

Ecological risk assessment of the Queensland Eel Fishery



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The Department of Primary Industries and Fisheries (DPI&F) seeks to maximise the economic potential of Queensland's primary industries on a sustainable basis.

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Introduction

The Queensland Eel Fishery (QEF) targets the long fin eel (*Anguilla reinhardtii*) and the short fin eel (*Anguilla australis*), in rivers and freshwater impoundments. The QEF is unique in that the resource is harvested at two stages in the lifecycle—the adult stage (eels >30 cm) and the glass/elver stage (eels <30 cm) for both species. Commercial adult eel trappers collect adult eels from impounded waters; commercial juvenile eel fishers take glass eels and elvers from rivers to supply seed stock for grow-out in aquaculture systems.

The QEF was assessed by the Australian Government Department of the Environment and Water Resources¹ (DEW) against stringent sustainability guidelines and was accredited with a five year exemption from export controls. Continued export approval for this fishery is contingent upon meeting a number of recommendations, including:

- 'Within three years, DPI&F to undertake a risk analysis of the bycatch species, including protected species, taken in the fishery to identify those species vulnerable to fishing. Management measures to mitigate threats to any species found to be at high risk from fishing operations should be developed and implemented in a timely manner.'

Given the requirement to address DEW's recommendations, and the Queensland Government's commitment to manage fisheries sustainably, DPI&F facilitated a two-day stakeholder meeting in September 2006 to conduct an assessment to identify ecological risks in the eel fisheries (juvenile eel and adult eel were assessed separately).

The 'Ecological Risk Assessment for Effects of Fishing' (ERAEF) Level One model², developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) that has been applied to a range of Australian Fisheries Management Authority (AFMA) managed Commonwealth fisheries, was selected as an appropriate methodology to assess ecological risks in the QEF.

The ERAEF model uses a step-wise process involving the development of three 'Scoping Documents' to build the final 'Scale, Intensity and Consequence Assessment (SICA)' table which details the risk rating for each issue. The outcomes of the ERAEF process from the

¹ Formerly known as the Department of the Environment and Heritage (DEH).

² AJ Hobday, A Smith, H Webb, R Daley, S Wayte, C Bulman, J Dowdney, A Williams, M Sporcic, J Dambacher, M Fuller and T Walker, *Ecological Risk Assessment for the Effects of Fishing: Methodology*, Report R04/1072 for the Australian Fisheries Management Authority, Canberra, 2006.

DPI&F stakeholder workshop were provided to the Freshwater Management Advisory Committee (FreshwaterMAC) for comment and endorsement.

The tables below provide a summary of the consequence scores as determined by DPI&F and endorsed by FreshwaterMAC. The consequence scores are inherently precautionary as the ERAEF process assesses the components of the ecological community associated with the fishery that were considered by DPI&F to be 'most at risk' from fishing and related activities. Consequence scores of three or higher requires a management response to be developed regarding the mitigation of this risk.

Juvenile Eel Fishery

Consequence score of 1 = Negligible risk; 2 = Minor; 3=Moderate; 4=Major; 5=Severe; 6=Intolerable.

Direct impact of fishing	Fishing Activity	CONSEQUENCE SCORES (1 – 6)	
		Threatened, Endangered and Protected (TEP) Species ³	Bycatch
Capture	Bait Collection	-	-
	Fishing	1	1
	Incidental behaviour	1	1
Direct impact without capture	Bait collection	-	-
	Fishing	1	1
	Incidental behaviour	1	1
	Gear loss	1	1
	Anchoring/mooring	-	-
	Navigation/steaming	1	1
Addition/ Movement of Biological Material	Translocation of species	1	2
	On board processing	-	-
	Discarding catch	2	1
	Stock enhancement	-	-
	Provisioning	-	-
	Organic waste disposal	-	-
Addition of Non-Biological Material	Debris	1	1
	Chemical pollution	-	-
	Exhaust	1	1
	Gear loss	1	1
	Navigation/Steaming	1	1
	Activity/presence on water	1	1
Disturb Physical Processes	Bait collection	-	-
	Fishing	1	1
	Boat launching	-	-
	Anchoring/mooring	-	-
	Navigation/steaming	1	1
External Hazards	Other capture fishery method	1	2
	Aquaculture/Mariculture	-	-
	Coastal development	3	2
	Other extractive activities	-	-
	Other non-extractive activities	-	-
	Other anthropogenic activities	1	1

³ The Queensland Environment Protection Agency (EPA) indicated that based on their knowledge of protected species found in the riverine and riparian habitats associated with the Juvenile Eel Fishery, the fishery would generally not overlap with the range of many TEP species. The majority of possible species identified were freshwater-only species that would not be found in the estuarine sections of the river where the Juvenile Eel Fishery operates. The most likely potential for interaction was identified with the water mouse *Xeromys myoides* (false water rat) and the Oxleyan Pygmy Perch *Nannoperca oxleyana* in southern Queensland.

Justification of Juvenile Eel consequence scores of three or above:

The Juvenile Eel Fishery is restricted to sections of 23 rivers on the east coast, a spatial scale of 100–500 n.mile and as such has been scored at a spatial scale of four.

Fishing activity varies through the year based on moon and tidal phases and rainfall. Catch return data from DPI&F’s Commercial Fisheries Information System (CFISH) suggests approximately 100–200 days per year, a temporal scale of four.

These scores are applicable for each component in the Juvenile Eel Fishery.

Threatened, Endangered and Protected Species										
Direct impact of fishing	Fishing activity	Presence (1) Absence (0)	Spatial scale of Hazard (1 – 6)	Temporal scale of Hazard (1- 6)	Sub-component	Unit of Analysis	Operational Objective (S2.1)	Intensity Score (1 – 6)	Consequence Score (1 – 6)	Confidence score (1 – 2)
External Hazards	Coastal development	1	4	4	Population size	Oxleyan Pygmy Perch	P1.1	3	3	1

Coastal development has been identified as the highest risk external hazard to Oxleyan Pygmy Perch—which is not directly related to the Eel Fishery.

DPI&F has acknowledged that coastal development could potentially impact on the population size of Oxleyan Pygmy Perch. Notwithstanding, this issue does not fall within the capacity of fisheries management alone to respond. DPI&F plan to contact the relevant coastal management agencies through appropriate forums to discuss cumulative impacts of fishing and coastal development on this TEP species.

Adult Eel Fishery

Consequence score of 1 = Negligible risk; 2 = Minor; 3=Moderate; 4=Major; 5=Severe; 6=Intolerable.

Direct impact of fishing	Fishing Activity	CONSEQUENCE SCORES (1 – 6)	
		TEP Species	Bycatch
Capture	Bait Collection	-	-
	Fishing	3	1
	Incidental behaviour	1	1
Direct impact without capture	Bait collection	-	-
	Fishing	1	1
	Incidental behaviour	1	1
	Gear loss	1	1
	Anchoring/mooring	-	-
	Navigation/steaming	1	1
	Translocation of species	3	3
Addition/ Movement of Biological Material	On board processing	-	-
	Discarding catch	1	1
	Stock enhancement	-	-
	Provisioning	1	1
	Organic waste disposal	1	1
	Addition of Non-Biological Material	Debris	1
Chemical pollution		1	1
Exhaust		1	1
Gear loss		1	1
Navigation/Steaming		1	1
Activity/presence on water		1	1
Disturb Physical Processes	Bait collection	-	-
	Fishing	1	1
	Boat launching	1	1
	Anchoring/mooring	-	-
	Navigation/steaming	1	1
External Hazards	Other capture fishery method	1	2
	Aquaculture/Mariculture	-	-
	Coastal development	1	3
	Other extractive activities	-	-
	Other non-extractive activities	-	-
	Other anthropogenic activities	1	1

Justification of adult eel consequence scores of three or above:

The Adult Eel Fishery is undertaken within all Queensland's east coast catchments so has been given a score of six, however is restricted to privately owned farm dams and a small number of public dams reducing the actual spatial scale of fishing activity within that range significantly.

Fishing activity occurs all-year round. Catch return data suggests approximately 100–200 days per year, a score of four.

These scores are applicable for each component in the Adult Eel Fishery.

Threatened, Endangered and Protected Species										
Direct impact of fishing	Fishing activity	Presence (1) Absence (0)	Spatial scale of Hazard (1 – 6)	Temporal scale of Hazard (1- 6)	Sub-component	Unit of Analysis	Operational Objective (S2.1)	Intensity Score (1 – 6)	Consequence Score (1 – 6)	Confidence score (1 – 2)
Capture	Fishing	1	6	4	Population size	Freshwater turtles ⁴	P1.1	3	3	2

Fishing is likely to affect population size before other subcomponents, given generalist impacts to TEP species. Freshwater turtles are considered to be the most commonly caught TEP species according to anecdotal information from fishers.

Fishing impacts on population size of freshwater turtles is considered to occur at a moderate intensity. Given the small size of individual fishing sites (dams), there is a possibility of having severe local effects while at the broader scale the effect is likely to be moderate.

Capture of freshwater turtles through fishing is considered to have a moderate impact on population size. Traps are designed to allow any trapped turtles to surface for air and as such, most turtles are released alive. Recent reports in the Species of Conservation Interest (SOCI) logbooks indicate that interactions with freshwater turtles are high, with the majority of turtle reported as released alive. Given these factors there is potential for a minimal impact on population size but little to none on population dynamics.

Medium level of confidence in scores assigned. The interactions are with common species such as longneck and shortneck freshwater turtles and information from the SOCI logbooks on release condition.

⁴ Turtle species listed as endangered, vulnerable or rare under the Australian Government *Environment Protection and Biodiversity Conservation Act 1999* or the Queensland *Nature Conservation Act 1992* do not occur in the limited adult eel fishery area (dams) as they are either cloacal breathers (which do not live in dams) or do not occur within the geographic range of the fishery. References to freshwater turtles refer to species regarded as common (longneck and shortneck) under the Queensland *Nature Conservation Act 1992*.

Threatened, Endangered and Protected Species										
Direct impact of fishing	Fishing activity	Presence (1) Absence (0)	Spatial scale of Hazard (1 – 6)	Temporal scale of Hazard (1- 6)	Sub-component	Unit of Analysis	Operational Objective (S2.1)	Intensity Score (1 – 6)	Consequence Score (1 – 6)	Confidence score (1 – 2)
Addition/ Movement of Biological Material	Translocation of species (movement of traps between locations, boat launching)	1	6	4	Population size	Mary River Cod (<i>Maccullochella peelii</i>)	P1.1	3	3	1

Translocation is likely to affect population size before other subcomponents through the potential impact of the introduction of new organisms to a water system. The Mary River cod is considered the most at risk species as they face the greatest sensitivity to potential impacts, including predation and competition from pest or competing species, disease and parasites.

Translocation of species is believed to occur at a moderate intensity as it is possible for fishers to move between several dams on a single fishing trip, particularly if there are low water levels in dams, however traps are generally dried during transportation. The overall distance of movement would generally be local.

Translocation of species would have moderate consequence, if pest species (fish, weeds etc), parasites or diseases are present in some of the waters fished and not others and there is regular movement between the locations by fishers using the same gear, there may be a high potential for translocation impacts. The severity of consequence would depend on which specific pest/disease species are present, their distribution relative to fisher movement and the resilience of the species to movement/desiccation/colonisation.

Confidence in the scores assigned is low due to a lack of information and knowledge of the impacts of translocation in fresh water systems and dams.

Bycatch										
Direct impact of fishing	Fishing activity	Presence (1) Absence (0)	Spatial scale of Hazard (1 – 6)	Temporal scale of Hazard (1- 6)	Sub-component	Unit of Analysis	Operational Objective (S2.1)	Intensity Score (1 – 6)	Consequence Score (1 – 6)	Confidence score (1 – 2)
Addition/ Movement of Biological Material	Translocation of species (movement of traps between locations, boat launching)	1	6	4	Population size	Freshwater shrimp (<i>Paratya australiensis</i>)	B1.1	3	3	1

Translocation is likely to affect population size before other subcomponents through the potential impacts associated with addition of new organisms to a water system. Freshwater shrimp are considered most likely to be affected as they potentially face the greatest range of impacts, including predation and competition from pest or competing species⁵, disease or parasites.

Translocation is believed to have a moderate intensity as it is possible for fishers to move between several dams on a single fishing trip, although the overall distance of movement would generally be local.

The consequence of translocation of species is considered moderate. Fishers are reported to move between water bodies quite regularly. If pest species (fish or weed), parasites or diseases are present in some of the waters fished and not others, there is the potential for translocation impacts. The severity would depend on which pest/disease species are present; their distribution relative to fisher movement; and the resilience of the species to movement/desiccation/colonisation.

Confidence in the scores assigned is low due to a lack of information and knowledge of the impacts of translocation in fresh water systems and dams.

Bycatch										
Direct impact of fishing	Fishing activity	Presence (1) Absence (0)	Spatial scale of Hazard (1 – 6)	Temporal scale of Hazard (1- 6)	Sub-component	Unit of Analysis	Operational Objective (S2.1)	Intensity Score (1 – 6)	Consequence Score (1 – 6)	Confidence score (1 – 2)
External hazards	Coastal development	1	6	4	Population size	Australian Bass (<i>Macquaria novemaculeata</i>)	B1.1	3	3	1

Coastal development has been identified as the highest risk external hazard to Australian bass—which is not directly related to the Eel Fishery.

DPI&F has acknowledged that coastal development could potentially impact on Australian bass population size. Notwithstanding, this issue does not fall within the capacity of fisheries management alone to respond. DPI&F plan to contact the relevant coastal management agencies through appropriate forums to discuss cumulative impacts of fishing and coastal development on this TEP species.

⁵ Shrimp and weeds are the organisms most likely to be translocated in fishing gear.

Compiled by

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Image

Longfin eel – *Anguilla reinhardtii* (Photograph by GE Schmida)