

NORTHERN INLAND BIOREGION

ABOUT THE BIOREGION

The Northern Inland Bioregion, which encompasses the northern half of Western Australia, is predominantly a desert area, with few permanent water bodies. As a result of occasional summer cyclones, the various river systems flow at flood levels for short periods before drying-out to residual waterholes. The only exceptions to this are man-made dams, which trap rainfall for water supply purposes and irrigation.

The only significant fishable water body in the region is Lake Argyle, created by the damming of the Ord River. The continuous release of water from the dam has resulted in the Ord River maintaining its freshwater fish populations year-round, as does the lake, where some freshwater native fish populations have expanded.

Populations of reptiles, such as the protected freshwater crocodile, are also supported by the expanded food chain of native fish, and are thought to have increased significantly from their original billabong-based populations.

SUMMARY OF FISHING AND AQUACULTURE ACTIVITIES

The creation of Lake Argyle has produced a unique inland aquatic environment which is now home to various fishing and tourism-related activities. The lake supports the State's only commercial freshwater fishery – for the silver cobbler or catfish – together with a processing facility supplying predominantly Western Australian and interstate markets. The lake and its associated river system also support recreational fishing for the freshwater component of the barramundi stock and cherabin (freshwater prawns).

Aquaculture development operations in the region have previously included the production of barramundi from a cage operation in Lake Argyle, and a small but growing pond production of redclaw crayfish in the Ord River irrigation system around Kununurra.

The State Government recently funded a stock enhancement project at Lake Kununurra to create a recreational barramundi fishery in the region.

ECOSYSTEM MANAGEMENT

As one of the key ecosystem risks is the introduction of non-endemic species, the Department has an approval process in place for assessing proposals to translocate live non-endemic fish species into and within Western Australia, so as to minimise the environmental risks to freshwater ecosystems associated with this activity.

ECOSYSTEM BASED FISHERIES MANAGEMENT

Identification of Ecological Assets using the EBFM framework

The Department is now implementing an Ecosystem Based Fisheries Management (EBFM) framework (see How to Use section for more details). In terms of ecological assets, the Department has recognised the following for the Northern Inland Bioregion:

Ecosystem structure and biodiversity;

Captured fish species

Protected species (direct impact – capture or interaction);

The full set of ecological assets identified for ongoing monitoring are presented in Northern Inland Ecosystem Management Figure 1.

Risk Assessment of Regional Ecological Assets

The EBFM process identifies the ecological assets in a hierarchical manner such that the assets outlined Northern Inland Figure 1 are often made up of individual components at species or stock level. The risks to each of the individual stock or lower level components are mostly detailed in the individual fishery reports presented in this document. The following table (Northern Inland Ecosystem Management Table 1) provides an overview and cumulative assessment of the current risks to the ecological assets of the Northern Inland Bioregion, at a bioregional level and provides a mechanism for reporting on their status and the fisheries management arrangements that are being applied. These bioregional level risks are now used by the Department as a key input into the Department's Risk Register which, combined with an assessment of the economic and social values and risks associated with these assets, is integral for use in the annual planning cycle for assigning priorities for activities across all Divisions in this bioregion.

Summary of Monitoring and Assessment of Ecosystem Assets

The Department of Fisheries actively supports a number of studies into the native freshwater fish fauna and their habitats in northern river systems in conjunction with Murdoch University, the Department of Water and the Department of Parks and Wildlife, and through involvement with local natural resource management councils. New aquaculture ventures are also subject to strict environmental evaluation under the Department's licensing and on-going arrangements, in conjunction with industry and TAFE.

**NORTHERN INLAND ECOSYSTEM MANAGEMENT TABLE 1
RISK LEVELS FOR EACH ASSET.**

Risk levels in this table are developed by combining the individual (lower level) elements that make up each of the higher level components. Low and Medium values are both considered to be acceptable levels of risk. High and Significant risks indicate that the asset is no longer in a condition that is considered appropriate and additional management actions are required. Where the value is followed by (non-fishing) this indicates that all, or the majority of the risk value, was not generated by fishing activities.

Ecosystem Structure and Biodiversity

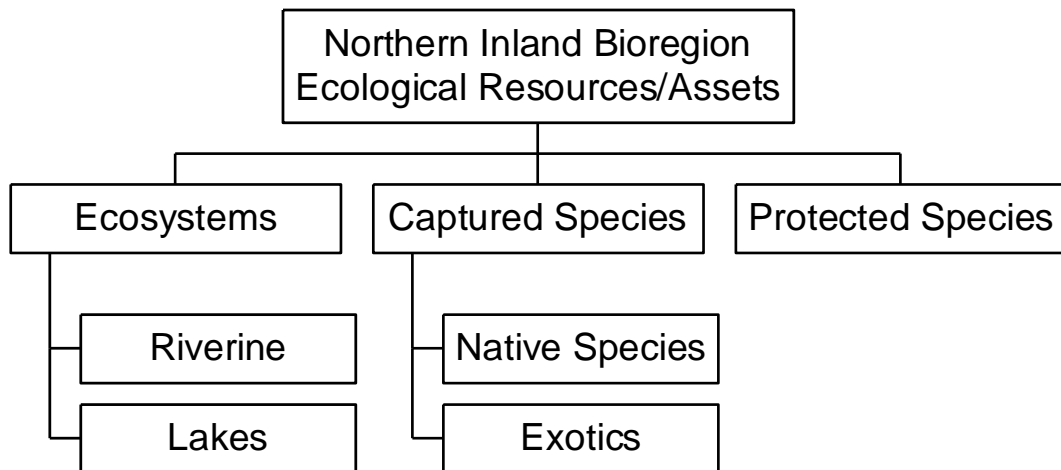
Ecosystem	Risk	Status and Current Activities
Ecosystems	LOW (non fishing)	Minimal threats and these would be due to non-fishing activities

Captured fish species

Fish species	Risk	Status and Current Activities
Finfish Native	LOW	The stocks of freshwater fish are not under any material threat
Finfish Exotics	LOW	As above

Protected species

Protected fish species	Species	Risk	Status and Current Activities
Protected Species	Crocodiles	LOW	A small number of crocodiles have been reported captured in nets in Lake Argyle. The numbers are small and would not affect these stocks.



NORTHERN INLAND ECOSYSTEM MANAGEMENT FIGURE 1

Component tree showing the ecological assets identified and separately assessed for the Northern Inland Bioregion

FISHERIES

Lake Argyle Silver Cobbler Fishery Report: Statistics Only

S.J. Newman, C. Skepper, G. Mitsopoulos, A. Thomson and P. Carter

Fishery Description

Commercial

The only commercial freshwater fishery in Western Australia is in Lake Argyle in the north-eastern Kimberley (Lake Argyle Silver Cobbler Figure 1). This gillnet fishery specifically targets the silver cobbler (*Neoarius midgleyi*).

Recreational

A small recreational and charter boat fishery for this species exists in Lake Argyle with fishing activities peaking during the dry season (winter months).

Boundaries

Commercial

The waters of the Lake Argyle Silver Cobbler Fishery (LASCF) include all waters of Lake Argyle between the dam wall and 16° 37' south latitude.

Recreational

In addition to the waters of Lake Argyle, recreational anglers can fish in all creeks and tributaries that feed into the Ord River and Lake Argyle.

Management arrangements

The LASCF is a limited entry fishery, with six Fishing Boat Licences permitted to operate in the Fishery. A licence condition restricts the net type permitted, with fishers only permitted to use set nets that have a minimum mesh size of 159mm and maximum net drop of 30 meshes.

In June 2012 the *Lake Argyle Fishery Notice 1994* was revoked and replaced with a new notice (Prohibition on Commercial Fishing (Lake Argyle) Order 2012) containing the management arrangements for the Fishery. Under this Order the six Fishing Boat Licences listed are permitted to use no more than 1,500 metres of net at any one time, and are prohibited from taking any fish whatsoever by means of nets during the period from 1 November to 31 December in any year. This seasonal closure is aimed at protecting silver cobbler during the spawning season. Furthermore, at this time of the year water temperatures in the lake are high resulting in spoilage of fish in the nets. Fishers in the LASCF operators are not permitted to take barramundi (*Lates calcarifer*) at any time and all nets used by LASCF operators must be suitably marked with licence identification.

In 2001, a voluntary industry Code of Practice was introduced to the LASCF, to implement sustainable fishing practices and to reduce conflict with other stakeholder groups in Lake Argyle. The Code specifies the accepted means of operation in the Fishery and outlines contingency procedures for lost or abandoned fishing gear.

A Bycatch Action Plan has also been developed for the LASCF which aims to minimise the incidental capture of protected species in Lake Argyle (including freshwater crocodiles, freshwater turtles, and birds) during commercial

gillnetting targeting the silver cobbler. The Lake Argyle Silver Cobbler Fishery Bycatch Action Plan and Code of Practice were revised in 2010.

Landings and Effort

Commercial (season 2012): 118.5 tonnes

The fishery first developed in 1979 with increasing catches reported until 1989 (143 t). Catches have fluctuated between approximately 50 t and 230 t per year since 1990 (Lake Argyle Silver Cobbler Figure 2). Catches from 2009 to 2010 were less than 70 t, while the 2011 catch increased to over 100 t, with the 2012 catch over 118 t. The 2012 catch is within the acceptable catch range.

Nominal effort in this gillnet fishery is calculated as the total number of fishing days by all boats multiplied by the average daily total net length fished per boat (divided by 100) to give '100 m net days'. During 2012, four vessels were active in the fishery, and generated an effort of 8,685 units (100 m net days), this level of effort is similar to that reported in 2000 and is much higher than that reported in recent years (Lake Argyle Silver Cobbler Table 1).

The level of catch in the fishery at present is a reflection of the variable level of effort expended. In recent years effort in the fishery has been variable due to inconsistent fisher participation rates. Participation in the fishery can be variable as a result of the availability of fishers (i.e. active in other fisheries/industries) and market demand.

Recreational: Charter <1 tonne

Limited data are currently available on recreational fishing in this region. The reported charter boat catch for Lake Argyle from 2002 to 2012 was less than 1 t of silver cobbler per annum. There are no data available on general angling catches. There are no minimum legal size limits for silver cobbler, however, fishers are restricted to a mixed species bag limit of 4 freshwater fish per day.

Fishery Governance

Commercial

Target commercial catch range: 90-155 tonnes

The current target catch range is a confidence interval for total catch from those observed during a stable time period for this fishery (1990 through to 1998). This interval was calculated using the estimate of variance that assumes seasonal catches are serially correlated and are explained by an autoregressive moving average model.

NORTHERN INLAND BIOREGION

Current Fishing (or Effort) Level

Acceptable

New management initiatives

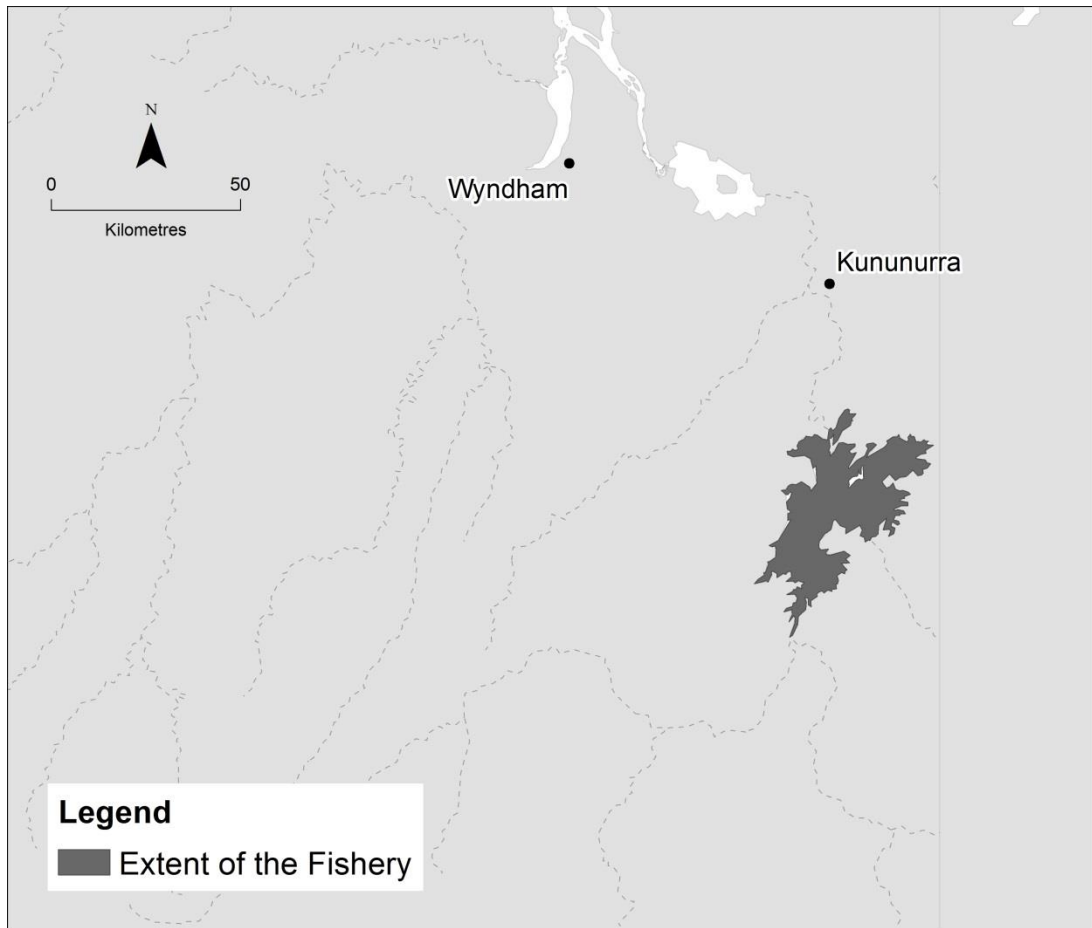
The level of catch in the fishery in 2012 is within the acceptable catch range. The lower levels of catch in the fishery in 2009 and 2010 are likely to have allowed the breeding stock to increase in size if environmental conditions were favourable during those years.

The new Order for this Fishery was gazetted in June 2012 which provided greater clarity around areas permitted to be fished. The next management review for the Fishery is scheduled for 2016/2017.

LAKE ARGYLE SILVER COBBLER TABLE 1

The annual effort (100 m net days) for silver cobbler in the Lake Argyle Silver Cobbler Fishery over the period from 1979 to 2012.

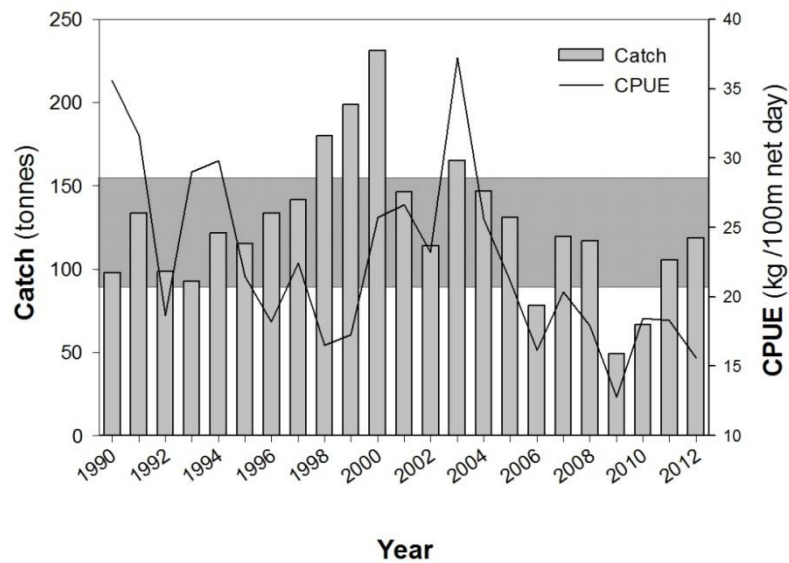
Year	Effort (100m net days)
1979	100.00
1981	166.40
1982	312.33
1983	348.95
1984	703.82
1985	4945.15
1986	2964.13
1987	3630.89
1988	4059.08
1989	2972.81
1990	2869.86
1991	5234.28
1992	5426.90
1993	3642.50
1994	4384.67
1995	5737.96
1996	7481.55
1997	6629.47
1998	11154.89
1999	11485.50
2000	9181.22
2001	5569.88
2002	4698.17
2003	5069.66
2004	6631.87
2005	6471.63
2006	5153.73
2007	5822.67
2008	6787.17
2009	4004.00
2010	3808.50
2011	7335.00
2012	8685.00



LAKE ARGYLE SILVER COBBLER FIGURE 1

Location of the Lake Argyle Silver Cobbler Fishery in northwestern Australia illustrating the remoteness and extent of the fishery.

Lake Argyle Silver Cobbler Fishery



LAKE ARGYLE SILVER COBBLER FIGURE 2

The annual catch and catch per unit effort (CPUE, kg/100 m net day) for silver cobbler in the Lake Argyle Silver Cobbler Fishery over the period from 1990 to 2012. The upper and lower bounds of the target commercial catch range are shown by the shaded catch area between 90 and 155 tonnes.

AQUACULTURE

Regional Research and Development Overview

The process to identify a site to enable and support aquaculture around Lake Argyle as part of the implementation of the Ord Stage II final agreement continues to progress slowly. The issue of a lease has been delayed while the relevant group reviews its options.

A licence to produce barramundi has been issued, but is currently inactive; the licensee is also pursuing a land based lease to support its proposed aquaculture activities. For proponents considering aquaculture in Lake Argyle, identifying a site suitable for land based support facilities has proved difficult.

A proposal to formulate a project to use aquaculture in Lake Argyle as a means to sequester carbon is being contemplated.

A Western Australian company is contemplating the development of a large-scale, land-based aquaculture project in coastal areas of the northern inland area of the State. The project, which proposes to focus on the production of marine prawns in a vertically integrated system, is in the early stage of development.

COMPLIANCE AND COMMUNITY EDUCATION

The Northern Inland Bioregion includes the freshwater rivers, lakes, billabongs and wetlands primarily located in the Kimberley. Commercial fishing is permitted in Lake Argyle (man-made lake) and in the tidal area of the mouth of the lower Ord River.

Compliance and education for the freshwater systems in the North Inland Bioregion focuses on:

- translocation inspections of non-endemic freshwater species;
- protected species interaction;
- monitoring of introduced fish species;
- aquaculture lease and licence compliance;
- localised depletion of barramundi as a target recreational species;
- cherabin catches; and
- commercial Silver Cobbler fishery in Lake Argyle.

Patrols continue to focus on the Fitzroy and Ord Rivers, due to the large number of campers and fishers accessing the inland Kimberley rivers during the peak tourism period of May to October and the area-specific barramundi size and possession limit legislation. Both the Fitzroy and Ord Rivers are identified as major breeding areas for barramundi.

Officers pay particular attention to catch of any protected sawfish species, disused recreational fishing gear and localised impacts of fishers.

Activities during 2011/12

During 2011/12, Fisheries and Marine Officers (FMOs) recorded 2,459 hours of active compliance patrol time in the Northern Inland Bioregion – an increase compared to previous years due to the impact of the Recreational Mobile Patrol (Northern Inland Compliance Patrol Hours Figure 1).

Across the Northern Inland Bioregion, personal contact was made with 4,639 fishers and non-fishers across the commercial, recreational and other sectors (Northern Inland Compliance Table 1). FMOs focused on freshwater fishing

compliance in areas of known high visitation or local complaints regarding illegal fishing activities.

Compliance and education was also undertaken in the Lake Argyle area, where FMOs inspected commercial silver cobbler fishers to ensure that compliance with management, protected species interaction and environmental objectives were being met.

The Community Education Officer develops programs and coordinates delivery of education activities to school-aged children and awareness raising activities with the broader community. In-school and school holiday programs are the main method of reaching students in both the Pilbara and the Kimberley, while attendance at shows and local events target the broader community. An increased emphasis has been placed on developing materials that focus on local issues and their dissemination through regional brochure stockists and local publications.

Initiatives in 2012/13

Compliance service delivery will continue to target any areas of non-compliance and high levels of recreational fishing pressure. These locations are reviewed during annual risk-assessment processes.

The Department's office in Kununurra will be increased to two FMO's. This will greatly enhance the ability of the Department to conduct education and compliance activities in the East Kimberley.

The Departments Northern Region Mobile Patrol will focus on compliance and education of recreational fishers. A large portion of the mobile patrols time will be spent ensuring that fishers are aware of, and comply with, bag, size and possession limits relating to Barramundi, which is one of the States iconic fisheries that is primarily inland based.

The Departments Statewide Mobile Patrol will assist by delivering a compliance and education program through the Pilbara and Kimberley during the peak tourist season.

Compliance activities relating to the only freshwater commercial fishery, which targets the Lake Argyle silver

cobbler, will continue. The operators in this fishery are inspected to ensure that high levels of compliance and community confidence are maintained.

NORTHERN INLAND COMPLIANCE TABLE 1

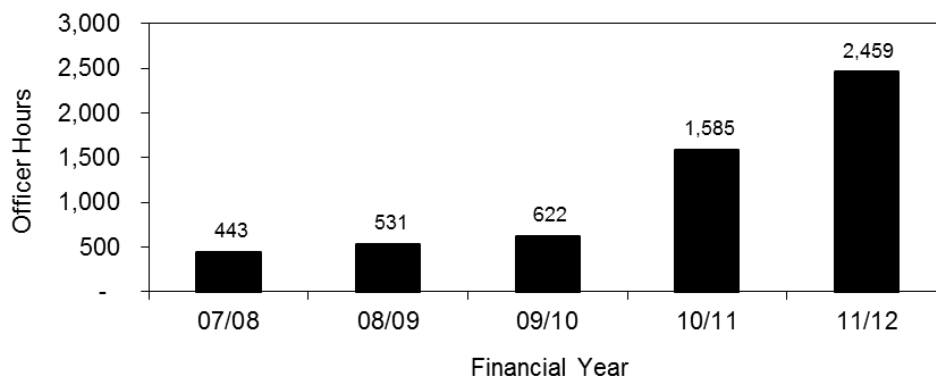
This table gives a summary of compliance and educative contacts and detected offences within the Northern Inland bioregion during the 2011/12 financial year.

PATROL HOURS DELIVERED TO THE BIOREGION	2,459 Officer Hours
CONTACT WITH THE COMMERCIAL FISHING COMMUNITY ¹	
Field contacts by Fisheries & Marine Officers	14
Infringement warnings	4
Infringement notices	2
Prosecutions	3
CONTACT WITH THE RECREATIONAL FISHING COMMUNITY	
Field contacts by Fisheries & Marine Officers	3,892
Infringement warnings	27
Infringement notices	44
Prosecutions	22
OTHER FISHING-RELATED CONTACTS WITH THE COMMUNITY	
Field contacts by Fisheries & Marine Officers	733
Fishwatch reports ²	N/A

1 Contacts are classified according to the specific fishery, which is usually clearly delineated as being either commercial or recreational. The “other fishing-related contacts with the community” category is used where multiple fisheries are contacted and it is not possible to accurately classify the contacts into one specific fishery – typically, the majority of contacts are these contacts are recreational in nature (e.g. personal contacts in marine parks), but contacts made in relation to fish kills, shark patrols and inspections of commercial fish wholesale and retail premises, etc, are also included in this category.

2 This represents the total number of Fishwatch reports, both commercial and recreational, since the service provider reporting mechanism cannot differentiate between sectors.

Northern Inland Bioregion Compliance Patrol Hours



NORTHERN INLAND COMPLIANCE FIGURE 1

This figure gives the “On Patrol” officer hours showing the level of compliance patrol activity delivered to the Northern Inland bioregion over the previous five years. The 2011/12 total gives the patrol hours in the bioregion that resulted in the contacts detailed in Table 1. The totals exclude time spent on other compliance-related tasks, e.g. travel time between patrol areas, preparation and planning time.