral fish*
- Species *e.g. Bostockia porosa*
- Common name *e.g. nightfish*
- Data quality *i.e. high, medium or low*

- Permit No. - *N/A at this stage see section 5 for details*
- Publication *i.e. source of each record*
- Date collected *i.e. date sample was recorded*
- Date last modified *i.e. search for recently edited records*
- Area *i.e. indicate a relevant x,y range*.

To demonstrate how a search of the database is undertaken, a search query for the distribution records for Nightfish, *Bostockia porosa* in the Blackwood River from 1991 onwards is shown in Figure 4. This query would return a list of all the known records in the database (Figure 4), which could then be narrowed further to specific localities or collection dates or other variables.

There is an option to export a particular list of records into an *Excel* spreadsheet (Figure 4, see area circled in red). This can be done by selecting **Export to Excel** and then **Go,** the user will be prompted to open or save the *Excel* file (Figure 5)**.**

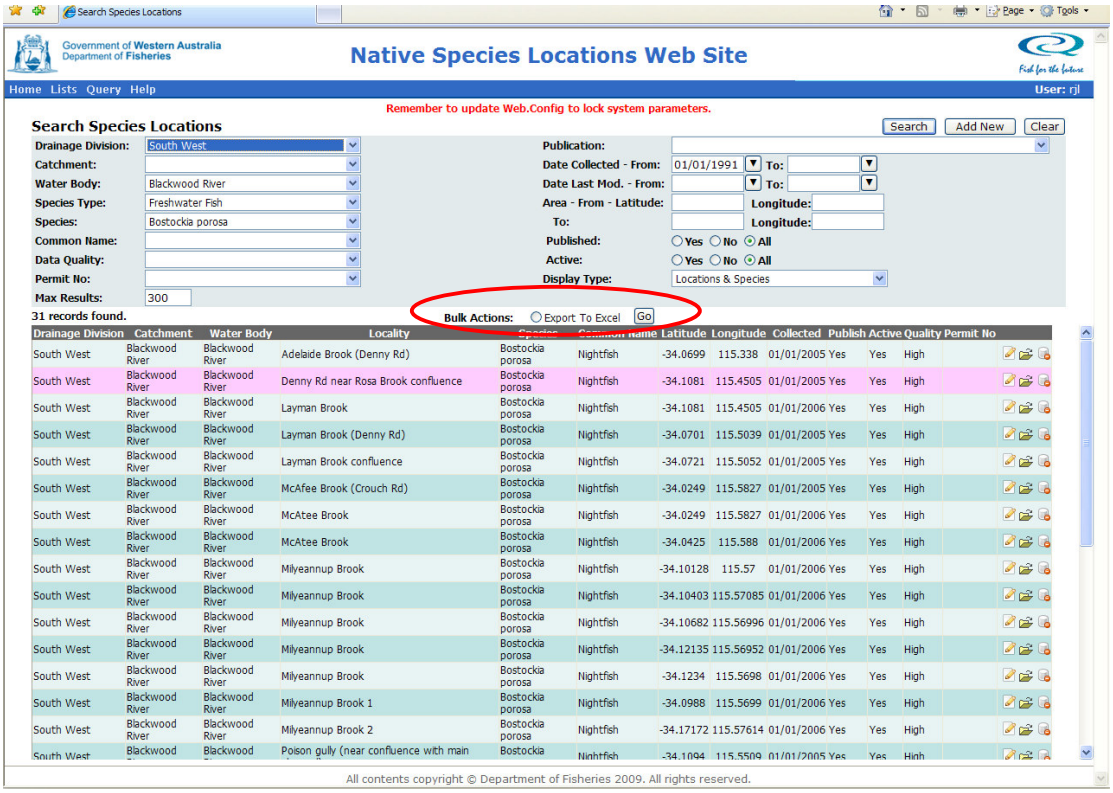


Figure 4 Screen grab of a search query for the distribution of Nightfish, *Bostockia porosa,* in the Blackwood River from 1991 onwards (the command to export data to Excel is circled in red).

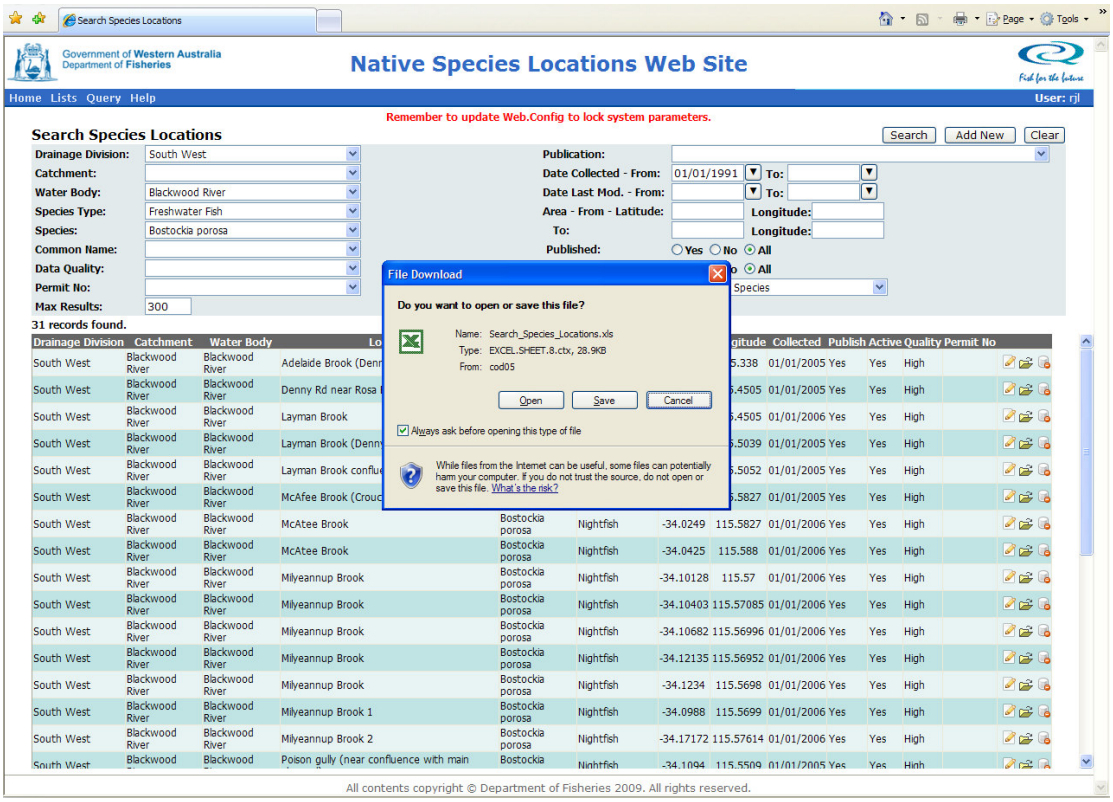


Figure 5 Screen grab of the prompt for exporting an *Excel* file from the database.

For those users with administrator access, there are also options to edit individual records. For example, selecting the record highlighted in Figure 4 above opens a window for updating variables for an existing species location under the **Location** tab. This includes editing coordinates, location details, publications, data quality and a yes/no option to publish the record to the website (Figure 6). Selecting on the **Species** tab in this window will open a list of all the species found at the same location (Figure 7).

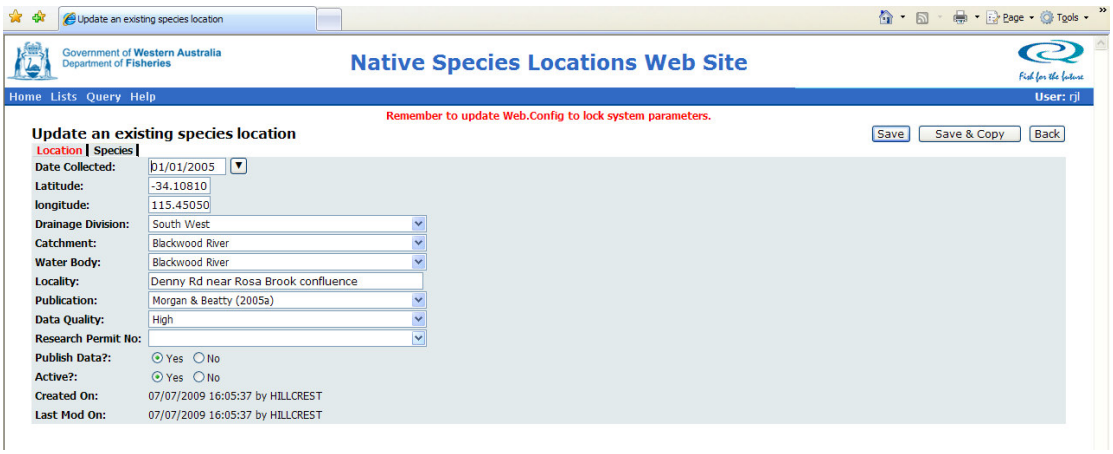


Figure 6 Screen grab of the database page used for updating an individual species location.

Figure 7 Screen grab of database page, which lists the different species found at a common location.

3.4 System maintenance

Administrators of the database have access to the **Lists** page to carry out system maintenance (Figure 2). In this window, the administrator can select various headings from the drop-down list to make edits and updates to every aspect of the database including:

- Catchments
- Data Qualities
- Drainage Divisions
- Publications
- Species
- Species Families
- Species Types
- Waterbodies
- Research Permits

Other headings on the list include ‘System Parameters’, which can be used to customise how the web application runs and ‘Security Roles‘ and ‘User Security Roles’ which are used to add new users and edit and update user access information. For further details on these and other database components please refer to Appendix 1, the *User and System Administrators Guide.*

4 Public website

4.1 Function and components

The internal database discussed to this point, is not available to general user groups. This section outlines the website *Freshwater Fish Distribution in Western Australia*. The website is intended only to serve as a general information source to enable any member of the public to conduct a search for the distribution of native and introduced freshwater fish and invertebrate species in Western Australia.

The website is located within the Department of Fisheries website www.fish.wa.gov.au as a sub-domain http://freshwater.fish.wa.gov.au and planned promotion over the life of the website will be via a dedicated link from the Fisheries website and correspondence with target audiences.

The content on the public website is restricted by the administrators of the internal database and therefore contains less detailed distributional information than that which can be accessed via the internal database.

Ongoing maintenance and updates to the website will be the responsibility of members of the Freshwater team at Fisheries Research. The site will be subject to ongoing Departmental review and where possible will attempt to respond to constructive feedback from external audiences.

The site consists of three main pages:

- **Overview** page – This is the homepage, which consists of a short description about the site. This text is readily updateable via the internal database. This page also contains the links for performing a distribution search (i.e. browse by map, browse by species, browse by region) (Figure 8).

- **About** page – The About page contains background information about the purpose of the site and goals. The text on this page is also updateable via the internal database (Figure 9).

- **Contact Us** page – The contacts page directs user enquiries to relevant Fisheries offices including, the Freshwater team, Research Division, Head Office and the Fisheries Library (Figure 10).

Other features of the site are mandatory elements such as, a link back to www.fish.wa.gov.au (Figure 8), links to the privacy, disclaimer and copyright statements as well as a link to the reference list located at the bottom of the web page (Figure 8). At the top right-hand-corner of the site there are links to the site map, accessibility information and to a standard search query (Figure 8).

Figure 8 Screen grab of the *Freshwater Fish Distribution* website displaying the overview page. Numbers indicate key components on the page: 1 - search query, 2 - browse by map, 3 - browse by species, 4 - browse by region, 5 - link to Fisheries page and 6 - links to the reference, privacy, disclaimer and copyright pages.

Figure 9 Screen grab of the Freshwater Fish Distribution in Western Australia website displaying the About page.

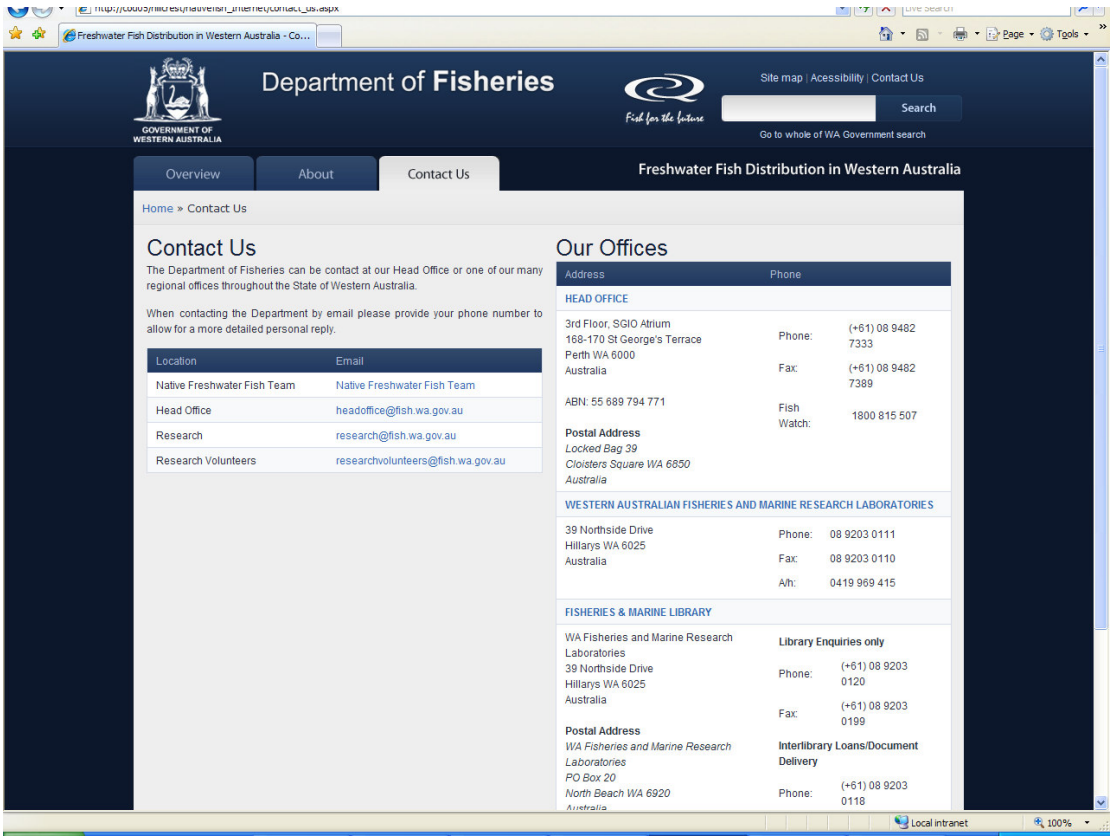


Figure 10 Screen grab of the Freshwater Fish Distribution in Western Australia website displaying the Contacts page**.**

4.2 Performing a website search

Users can search for a particular species of interest by typing the common or scientific name into the search query or by selecting a category under **Browse by Species** (Figure 8) then clicking on the name of the species of interest (e.g. Western pygmy perch) to produce:

- a *Google* map displaying data collection points for the particular species of interest,
- a table which lists all the catchments and water bodies where the species has been found in Western Australia,
- a photograph of the species and brief species description (if available) and
- links to the data source (reference) for each record (Figure 11).

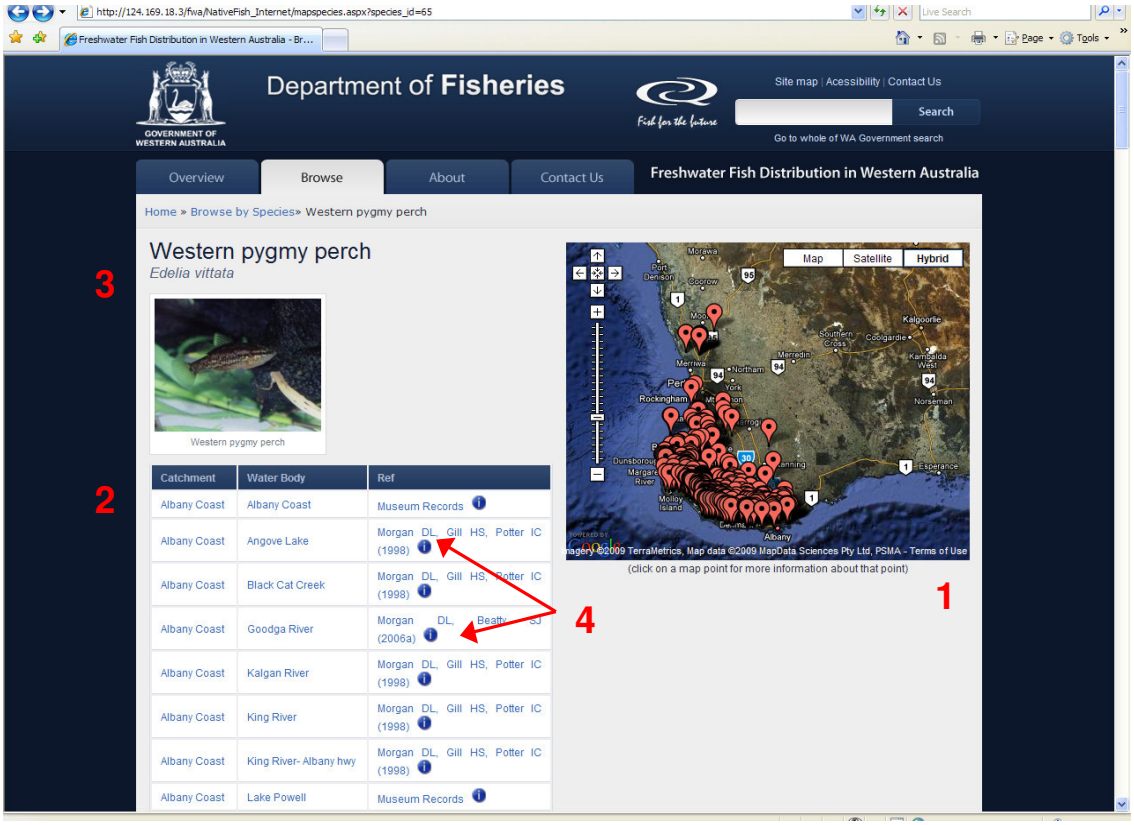


Figure 11 Screen grab of the Fresh Water Fish Distribution in Western Australia website displaying species search results for Western pygmy perch *Edelia vittata*. Numbers indicate key components of the page: 1 - *Google* map with data points, 2- table listing catchments, water bodies and references, 3 – species name (common and scientific) and photograph, 4 – links to specific references/data source.

Broader scale searches can be carried out under the **Browse by Region** heading, by first selecting a region from the drop-down list (e.g. South West) and then a drainage division (e.g. Blackwood River) (Figure 8). This generates a map and table, which displays the water bodies within that catchment and the species recorded in each water body, as well as links to the data source for each record listed (Figure 12).

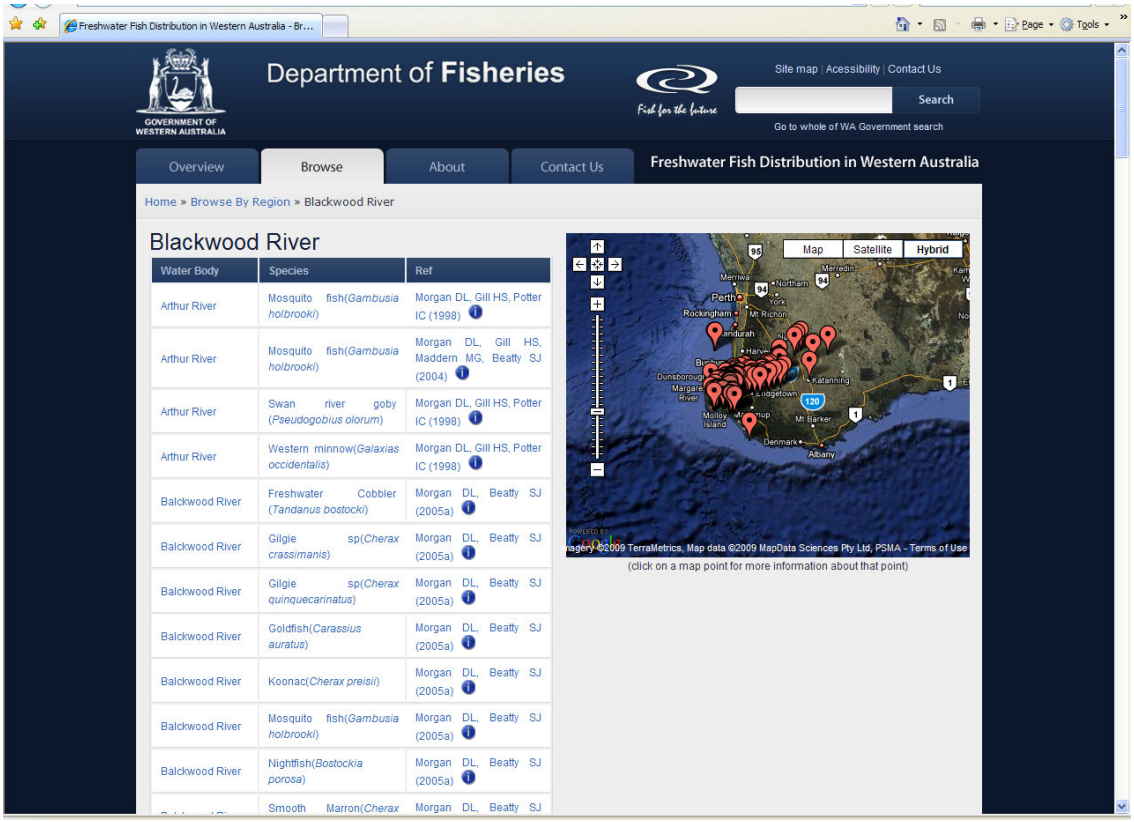


Figure 12 Screen grab of the Freshwater Fish Distribution in Western Australia website displaying results from a search for the Blackwood River drainage division.

By selecting on **Browse by Map** (Figure 8)**,** users can conduct searches by choosing a drainage division (e.g South West) and then selecting a catchment from the map (Figure 13). This generates a table, which lists the names of the water bodies within the particular catchment, species present and links to data sources.

Figure 13 Screen grab of the Freshwater Fish Distribution in Western Australia website displaying search page for South West catchments.

Results from wider searches can be narrowed down if required by selecting different variables in the Tables (i.e. either a catchment, water body, species or reference). For example, to narrow down the search query for Western pygmy perch to display only those results for a particular water body such as, Black Cat Creek, users can select on the water body from the Table (Figure 11). A new page will appear, which displays all the locations within that water body where Western pygmy perch have been found, in this case, there is only one location recorded for Western pygmy perch in Black Cat Creek (Figure 14). Alternatively if users were to select a particular publication such as *Morgan DL, Gill HS, Potter IC (1998)* from the table, this would produce results for Western pygmy perch distribution for that publication only (Figure 15).

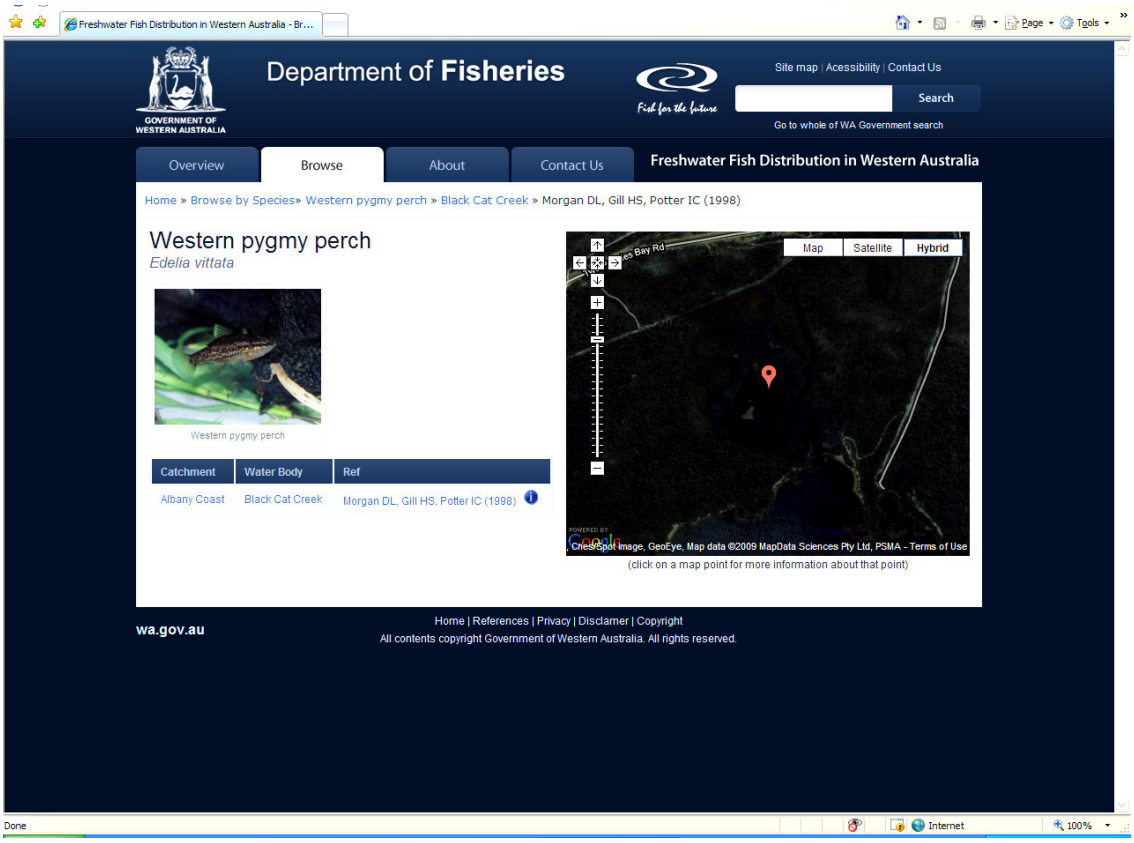


Figure 14 Screen grab of the Freshwater Fish Distribution in Western Australia website displaying a search of fish species by water body (i.e. Western pygmy perch and Black Cat Creek).

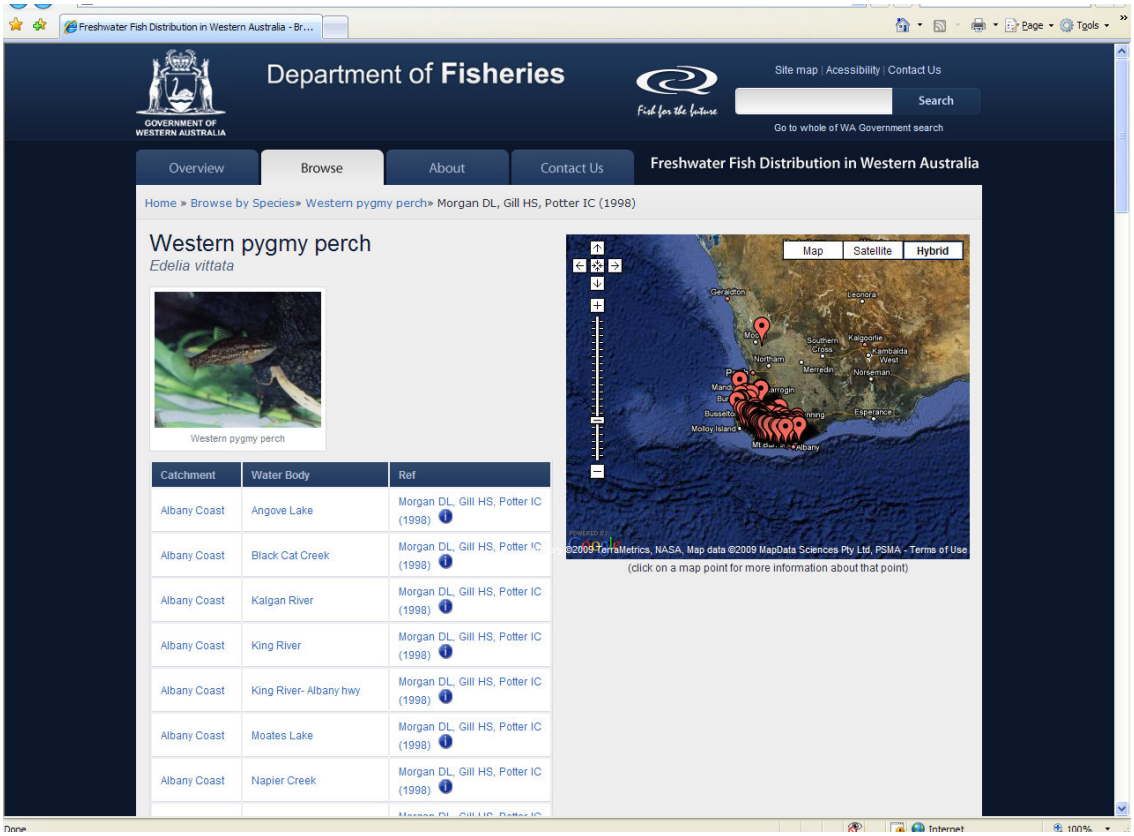


Figure 15 Screen grab of the Freshwater Fish Distribution in Western Australia website displaying a search for Western pygmy perch by publication, (i.e. Morgan DL, Gill HS, Potter IC (1998)).

5 Proposed future developments

There are two areas that we propose to further develop and expand in the freshwater fish database. The first is to improve freshwater fish distributional data availability. There are two parts to this: access to existing data and access to future data. We know that there are existing datasets available, but at this stage some holders of datasets feel reluctant to contribute information to this community database. The challenge is to convince all that it is in the best interests of freshwater fish management to have such data as widely accessible as possible.

The second part to our effort to improve freshwater fish distributional data availability is within the control of the Department of Fisheries. Under the Fish Resources Management Act 1994 Section 7(3), the Executive Director may grant an exemption to conditions under the Act for purposes (amongst other things) of scientific research (see Appendix 2 for an example of the research exemption template). Applications for scientific exemptions under the Act have a prescribed fee of $290 per application, but this is generally waived for research organisations.

Recently the Department has made it a condition of the Exemption that researchers provide amongst other things, a record of native and feral fish species sampled in the course of their research work, GPS localities where the species were sampled and sampling date. Applicants for exemptions to the Act are being made aware that this freshwater fish distributional data provided under the research exemptions will be entered into the Freshwater Fish database, which will be made available to all users. In cases where researchers object to their freshwater fish distributional data being made available, their objection will be respected, but the prescribed fee for the research exemption will be charged in full.

Consideration is being given to establish a system whereby researchers can apply for research exemptions online and also submit datasets produced from their research online (see Appendix 3 for an example of the scientific exemption application form). In future, researchers may also apply to the Department of Fisheries for access to the database and submit requests for datasets.

The second area that we propose to further develop is the freshwater fish website, in terms of improving content and functionality by incorporating:

- species descriptions (i.e. general biological and habitat information),
- the catchment and drainage division boundaries on the *Google* maps,

- links to other relevant freshwater information and conservation websites and
- a temporal component to the website (i.e. users will be able to search changes in species distribution over time).

6 Discussion

The database and website developed during the course of this project have set the groundwork in terms of knowledge development for the distribution of native and introduced freshwater fish and invertebrate species in Western Australia. These applications will enhance the management and conservation of freshwater fish and fish habitats in Western Australia through 3 key outcomes. Firstly ensuring that all future research data is captured and included in the database, by establishing that, as the custodian for all native fish data, the state government department (Department of Fisheries) has regulatory responsibility for native fish, and the authority under the act to collect research data via the scientific exemption process. Secondly creating a data source that will improve data management, record keeping standards, data accessibility and collaboration between institutions and government departments. Thirdly the database will for the first time allow fisheries managers to carry out a systematic review of the dataset to identify and report on:

- critical knowledge gaps (i.e. in terms of regions where freshwater fish research is lacking),
- catchments that have become colonised by introduced species,
- areas free of feral species that require protection from invasive species and
- changes in the spatial and temporal distribution of native and introduced freshwater species (i.e. the reduction in range of a native species or spread of an introduced species to new regions).

The database also complements the Fish Barrier Prioritisation Decision Tool and Fish Barrier Database, which were also developed as part of this project but reported separately by the Department of Water Drainage and Waterways and Water Science branches.

Unfortunately, due to logistical constraints a review of the management options for native and feral fish populations in this state could not be carried out within the time frames set for this project. The review of options for the management of native and feral freshwater fish is considered to be necessary for managers to be able to prioritise research efforts and management decisions.

The Department of Fisheries is confident that the Freshwater Fish Distribution database and website will prove to be essential tools for promoting a systematic, collaborative and strategic approach to the future management of native freshwater fish and invertebrates in Western Australia. However, such a comprehensive database cannot be built upon without contributions from other agencies, universities, researchers and members of the community who are involved in freshwater research. While the introduction of mandatory submission of datasets as part of the research exemption application process will ensure the expansion of the database in the future, we strongly encourage

those with existing valuable distributional data to make it available to the Department of Fisheries to be included in the State Government's database.

7 Future directions

Further steps towards the development and implementation of a strategy to manage W.A native freshwater fish populations include:

- Developing a framework for a preliminary assessment process for prioritising those regions, waterways and/or species, which require further research attention. This will require research of a range of parameters i.e. not just limited to changes in distribution but biological and environmental variables.
- Identifying major threatening processes and those species under immediate threat.
- Developing risk rankings in terms of vulnerability for particular species to the various threatening processes.
- Establishing regular monitoring of species abundance and distribution in priority areas.
- Managing and coordinating native fish research and collection activities by all universities and government agencies via the Department of Fisheries scientific exemption process.
- Implementing breeding and restocking programs for those native fish communities under serious threat.
- Controlling the spread of feral species and their impact on native fish populations.
- Identifying potential new invasive species and likely impacts.
- Encouraging collaboration with other organisations.
- Engaging community involvement via the website and conservation and rehabilitation programs.

Appendix 1

WA Freshwater Fish Distribution Database and website: User and System Administrators guide

Native Fish Strategy System is made up of two web applications written in ASP.NET 2.0. These being:

- An internal application run on the agencies intranet which is used to maintain and publish the details about the location of Native Freshwater Fish Species in Western Australia, and
- An externally hosted public web site that allows the public to search and map results for Native Freshwater Fish Species by Species, Catchment or via a drill-down map

This guide describes the operation of the Internal Application as deployed on the Fisheries Intranet and the public website.

Internal database

Security within the System

The system has two levels of security, these are:

- System Administrator Access
- Read-Only Access

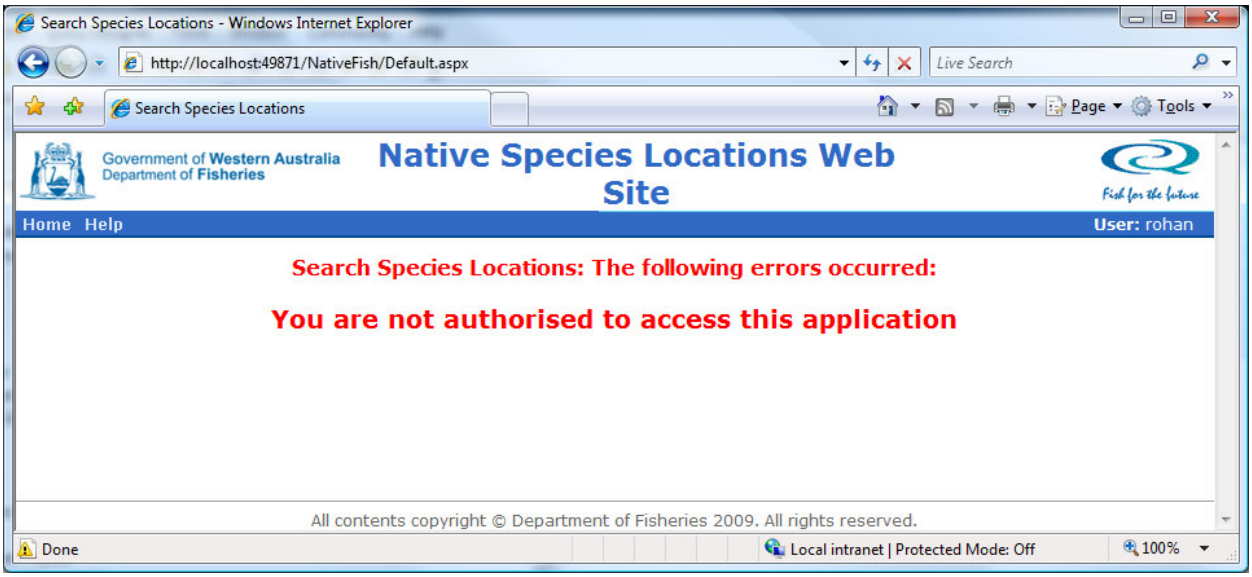
Users with System Administrator Access have full access to the system including the ability to:

- Search and export data to excel
- Add, update and delete species location data
- Maintain the various reference files used within the system
- Export data to the public web site

User with Read-Only Access

- Search and export data to excel
- View Species Location Data

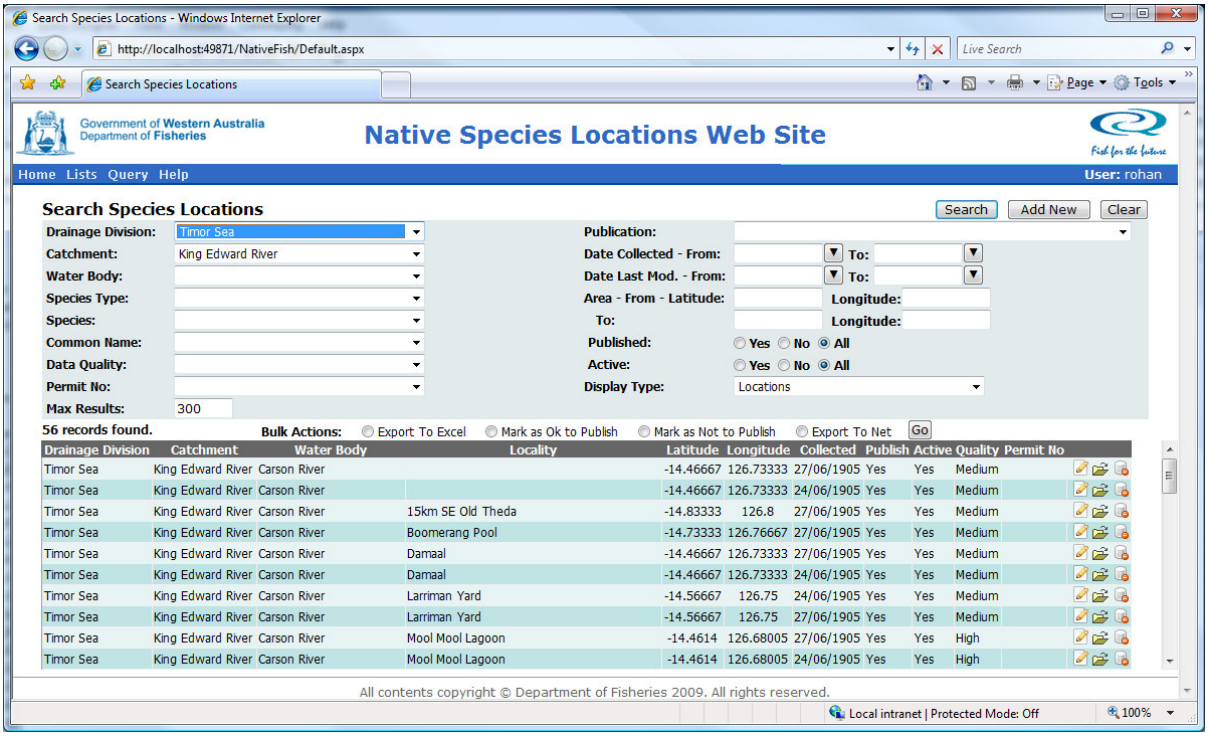
One of these Roles must be explicitly granted to a user before they can access the system. Any user attempting to access the system without first being granted access be blocked from the system as shown in the screen shot below.



For more details about security see of the ***User Security Roles*** in the ***Maintaining the Lists*** Section of this guide.

Species Location Search Screen

The Species Location Search screen is the first screen displayed when the system is accessed.



This screen has:

- A series of menu links located at the top of the screen that provides access to other parts of the system. These links will be different depending on the level of access you have to the system.
- A series of selection criteria you can use to locate particular Species Location Records
- A scrollable area to display the results to your searches.

Doing a Search

To perform a search, simple enter the required selection criteria you wish to search on into one or more of the fields provided and press the ***Search*** button. A set of results matching your criteria will then be displayed togther with some additional options to perform Bulk Actions of your selected Results.

By Default, the system will only return the first 300 rows of any query. The ***Max Results*** field located at the bottom left hand side of the selection criteria area can be used to over-ride these details.

The search screen can display your results By ***Location*** or By ***Location and Species***

This is controlled by the **Display Type** field located at the bottom right hand side of the selection criteria area. When ***Location*** is selected, the results will only show the locations entered from a particular publication or data source. When ***Location and Species*** is selected, the results will show an entry for each species found at th locations matching the specified selection criteria.

The ***Add New*** button can be used by System Administrators to create new Species Locations records. See ***Maintaining Species Locations Details*** for more details.

The ***Clear*** button can be used to clear all the previous entered selection criteria and results.

Bulk Actions

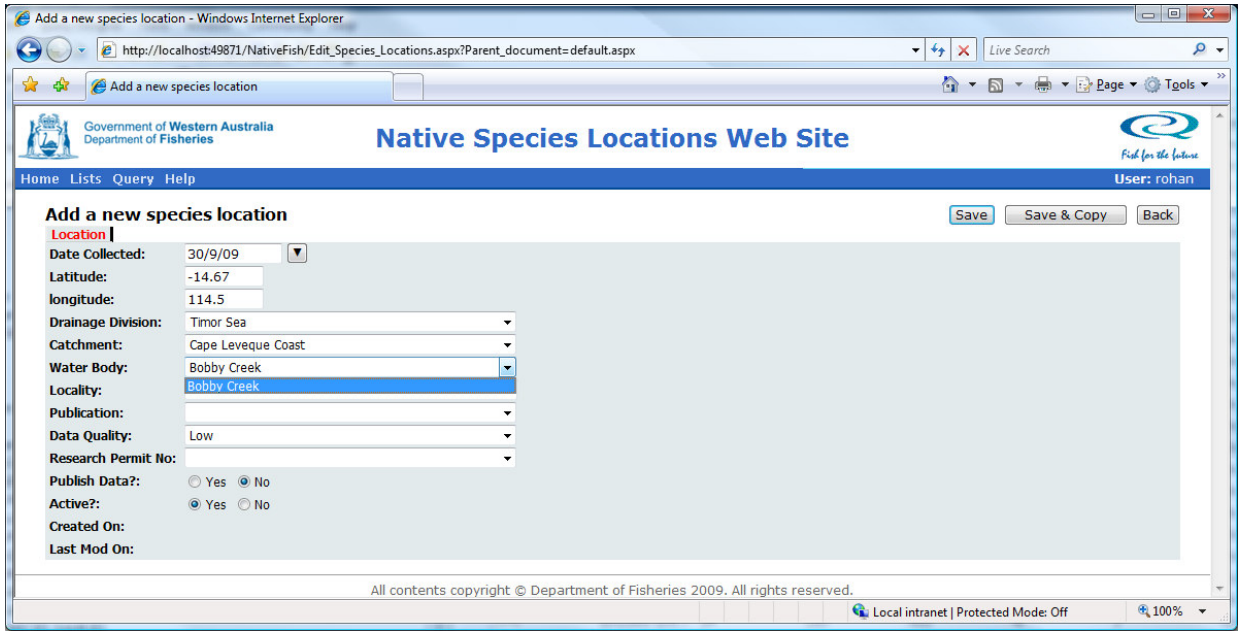
Once a search has been performed and a set of results has been found, you can perform special actions for these results using the Bulk Actions options. These options will change depending on the Display Type and your Security Role. A brief description of each of these options is listed below.

Action	Description
Export to Excel	Exports all selected data to an excel workbook. This option is always available
Mark as Ok to Publish	This options sets the Publish flag associated with this location to “Yes” for all the selected locations. This option is only available to System Administrators for the Location display type
Mark as Not to Publish	This options sets the Publish flag associated with this location to “No” for all the selected locations. This option is only available to System Administrators for the Location display type
Export to Net	This options exports the selected data to the Public Web Site. In addition to exporting the selected Location Information this option will also export data from the Drainage Division, Catchments, Waterbody, Species, Species Type, Species Family, Data Quality, Permits, Publications and System Parameter tables. This option is only available to System Administrators for the Location display type

Maintaining Species Location Details

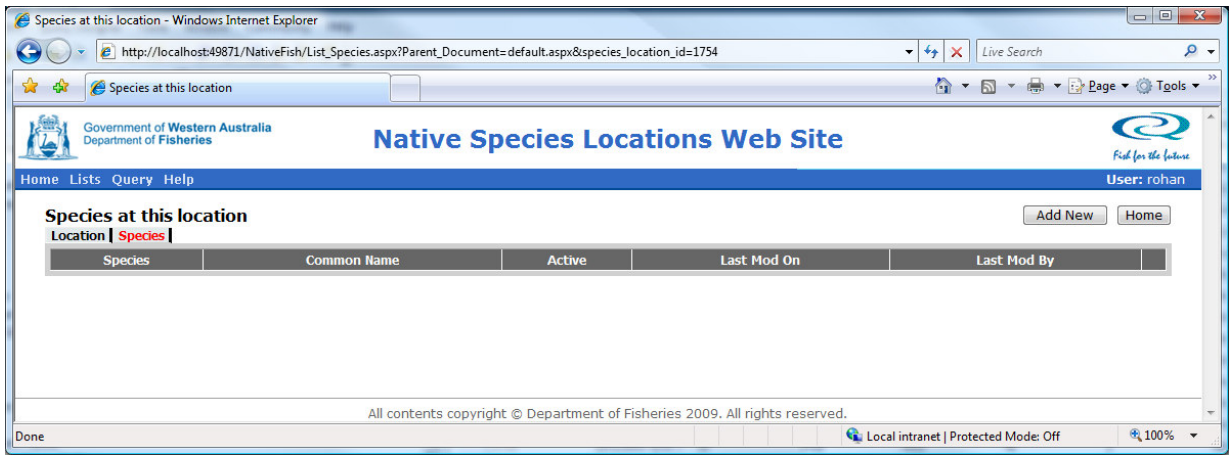
Adding a new Species Location Detail

To add a new Species Location Detail, first press the ***Add New*** button from the Species Location Search Screen. This will display a blanks Species Location entry form

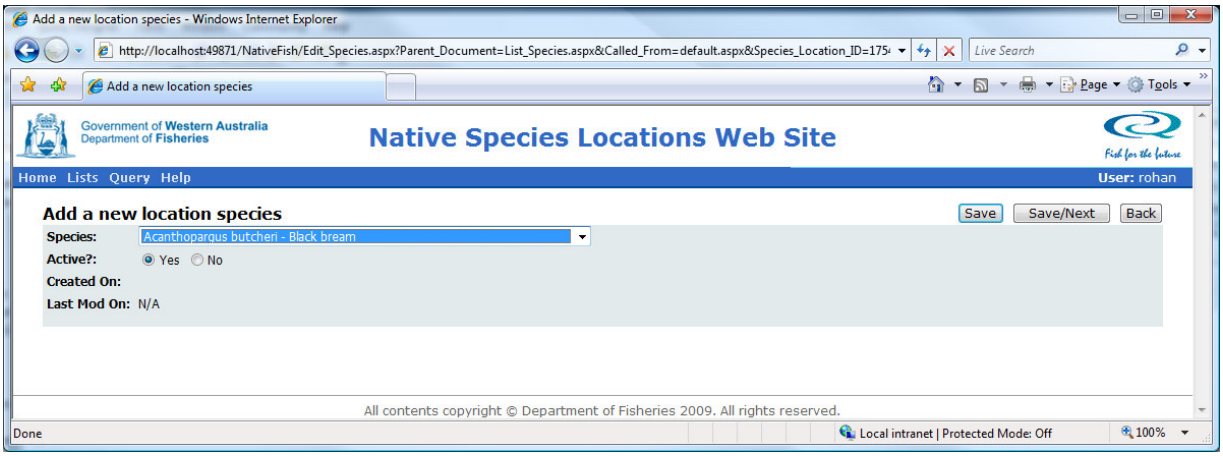


Complete the field show and press ***Save*** to records your changes. All the fields listed except Locality, Publication and Research Permit number are required. Latitude and Longitude can be entered in <hour>.<decimal minute> or <hour>.<minute>.<second> format but in the later case, the entry will automatically be converted to <hour>.<decimal minutes> format on saving.

Once you have saved the Location entry, the Species Tab will be displayed. This tab allows you to enter species found for this location. To add species entries, click on the species tab.



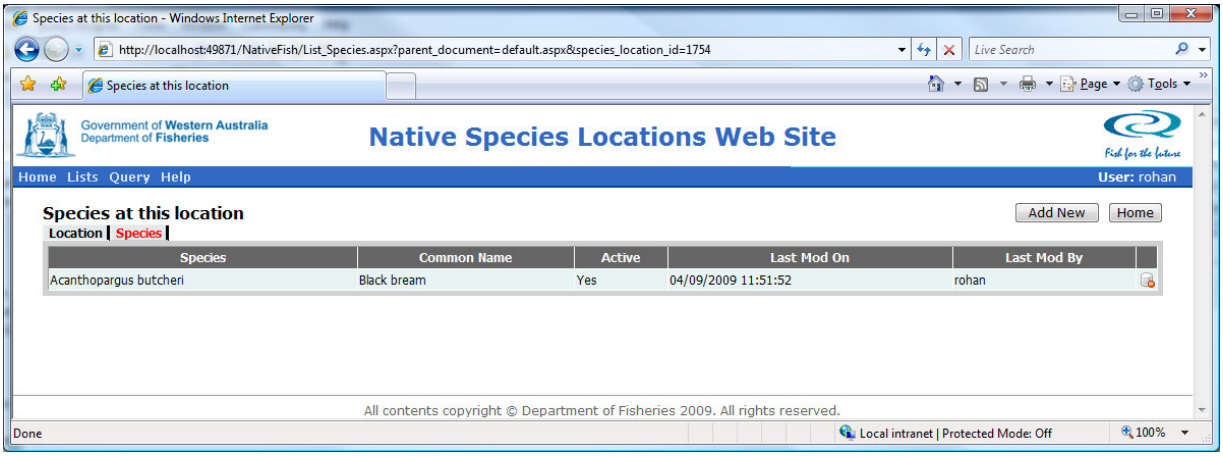
Now press the ***Add New*** Button to enter a new species location record.



Select the species from the drop down list and press ***Save*** to return to the Species Location List screen, or ***Save/Next*** to save the current records and enter another species using this screen.

The ***Back*** button can be used to return to the ***Species Location List*** Screen

The species you enter on this screen will be shown on the Species Location List screen.

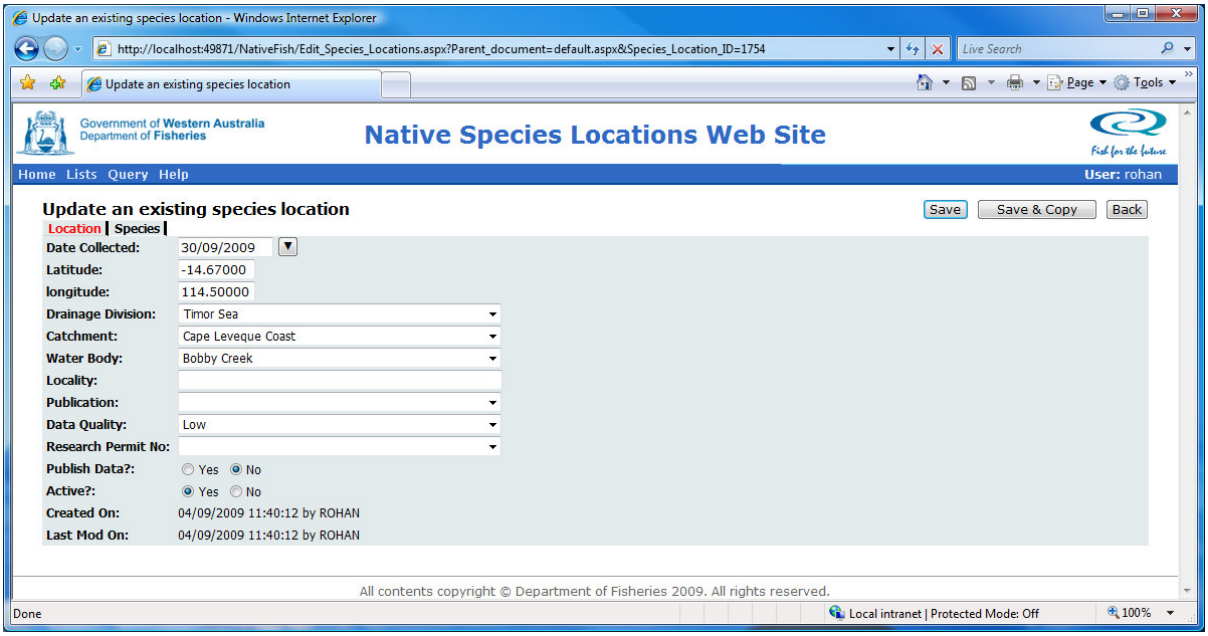


Species Location records can never be deleted as they may have been exported to the public web site. They may however be marked as inactive and thus be excluded from the results shown on the public web site. To do this simply click on the Task Can Icon located at the end of row of the item you wish to mark as being inactive on the list screen.

Updating an existing Species Location Detail

To update an existing Species Location detail, first select the details by entering some criteria on the Search Screen and perform the search. Once the location records to be changed are displayed, click on the row of the item to be edited. This will open the Location screen.

Like Species Location records, Location records can never be deleted as they may have been exported to the public web site. They may however be marked as inactive and thus be excluded from the results shown on the public web site. To do this simply click on the Task Can Icon located at the end of row of the item you wish to mark as being inactive on the Search Results screen.



Make the required changes and press the ***Save*** button to records your changes. Species Location records can be update via the species tab. For More details on adding, updating or deleting Species Location details, see ***Adding a new Species Location Detail***.

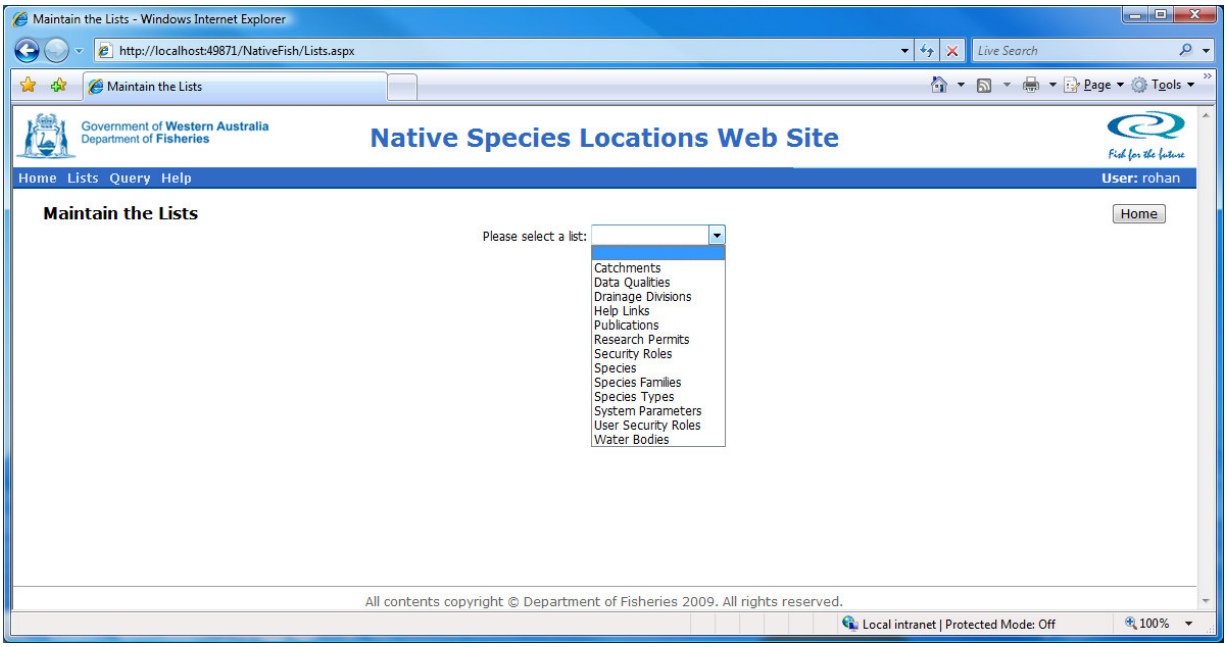
The ***Save/Copy*** button can be used to save the current records and create a new record based on the details contained in the previous records.

The ***Back*** button can be used to return to the ***Search*** Screen

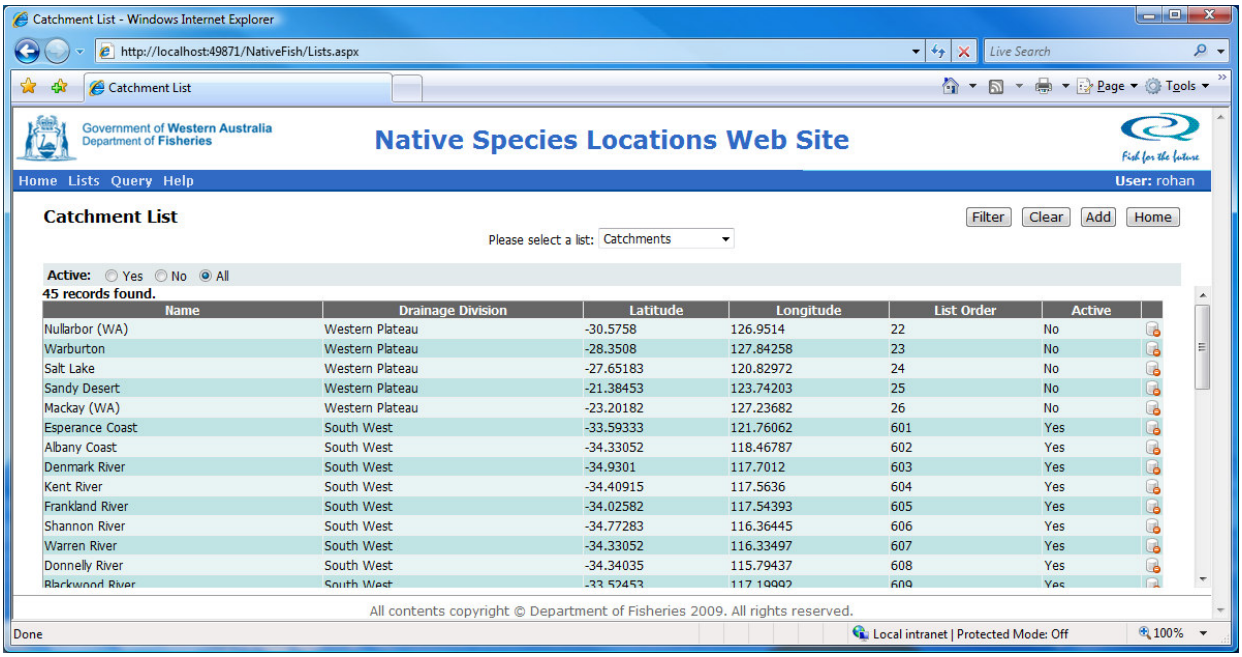
Maintaining the Lists

System Administrators can maintain reference lists used by system. These lists allow the web application to populate drop down lists, store application settings and to manage application security.

To maintain these lists, click on the lists button in the top left hand corner of the screen. This will display the Maintain the Lists screen.



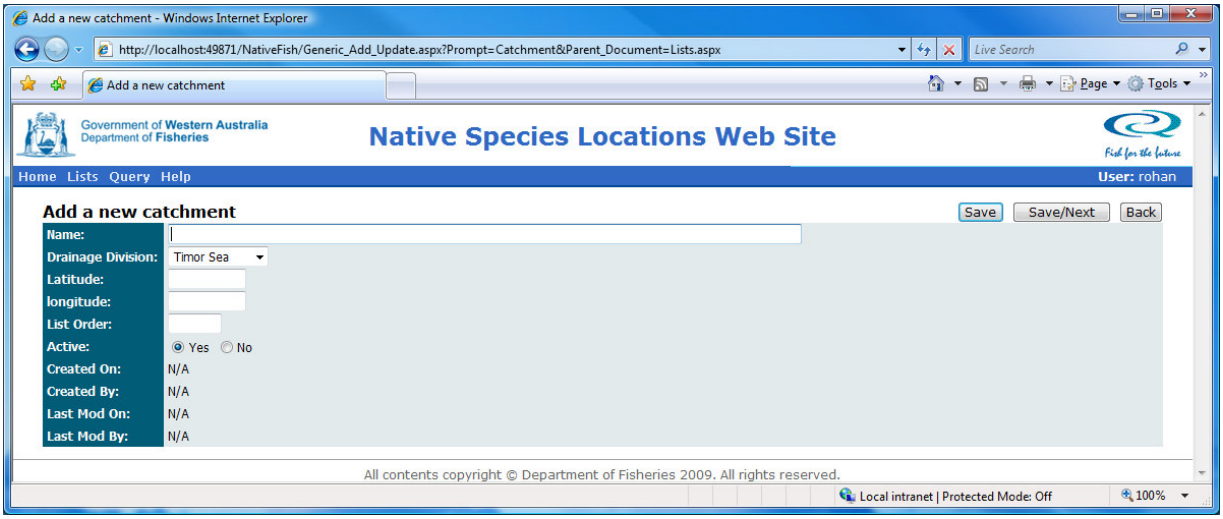
Select an entry from the drop down list to view a list. Once you have selected a list, a table will appear showing the contents of the selected list.



Adding a new list item

Many of the lists contain common fields such as a name, whether or not the item is active and a list order.

To add a new item to a list, select the appropriate list on the 'maintain the lists' screen and click on the add button to open the add update screen.



The common fields – name, active and list order – are described below.

The name field is the name of the list item. In most cases the name field is what the user will see in the drop down lists within the system.

The active field determines whether or not a particular field will be displayed in a drop down list. This is an easy way to remove a list item from a drop down list without deleting the list item and compromising data already stored in the system.

The list order field is used to determine the order of items in a list, where 1 has a higher precedence than 10 in the list. The list order cannot be less than zero. The list order is not a required field, but it is useful in determining which items will appear at the top (and bottom) of a list.

Click on the save button to save the list item and return to 'the maintain the lists' screen, or save/next to save the list item and clear the screen for the next new list item.

Updating an existing list item

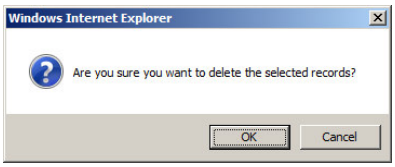
To update a list item, select a list on 'the maintain the lists' screen and click on the list item you would like to update. Clicking on any of the list items details will open the add update screen.

Click on the save button to save the list item and return to 'the maintain the lists' screen, or save/next to save the list item and clear the screen for the next new list item.

Deleting a list item

To delete a list item, select the appropriate list and find the list item you wish to delete. Once you have found the list item, click on the delete icon.

A confirmation screen will ask you to confirm the delete. Click ok to delete the list item or cancel to return to 'the maintain the lists' screen.



Lists – A detailed explanation

Many of the lists in the system will use the generic name, active and list order fields. However, there are many lists that collect different information in addition to, or instead of, these generic fields. Descriptions of these differences can be found below.

Catchments

A list of the catchments available to the system. Catchment entries have the common fields plus:

- A Drainage Division to which this catchment belongs.
- A Latitude and Longitude - These can be entered in <hour>.<decimal minute> or <hour>.<minute>.<second> format but in the later case, the entry will automatically be converted to <hour>.<decimal minutes> format on saving. These are used by the Browse By Map Option to place the Markers on the map for a given catchment.

Drainage Divisions

A list of the Drainage Divisions available to the system. Drainage Division entries have the common fields plus:

- A Latitude and Longitude - These can be entered in <hour>.<decimal minute> or <hour>.<minute>.<second> format but in the later case, the entry will automatically be converted to <hour>.<decimal minutes> format on saving. These are used by the Browse By Map Option to place the Markers on the map for a given Drainage Division.

Help Links

Help links are used to build the help links list. Help links allow you to specify a URL. Relative URLs are supported.

Publications

A list of the Publications or References from which the Species Location Details have been sourced. Publication entries have the common fields plus:

- Long Name or fully title of the Publication
- Authors of the Publication
- Year the publication was first published
- A URL that is used by the Public Web Site to link from the References Page to an external link containing more information about this publications.
- ISBN

Species

A list of the Species listed in the application. Species entries have the common fields plus:

- Latin name
- Common Name
- Species Type
- Species Family (optional)
- Species No (Australian Standard Species Classification Number)
- Photo File Name – used to display an image of the species on the Public Web Site - Browse By Species Results Page.
- Description displayed on the Public Web Site - Browse By Species Results Page.

Species Family

A list of the Species listed in the application. Species entries have the common fields plus:

- Latin name
- Common Name

System Parameters

Refer to the system parameters section of this guide for further information on system parameters.

User Security Roles

The user security roles list defines user security for the application. A user security role list item consists of:

- A user name. This is not case sensitive.
- A role. The roles determine what the user can do.

Waterbody

A list of the waterbody available to the system. Waterbody entries have the common fields plus:

- A Catchment to which this waterbody belongs.
- A Latitude and Longitude - These can be entered in <hour>.<decimal minute> or <hour>.<minute>.<second> format but in the later case, the entry will automatically be converted to <hour>.<decimal minutes> format on saving. These are used by the Browse By Map Option to place the Markers on the map for a given catchment.

System Parameters

The web application has a number of system parameters that you can use to customise how the web application works. Most system parameters have descriptions stating their purpose, affect and default values. HCS will set these up as part of the installation process and for the most part they should not need to be updated.

A complete list of the system parameters used by this application and their purpose is given below.

System Parameter Name	Description
Data Source Type	Determines the Database back end being used. Can be SQLSERVER or MSACCESS
Project Name	Name of the project as displayed on the header portion of each page
Help Link List Title	Title displayed at the top of the list of help links on the Help Link Page
Help Links List Top HTML	Additional HTML that can be included to display additional information on the help links page after the standard page header and before the list of Help Links
Generic Lookup Default Active	Default value to be applied on the Generic Look up screen for the Active Filter. Values are “True”, “False” or blank
Abbrev Project Name	Project Abbreviated name
Default Active	Default for the Active Field on all entry forms within the application. Values are “True” and “False” or Blank
Lists Default Active	Default value for the Active Filter on the List page. Values are “True”, “False” and blank
Application Mode	A system internal variable used to allow organisation or environment specific code to be selected – Not used in this application
Internet Export URL	The full URL of the page used to import the data into the public web site. The last part of this url must always be “write_table.aspx”. eg http://cod05/hillcrest/nativefish_internet/write_table.aspx
External Web Site Overview Column 1	Text to be places in column 1 of the Overview page of the public web site
External Web Site Overview Column 2	Text to be places in column 2 of the Overview page of the public web site
Email Address	Email address used on the Public Web Site Contact Us page for the Native Fish Team.

Appendix 2

Fish Resources Management Act 1994
Section 7(3)

EXAMPLE OF EXEMPTION

Number

I, Director of Fisheries Research, WA Department of Fisheries, for the purposes of scientific research HEREBY EXEMPT *<insert relevant applicant here>* from all of those provisions of the Fish Resources Management Act 1994 and regulations there under which would otherwise prevent personnel from lawfully undertaking the research activities set out in **Schedule 1** for the period and purpose set out in **Schedule 2** under the conditions set out in **Schedule 3**.

Schedule 1
Activities

<outline of activities to be undertaken>

Schedule 2
Period and Purpose

1. Period:

2. Purpose:

Schedule 3
Conditions

1. No collecting may take place under this general exemption until details of the individual project have been forwarded to the Director of Research, Department of Fisheries and this has been approved and a numbered research permit has been received in return.

2. A copy of the numbered research permit together with a copy of this general exemption must be carried by the person in charge of the collection operation at all times when collecting activity is undertaken.

3. On each occasion when collecting is to take place, notification must be provided **a minimum of 1 hour in advance**, to the Department of Fisheries by calling 1800 815 507 and providing the information requested, which will include the research permit number, caller name, contact numbers, species to be collected, collection dates, times, sites, methods, number and name of people collecting, and boat or vehicle numbers.

4. Where any boat, vehicle or equipment (e.g. fishing gear) used for collection purposes belongs to or is wholly under the control of *<organisation/individual>* it must be clearly identified as such. At land-based collection sites, a sign should be erected identifying the activity as a research project of *<organisation/individual>.*

5. Researchers must maintain a record of the number of fish of each species retained and the location of capture at the end of each collection trip, and cumulative totals for the life of the project, which will be made available for inspection by Department of Fisheries officers or submission to the Director of Fisheries Research, Department of Fisheries, PO Box 20, North Beach WA 6920 on request.

6. No fish, invertebrates or aquatic flora or their derivatives collected under the authority of this exemption are to be sold or used for human consumption.

7. No fish, invertebrates or aquatic flora shall be collected for purposes of chemical extraction, or to seek pharmacological or other biological activity ('bioprospecting'), without the specific written approval of the Chief Executive Officer of the Department of Fisheries under Regulation 179 of the *Fish Resources Management Regulations 1995*.

8. No live fish or invertebrate shall be translocated to an area of Western Australia to which it is not endemic without the specific written approval of the Chief Executive Officer of the Department of Fisheries under Regulation 176 of the *Fish Resources Management Regulations 1995*.

9. No collecting shall be undertaken within any marine park or marine reserve without specific written permission from the Department of Environment and Conservation.

10. No collecting shall be undertaken within 800 m of the high water mark of Rottnest Island without specific written permission from the Rottnest Island Authority.

11. Copies of reports resulting from this research must be forwarded to the Director of Fisheries Research, Department of Fisheries, PO Box 20, North Beach WA 6920.

12. The Director of Fisheries Research as the delegate of the Chief Executive Officer, Department of Fisheries, can at his discretion revoke this approval at any time.

DIRECTOR – FISHERIES RESEARCH
Department of Fisheries
As delegate for
CHIEF EXECUTIVE OFFICER
Department of Fisheries

Appendix 3

Government of Western Australia
Department of Fisheries

Fish for the future

EXAMPLE APPLICATION TO COLLECT FISH UNDER EXEMPTION FROM *FISH RESOURCES MANAGEMENT ACT 1994* AND REGULATIONS THEREUNDER ISSUED TO:

EXEMPTED INSTITUTION: .....

TITLE AND PURPOSE OF RESEARCH PROJECT:
SPECIES TO BE COLLECTED, including maximum quantities and arrangements for release of any fish in excess of sampling and analysis requirements:
FISHING GEAR/METHODS TO BE USED:
LOCATIONS TO BE FISHED:
DURATION OF RESEARCH PROJECT: Overall anticipated collection period: Date for final report:
PERSON IN CHARGE OF PROJECT (i.e. main contact for enquiries – PhD student or field supervisor):

Name:	Email:
Telephone:	Fax (for return of permit):
SUPERVISOR (if different from above):	
Name:	Email:
Telephone:	
OTHER PERSONNEL INVOLVED IN SAMPLING FOR FISH:	

AUTHORISATION

(This section must be completed by the Exemption Holder – the responsible individual within the research institution to whom the Fisheries exemption has been issued. This is normally the Director, or Dean of Faculty.)

I, ……..

(insert name and title)

confirm that the above project is an approved project of

……..….(insert name of institution)

and authorise the collection of fish as described.

Signature: ..... **Date:**…….

COMPLETED APPLICATION SHOULD BE FORWARDED TO THE DIRECTOR OF RESEARCH, DEPARTMENT OF FISHERIES, fax (08) 9203 0199 or mail to PO Box 20, North Beach WA 6920.

NOTE THIS DOES NOT CONSTITUTE PERMISSION TO COLLECT FISH UNTIL RETURNED TO YOU WITH THE SECTION BELOW COMPLETED.

Department of Fisheries use:

RESEARCH PERMIT NUMBER:…….

Signature: ..... **Date:**…….

Dr Rick Fletcher, Director – Fisheries Research