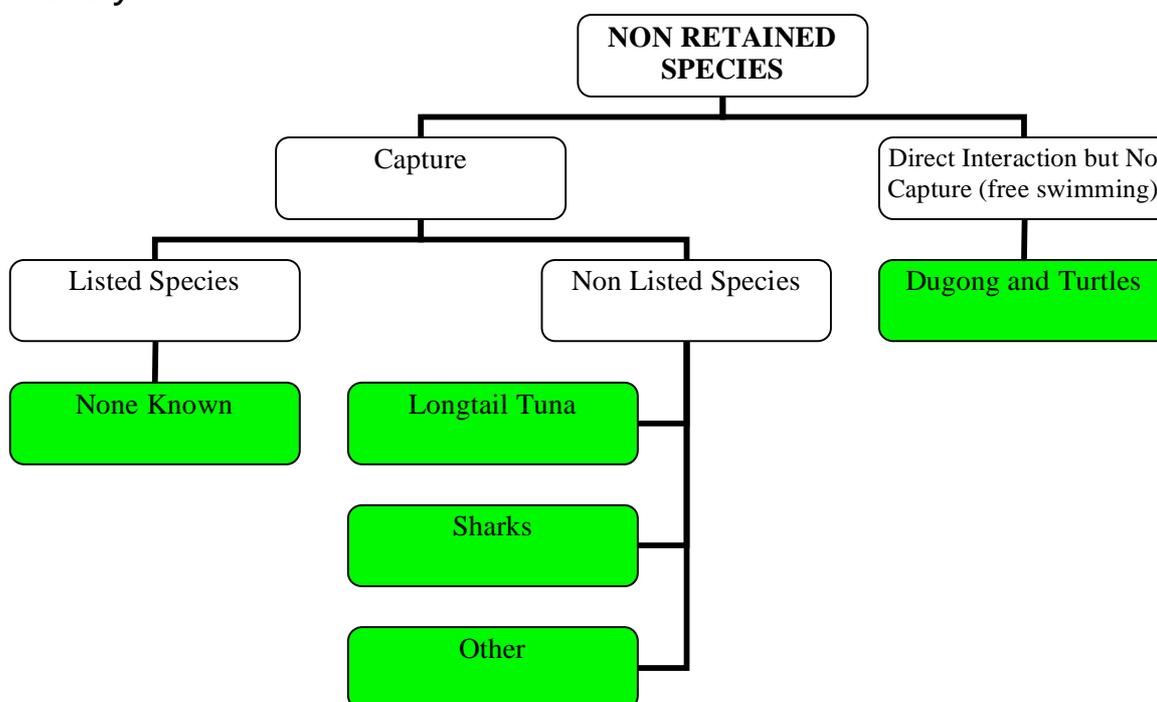

Non-Retained Species

Component Tree for Non-Retained Species in the L4/L5 Line Fishery



Captures

Little research has been conducted specifically on bycatch in the L4/L5 Line Fishery. The methods employed by the commercial operators are in essence, the same as used in Spanish mackerel fisheries in the Northern Territory and on the Queensland east coast, as well as the demersal hand line fishery in the Coral Reef Fin Fish Fishery that operates throughout the Great Barrier Reef (Roelofs *et al.* 2003). However, due to the nature of targeting fish in the L4/L5 Line Fishery, bycatch is considered to be negligible (G. McPherson, QDPI Fisheries Biologist *pers. comm.* 2003). The fishing gear and species targeting practices limit the take of species other than Spanish mackerel. Fishing methods include the use of troll lines and hand lines, which are always tended during fishing. Species that are caught incidentally can therefore be released alive (Roelofs *et al.* 2003).

Bycatch in the Northern Territory Spanish mackerel fishery is also negligible (O'Grady 2002). The gear types and methods used, effectively target Spanish mackerel and catch few incidental fish species. The major by-product species in the NT fishery are sharks which are released alive (Roelofs *et al.* 2003).

Listed Species

Few or no interactions with species listed under the *Environment Protection and Biodiversity Act 1999* are known in this fishery, therefore the fishery was considered to be at negligible risk.

ERA Risk Rating: Impact on breeding stocks (*Negligible*)

Non Listed Species

Longtail Tuna (*Thunnus tonggol*)

Tunas are sometimes caught on troll lines, including the long tail tuna (*Thunnus tonggol*), which is a Commonwealth regulated fish species and not permitted to be retained in the L4/L5 Line Fishery. Given the low incidental catch of tuna, the Workshop considered impact of the fishery on long-tail tuna stocks was negligible.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Sharks

As for longtail tuna, catches of non-marketable species including large sharks are very small and the fish are released alive (Roelofs *et al.* 2003). Similar to the east coast Spanish Mackerel Line Fishery (Ryan 2004), sharks are rarely caught and retained during trolling. Sharks may be landed while preying on hooked Spanish mackerel. Hooked sharks invariably break the troll lines and/or are released live by the operator. The survival rate is probably high for released sharks as the tinned hooks used in the fishery would ultimately rust and fall out (Roelofs *et al.* 2003).

Supported by observations from DPI&F officers on the east coast, fishers will generally relocate at the first sign of sharks in a Spanish mackerel school due to the considerable loss of product involved (D. Rose, DPI&F, *pers. comm.*, 2003). Based on the available information, the Workshop considered that the fishery was having a negligible impact of shark stocks and that other Gulf fisheries were more likely to have a greater impact. The largest impact on the sustainability of marketable (retained) shark species is covered in the N3 and N9 fishery risk assessments.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Other Species

Research on bycatch from Spanish mackerel fisheries on the Queensland east coast and in the Northern Territory can be broadly applied to L4/L5 Line Fishery (Roelofs *et al.* 2003). Similar to these other Spanish mackerel fisheries (Ryan *et al.*, 2004), small quantities of reef associated species are captured while fishing around shallow reefs and shoals in the L4/L5 Line Fishery. Barracuda (*Sphyraena* spp.) are likely to be the dominant other bycatch species when using troll lines (G. McPherson, DPI&F, *pers.comm.* 2003).

The Workshop considered that due to the highly selective nature of mackerel line fishing, catches of other bycatch species were insufficient in the L4/L5 Line Fishery to pose anything other than minimal risk to the sustainability of their stocks.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Non-Captures

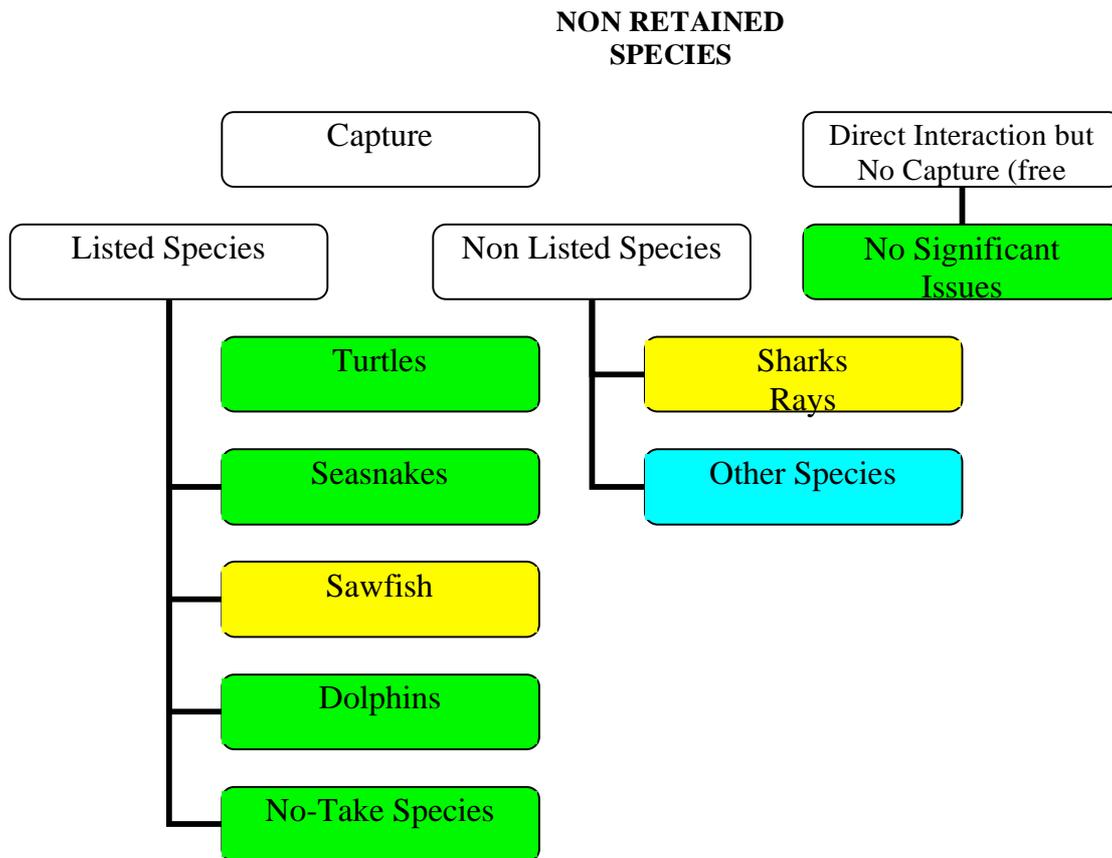
Dugong and Turtles

There is minimal likelihood of boat strikes on dugongs because these species do not occur in high numbers in the same areas as major effort in the fishery (viz. up to 25 nm offshore from Weipa, Karumba and Mornington Island).¹² Turtle populations in the Queensland Gulf have been surveyed by Marsh *et al.* and were found to occur in higher numbers along the western shore of Cape York Peninsula north of the Holroyd River and offshore from Mornington Island, potentially interacting with the fishery in these areas. However, the combination of low maximum speed of displacement hull vessels (compared to faster, planing hull vessels), selective fishing gear and their naturally evasive behaviour mean there is minimal risk to the sustainability of dugong and turtles from non-capture interactions with L4/L5 fishing vessels.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

¹² Marsh *et al.* 2002 confirmed that the regions in the vicinity of Weipa and Karumba are not particularly important dugong habitat and that the most important region for dugongs in the Gulf was the shallow (< 3 metres deep) waters inshore of the Wellesley Islands

Component Tree for Non-Retained Species in the Developmental Fin Fish Trawl Fishery



Captures

Listed Species

Turtles (Cheloniidae)

The six species of sea turtles listed in the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* have been reported by Marsh *et al.* 1998, to be present in Queensland waters of the Gulf of Carpentaria. Their 1997 survey of the coastal waters of the Queensland Gulf found turtles were abundant.¹³ Numbers were significantly higher in two distinct regions. The nearest of these to the fishery area was the western shore of Cape York Peninsula, north of the Holroyd River, lying 25 nm inshore of the fishery area. The fishery area is also about 200 nm from the other major turtle population area offshore from the Wellesley Islands. Since this workshop convened, the fishery area has been extended to 15°S latitude. Possible leatherback (*Dermochelys coriacea*) turtle nesting activity has been observed on the south-east Gulf coast.¹⁴ But is well outside of the fishery area. Observer data from a boat currently permitted in the fishery suggest that approximately 10 turtles may be caught per year. With only two boats operating in the fishery, potentially 20 turtles per year may be caught. However, it cannot be assumed that all of these turtles die. Observer

¹³ An estimate of between 14,500 and 17,000 turtles (all species combined) was derived from survey data

¹⁴ Marsh *et al* suggested leatherback turtles may nest in the vicinity of Kowanyama

reports indicate that the condition of trawled turtles can be difficult to assess by the presence/absence of movement alone and that survival depends on when the turtle was caught during the shot. Turtles are generally more likely to survive when entering a trawl net late in the shot. Observers report that most turtles observed were released alive (M. Hicks *pers com.* 2006)

Turtle species most likely to be caught are Olive Ridley turtles (*Lepidochelys olivacea*) and Green turtles (*Chelonia mydas*) (M. Read, EPA, *pers. comm.*, 2004). Recent observer reports have confirmed Olive Ridley interactions with this fishery (J. Stapley, DPI&F, *pers. comm.*, 2005).

The considerable distances between the fishery area and areas of high turtle density suggest that the likelihood for interaction is quite low. The Workshop considered that relative to a population estimate of some 14,000 to 17,000 turtles, the 20 turtles caught in the fishery each year (most probably olive ridley and possibly a number of green turtles) would have a negligible impact on their respective populations. Further evidence of the relatively low impact of the fishery upon turtles is provided when the reported annual 2003 catch of 27 turtles in the NPF is considered (Caton and McLoughlin 2005). The NPF is recognised as a well managed fishery that is generally conducted in a manner that aims to minimise and avoid death or injuries to protected species (including turtles) and that is unlikely to have an unacceptable or unsustainable impact on the environment in the short to mid term (DEH 2003).

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

Turtle resuscitation techniques developed through cooperation between DPI&F and industry are available through the Queensland Seafood Industry Association (QSIA).

In 2005, a DPI&F Protected Species Education Program (DPI&F 2005b) was delivered to industry, modifying existing and developing new educational material to improve awareness among commercial and recreational fishers of techniques to minimise interactions with protected species (including turtles) and to demonstrate methods of careful and safe handling of protected species post-capture to maximise their survival. DPI&F expects that these procedures will be adopted by operators in this fishery and are committed to ensuring they are reinforced with fishers through the DPI&F observer program.

In addition, as part of licensing conditions, all master fishermen are required to undertake a protected species awareness course. DPI&F will continue to monitor SOCI logbook returns for catch trends of all protected species.

Note: This proposed management action applies to all listed species referred to in this risk assessment.

Sea snakes (*Hydrophiidae*)

Risk assessment of seasnakes in the Gulf fisheries is limited to the finfish trawl fishery on the basis that, due to the gear deployed, other Gulf fisheries are unlikely to impact on these species.

Commercial logbook data records indicate six seasnakes were caught in 2002. More recent observer reports confirm a very low level of seasnake interactions with this fishery (J. Stapley, DPI&F, *pers. comm.*, 2005). Thirty species are known to occur in Gulf waters as reported through CSIRO research (Milton 2001). Results from research on the relative risks to seasnakes from trawling in the Gulf and Queensland east coast are not yet available (FRDC Project “Reducing the impact of Queensland's trawl fisheries on protected sea snakes”). Ongoing attempts at mitigation of trawl impacts on high risk seasnake species in the NPF and the ECOTF are being monitored for their relevance to sustainable management of seasnake bycatch in the Gulf Finfish Trawl Fishery.

Given the low levels of effort and observer reported seasnake interaction with the fishery, the Workshop considered the current impact of the fishery on sea snakes was negligible.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

The frequency of seasnake catches is monitored in the observer program for the fishery. Data from this source is regarded as reliable. Because the observed incidental catch is very low, there are no additional management actions proposed at this time. Further management of sea snake bycatch will be informed by the results of FRDC Project No. 2004/051 expected to be available by mid-2007.

Sawfish (Pristidae)

The narrow sawfish (*Anoxypristis cuspidata*) was the only sawfish species reported in offshore N9 net fishery catches by Gribble *et al.* (2004) and has been caught in depths up to 40 m in the Gulf. Low numbers are caught in the finfish trawl fishery, with 8 animals, recorded by observers, caught in 2002 (2 specimens were caught on the same trip). A moderate risk rating given to this sawfish in the inshore N3 net fishery and low risk rating given in the offshore N9 net fishery suggests there is a low to moderate risk to the sustainability of this species from the finfish trawl fishery. However, there are other sawfish species not positively identified that also occur in the catch. There could be green sawfish (*Pristis zijsron*), dwarf sawfish (*P. clavata*) or freshwater sawfish (*P. microdon*). Most sawfish caught in the fishery are returned to the water alive (J. Stapley, DPI&F, *pers. obs.*, 2004).

The Workshop considered that there was a possibility that the catch of sawfish species could be higher than the relatively low observed catch, it was appropriate to assign a higher level of risk to the sustainability of sawfish on a precautionary basis.

ERA Risk Rating: Impact on breeding stock (*Moderate*) - see N3 and N9 risk assessments

Proposed Management Actions

- Sawfish catches will continue to be monitored through an onboard observer catch monitoring program.
- A guide to careful and safe handling and release of sawfish was published by DPI&F and copies provided to GOCDFTF fishers in 2005.

-
- BRDs are already subject to testing in the Western Australian finfish trawl fishery (Bill Passey, Gulf Finfish Trawl Operator, *pers. comm.*, 2004). The Queensland Government will investigate the potential use of BRDs in the fishery by December 2007.

Dolphins (Delphinidae and Monodontidae)

Bottlenose dolphins (*Tursiops truncatus*), Indo-Pacific (*Sousa chinensis*), and Irrawaddy dolphins (*Orcaella brevirostris*) have been identified in aerial surveys of Gulf coastal waters by Marsh *et al.* The Workshop noted that during the life of the DPI&F observer program, none of these or any other dolphin species not identified in the surveys, are known to have been caught in the fishery. Interactions have been reported in other Gulf fisheries (see the N3 and N9 risk assessments for details).

ERA Risk Rating: Impact on breeding stock (Negligible)

Proposed Management Actions

No specific management actions are proposed.

No-take Species¹⁵

Captured live Queensland grouper (*Epinephelus lanceolatus*) have the swim bladder deflated prior to release to assist recovery from barotrauma. Less than 20 are estimated to be caught per year (J. Stapley, DPI&F observer, *pers. comm.*, 2004). On occasion catches of barramundi cod (*Cromileptes altivelis*) are also taken in the fishery (J. Stapley, DPI&F, *pers. comm.*, 2005). The Workshop did not consider the impact of these catches to be more than negligible on the populations of these species. Both have extensive tropical Indo-Pacific and Western Pacific distributions respectively of which the fishery area is only a very small part.

ERA Risk Rating: Impact on breeding stock (Negligible)

Proposed Management Actions

No specific management actions are proposed at this time. However, data in Fishbase (Froese and Pauly 2005) indicate the resilience of these species to exploitation is low, with minimum population doubling times up to 14 years for barramundi cod and more than 14 years for Queensland grouper. DPI&F will continue to monitor catches of these species and consider whether current management is appropriate when the Draft Bycatch Action Plan for the Gulf of Carpentaria Fisheries (DPI&F 2004) is reviewed.

Non Listed Species

Sharks and Rays (Lamniformes and Rajiformes)

A range of shark and ray species are captured by the fishery (Roelofs and Stapley 2004). The annual catch of sharks and rays in the fishery is estimated at a few tonnes per year. A nil in-possession limit for sharks and rays has been applied to operators in the fishery (M. Doohan, DPI&F, *pers. comm.*, 2004). Impacts on the stocks are due to incidental mortality before discarding and considered to be similar to the impact on

¹⁵ No-take species are regulated fish under the Qld Fisheries Legislation. All harvesting is totally prohibited

sharks and rays from interactions in the N9 offshore net fishery (see Offshore Net Fishery assessment).

ERA Risk Rating: Impact on breeding stock (*Moderate*)

Proposed Management Actions

Management similar to sawfish is proposed (see Proposed Management Actions for sawfish in this fishery for details).

Since the Workshop, it has been suggested that the current estimate of shark bycatch in the fishery may need to be reassessed based on shark catches in the NPF prior to the introduction of turtle excluder devices (Dr. S. Griffiths, CSIRO, *pers. comm.*, 2005). DPI&F will assess elasmobranch catch composition and catch trend data collected through the DPI&F observer program and determine whether the current risk rating needs to be reviewed and further management considered.

Other Species

The annual catch of all other bycatch species combined is estimated to be about 30t/yr in total. Squirrelfish (Holocentridae) and trevally (Carangidae) make up the bulk of the other bycatch species.

The Workshop considered that given the large number of species (e.g. 20 carangid species alone in DPI&F observer catch data that are regarded as bycatch: Roelofs and Stapley 2004), the 'Other Species' catch was relatively small compared to the catch of the target and byproduct species. The area of capture of these species (the fishery area) is also limited by comparison with their known catch distributions (CSIRO 2005). It was therefore considered unlikely that the impact of this fishery on these stocks was unsustainable at current catch levels.

ERA Risk Rating: Impact on breeding stock (*C1 L4 Low*)

Proposed Management Actions

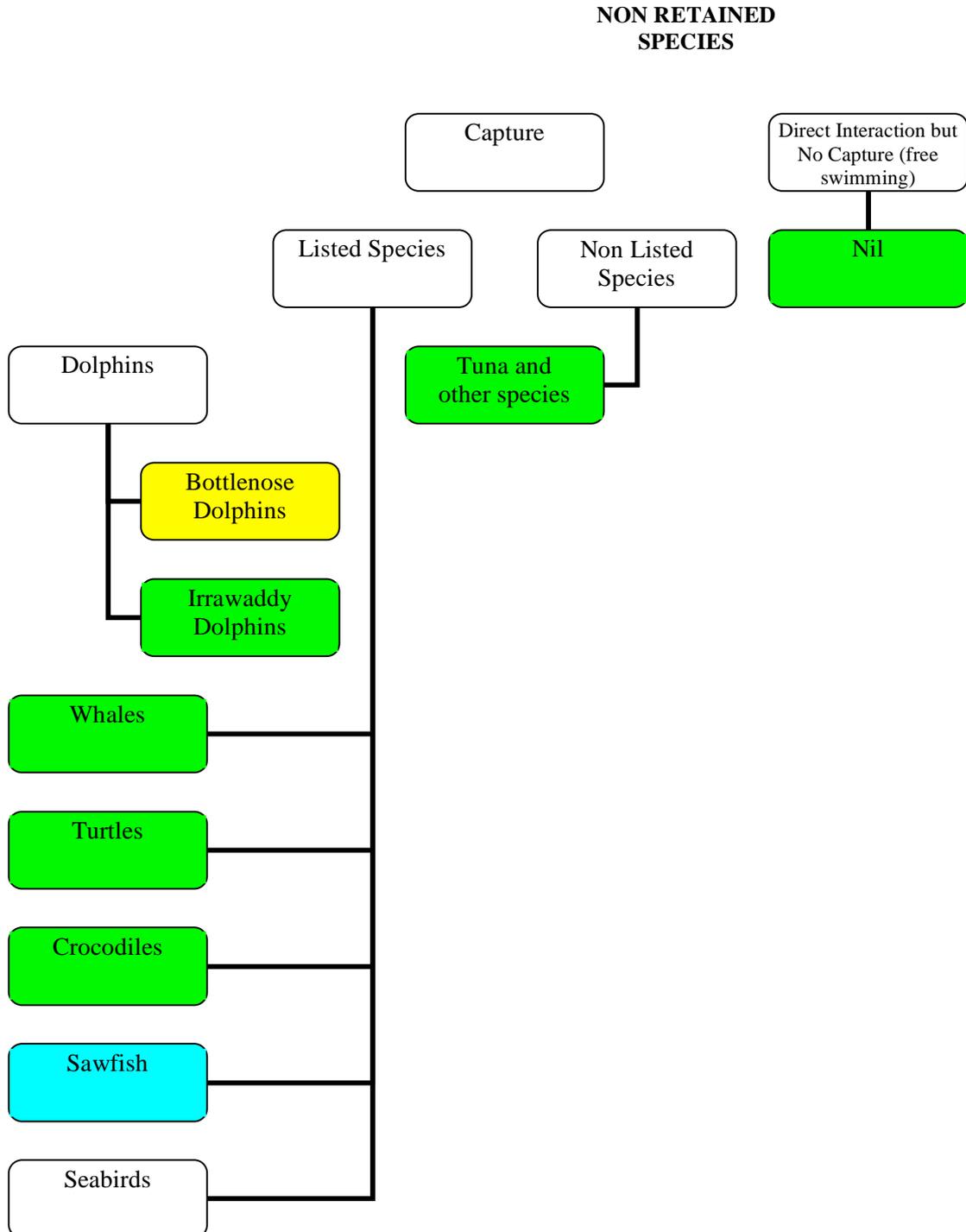
No specific management actions are proposed at this time. Since the Workshop recent observer data indicates undersized specimens of several lutjanid, lethrinid, scombrid and serranid species are discarded in some finfish trawl operations (J. Stapley, DPI&F, *pers. comm.*, 2005). DPI&F will continue to monitor bycatch species and consider whether current management is appropriate when the Draft Bycatch Action Plan for the Gulf of Carpentaria Fisheries (DPI&F 2004) is reviewed in 2006.

Non-Captures

No significant risk to any species from non-capture interactions was identified at the Workshop.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Component Tree for Non-Retained Species in the N9 Offshore Net Fishery



Captures

Listed Species

Bottlenose Dolphins (*Tursiops truncatus*)

The DPI&F Observer Program recorded five bottlenose dolphin captures over a six year period (Jason Stapley, DPI&F, *pers. comm.*, 2004). Observer trips make up 50 days for a season (i.e. 7% of the total fishing days in the fishery). It is estimated that the potential range of captures may be 10-25 per year. This species is reported to commonly interact with N9 fishing gear and is abundant in the Gulf.¹⁶ Acoustic pingers have been trialled in the fishery to assist dolphins avoid the net.

Consulting the *Protected Species Consequence Table A3.3* (Appendix 3), the Workshop considered the risk from the fishery to the bottlenose dolphin population was moderate, (i.e. the level of impact is currently at a maximum acceptable level).

ERA Risk Rating: Impact on breeding stock (C2 L4 Moderate)

Proposed Management Actions

Fishers tend to avoid areas where dolphins and other protected species are located (Gulf Fishers Code of Conduct). DPI&F is continuing to encourage fishers to take further precautions to reduce interactions with dolphins through the Protected Species Education Program for fishers (see *Proposed Management Actions for Non-Retained Species: Turtles* in the Finfish Trawl Fishery Assessment).

Irrawaddy Dolphins (*Orcella brevirostris*)

During 1997 aerial surveys, relatively small numbers of Irrawaddy dolphins were observed and these were limited to inshore locations (Marsh *et al.* 1998) outside the fishery area.¹⁷ During 2004, a single capture of an Irrawaddy dolphin was observed in the DPI&F Observer Program (J. Stapley, DPI&F, *pers. obs.*). Sightings have been made offshore, however the species usually inhabits inshore waters. The DPI&F observer reported the animal to be in an advanced state of decay, suggesting the dolphin was probably dead before capture and was carried into the net by prevailing currents.

There are no data to indicate that the GOCDFTF is having an impact on the population of this species because their area of occurrence and the fishery area do not significantly overlap. The Workshop considered that any impact would be minimal.

ERA Risk Rating: Impact on breeding stock (Negligible)

Proposed Management Actions

DPI&F is continuing to encourage all fishers to take further precautions to avoid interactions with Irrawaddy dolphins through its Protected Species Education Program for fishers (see above: *Proposed Management Actions for Bottlenose dolphins*).

¹⁶ From aerial survey data, the Queensland Gulf population was roughly estimated at about 750 bottlenose dolphins in 1997.

¹⁷ The N9 fishery lies from between 7 nm and 25 nm offshore (Roelofs *et al.* 2003)

Whales (Odonticeti, Balaenopteridae, Balaenidae)

Although pilot and false killer whales (Delphidae, Ziphiidae) are known to inhabit Gulf waters (C. Limpus, QPWS, *pers. Comm.* 2005), DPI&F has no observer or logbook data indicating that toothed, beaked or baleen whales have an interaction with this fishery. The Workshop considered the impact of this fishery on whale populations to be minimal on the basis that most of these species are oceanic preferring deeper waters of the continental slope. The Workshop considered the N9 fishery area to be outside of the main known migratory pathways of Australian east and west coast baleen whales and so poses no risk to these species.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

No specific management actions are proposed.

Turtles (Cheloniidae)

Low numbers of green turtles have been observed in the N9 bycatch. Most are returned to the water alive. Other turtle species may potentially be captured but have not been reported by DPI&F observers.

Attendance rules apply to this fishery.¹⁸ There are small number of turtles reported in catches by independent DPI&F observers, which are probably Green and Olive Ridley turtles (Mark Read, QPWS, *pers comm.* 2006) and possible other turtle species in the Queensland Gulf (for details see the Risk Assessment for Non-Retained Species in the Queensland Gulf Developmental Finfish Trawl Fishery). The Workshop considered the impact of the fishery on turtle species in general was minimal. The existing attendance rules, protected species awareness course and GoC fishers Code of Conduct (see Roelofs, 2003) further reduce turtle interactions in the fishery.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

Additional data from observer activities are needed to assess relative risk among turtle species that inhabit the Gulf.

Crocodiles (*Crocodylus porosus*)

DPI&F observers report there have been no offshore sighting of crocodiles and no reports of their capture in the N9 fishery. The Workshop considered the impact of this fishery on the saltwater crocodile population to be minimal.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

No specific management actions are proposed.

¹⁸ A maximum 'in attendance' distance of 100 meters is required for a set net in offshore waters in the N9 fishery

Sawfish (Pristidae)

DPI&F observers recorded isolated catches of sawfishes in the N9 fishery. The risk to sawfishes are reported under the *Retained Species* section of the N9 Fishery assessment where the Workshop considered the current catch in the N9 fishery posed a low risk to the sustainability of sawfish stocks in general, and in particular, inshore species (*Pristis zjizron*, *Pristis clavata*, and *P. microdon*) which have not been recorded as part of the offshore N9 net fishery catch (Peverell 2005).

ERA Risk Rating: Impact on breeding stock (C1 L4 Low)

Proposed Management Actions

Future management of sawfishes will be revised regularly, based upon data received through the DPI&F Observer Program. See the *Retained Species* section of the N9 Fishery assessment for details.

Seabirds

Impacts on seabirds in the N9 fishery were not specifically considered at the Workshop.

Non Listed Species

Tuna and other species

Longtail tuna (*Thunnus tonggol*) and trevallies are the major non-EPBC Act listed bycatch species caught in the N9 fishery. Five to ten tonnes of tuna and three to five tonnes of trevallies are captured each year. The Workshop considered that the N9 fishery area was only a small proportion of extensive Indo-Pacific or endemic northern Australian distributions of the reported trevally bycatch species (Froese and Pauly 2005). The corresponding catch in the N9 fishery was considered to be insignificant in terms of having an impact upon the populations of these species.

Catches of other bycatch species in much lesser quantities (Roelofs 2003) were also considered to have minimal impact upon their respective stocks (e.g. tarpon, herring, batfish and catfish).

ERA Risk Rating: Impact on breeding stock (Negligible)

Proposed Management Actions

Bycatch species will continue to be monitored in the DPI&F Observer Program for catch trends. An in-possession limit of 10 tuna is in place for State licensed fishers. This limit has been proposed for consideration when the Management Plan is reviewed to address concerns about dumping of fish caught incidentally.

Non Captures

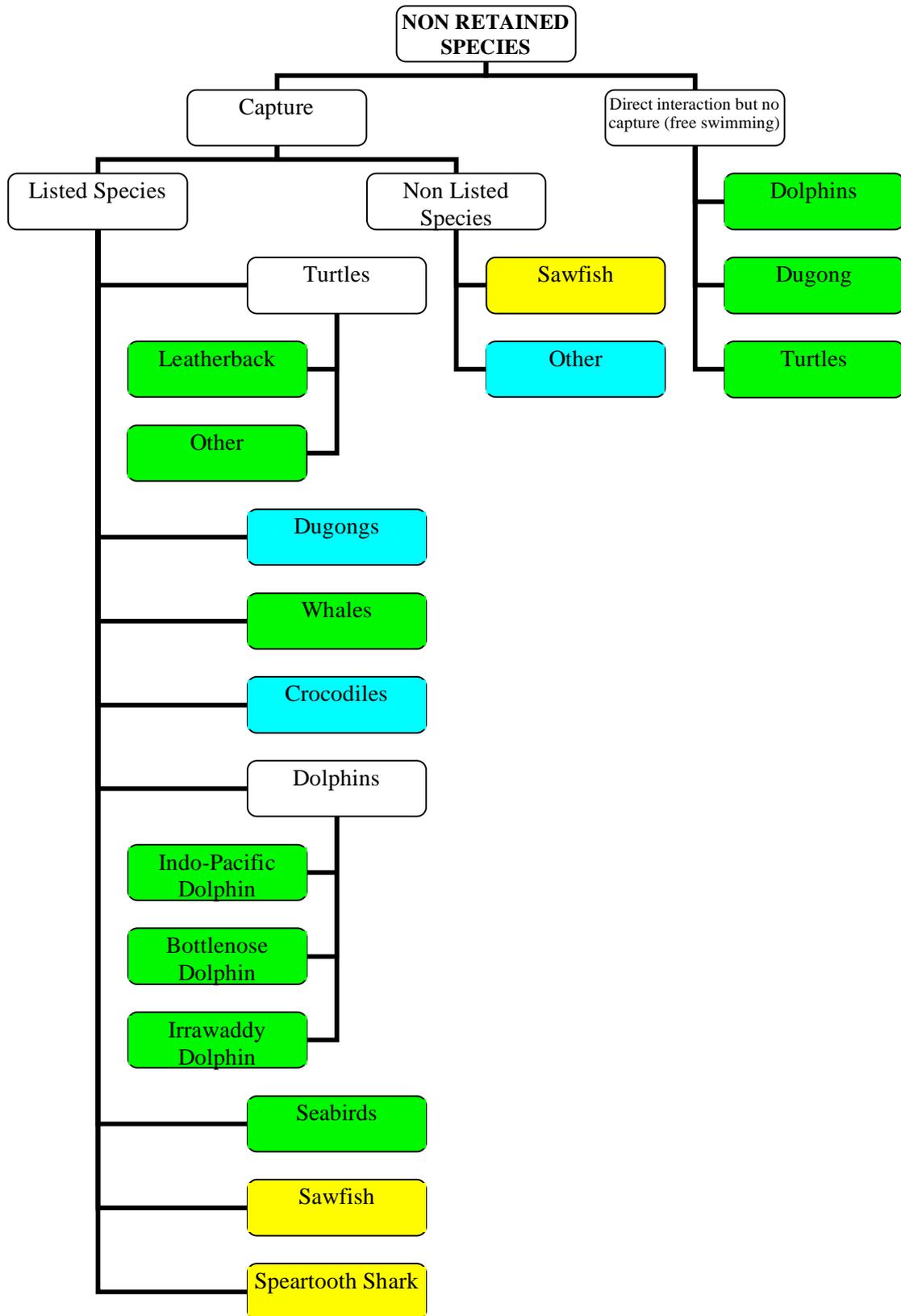
The Workshop considered there is little likelihood of non-capture interactions with other free-swimming marine life occurring in the offshore fishery area.

ERA Risk Rating: Impact on breeding stocks (Negligible)

Proposed Management Actions

No specific management actions are proposed.

Component Tree for Non-Retained Species in the N3 Inshore Net Fishery



Captures

Listed Species

Sawfish (Pristidae)

Four sawfish species are captured incidentally in the N3 fishery (*Pristis zijsron*, *P. clavata*, *P. microdon*, and *Anoxypristis cuspidata* (Gribble *et al.* 2004; Peverell 2005) and most are reported to be released alive. Results of the ecological risk assessment for Gulf sharks (Gribble *et al.* 2004) indicated all sawfish species have relatively low productivity and are moderately susceptible to net capture among the suite of elasmobranch species caught in the fishery.

Only *P. microdon* is currently listed under the EPBC Act, but other pristid species have been nominated for listing. Species identification by fishers is improving, aided by the recent release of a field guide. To assist reliable data collection on the relative capture rates among sawfish species, there is a need for further fisher education on pristid identification.

There is some indication that since 1980, the annual barramundi closure (full moon in October to 1 February) may be providing a level of protection to sawfishes during their pupping season (S. Peverell, DPI&F, *pers. comm.*, 2004). This is likely to benefit both the breeding females and their offspring (Peverell 2005b).

The Workshop considered it was unlikely that the N3 fishery area occupies more than 50% of the species depth distributions. This concurs with the results of the risk assessments by Gribble *et al.* 2004. However, their generally low productivity and high susceptibility to capture by net fishing compared to other elasmobranchs, indicate that there is at least a moderate level of risk to the sustainability of these species in the N3 fisheries.

ERA Risk Rating: Impact on breeding stock (C3 L4 Moderate)

Proposed Management Actions

The Queensland Government is eager to see the risks to the sustainability of pristids minimised. Handling procedures advising fishers about safe release practices for live sawfish are contained in the DPI&F publication “A guide to releasing sawfish” (Peverell 2005a). Confirmation is needed that existing seasonal closures are effective in protecting gravid females and their young as suggested by Peverell (2005b).

Speartooth Shark (*Glyphis* sp. A)

The speartooth shark is an inshore species inhabiting rivers and estuaries in far north Queensland and the Northern Territory, although its range could be much wider and include New Guinea and Borneo (Last and Stevens 1994) and the Gulf. Based on a single report from a DPI&F observer in the N3 fishery, the species may be captured incidentally during estuarine fishing operations in the northern Gulf (S. Peverell, DPI&F, *unpub. data*, 2005). The reported catch in March 2005, post-dates the Workshop by several months. Subsequently, this species was not assessed for risk at the Workshop.

Due to the catchability of sharks in general in the N3 fishery (Gribble *et al.* 2004), the uncertainty surrounding this species biology and distribution, the status of other non-target elasmobranchs in the N3 (viz. listing under the *Environment Protection and Biodiversity Protection Act 1999*), and the risk level assigned to these species (e.g. sawfish), it is considered appropriate on a precautionary basis to assign a moderate level of risk to this species.

ERA Risk Rating: Impact on breeding stock (*Moderate*)

Proposed Management Actions

The Queensland Government would like to see any risk the fishery may pose to the sustainability of the spartooth shark minimised. DPI&F onboard observers will continue to educate fishers on the correct identification of this species, monitor the catch frequency and obtain biological samples and data where appropriate. The implementation of Species of Conservation Interest (SOCI) logbooks has been proposed for this fishery.

Leatherback Turtles (*Dermochelys coriacea*)

The incidence of leatherback captures in normal fishing operations is very low. Fishers state that reports about historical catch rates have been inflated due to requests from researchers to target this species for research. Since its inception in 1998, there is no record of captures of this species from any N3 fishery Observer activities. The Workshop considered there was no evidence the fishery was impacting this species, thus any effect on the stock would be negligible.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

In view of reports of potential leatherback activity in the south-east Gulf (Marsh *et al.*), DPI&F observers will promote increased fisher awareness to minimise possible interactions, and monitor SOCI logbook returns for catch trends of this species.

Other Turtles

Coleman *et al.* 2003 reported that substantial numbers of sea turtles are harvested by indigenous communities in northern Australia including Queensland Gulf communities. Only 3 turtles have been seen interacting with N3 fishing gear by DPI&F Observers– green (*Chelonia mydas*) and flatback turtles (*Nattator depressus*). All were captured and released alive in good condition.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

DPI&F is promoting increased fisher awareness of possible interactions to minimise turtle capture and mortality through its Protected Species Education Program (DPI&F 2005b). DPI&F will monitor SOCI logbook returns for catch trends of turtle species.

Dugong (*Dugong dugon*)

Coleman *et al.* 2003 reported that substantial numbers of dugong are harvested by indigenous communities in northern Australia including Queensland Gulf communities. DPI&F observer programs have not reported any interaction with

dugongs. The workshop suggested there is anecdotal evidence of net captures and one or two interactions over the past 2 years.

Management tools are already in place to ensure that dugong captures are minimised (i.e. attendance rules). If and when captures occur, they are acted upon quickly to enhance post-capture survival of the animal. Net fishing is excluded from some potential dugong feeding habitats. For example, the seagrass meadows at the mouth of the Norman River in the South East Gulf are permanently closed to netting. Despite this, data from the aerial surveys of Marsh *et al.* in 1997 indicated that the regions near the main Gulf ports of Weipa and Karumba were not regarded as significant dugong habitat. Net modifications are in place in waters adjacent to the Wellesley Islands, a region known to support significant dugong habitat Marsh *et al.*

The fishery has attendance rules including the requirement that fishers to be within a 5 nm radius of a set net and fishers avoid resident dugong herds where possible. Dugong interactions are mitigated in the main Gulf dugong habitat of the Wellesley Islands through specific gear modifications that minimise the incidence of dugong drowning. Given these actions, and due to the low reported incidence of interaction with dugongs in the N3 fishery, the Workshop considered that it was highly unlikely that the fishery was having more than a minor impact upon the dugong population.

ERA Risk Rating: Impact on breeding stock (C1 L2 Low)

Indo-Pacific Humpback Dolphin (*Sousa chinensis*)

Research in Great Barrier Reef waters suggests that the distribution and habitat requirements for dugong and *S. chinensis* are similar (Corkeron *et al.* 1997). If humpback dolphins and dugong are similarly distributed in the Queensland Gulf, a similar low level of interaction with the fishery would be expected (see above). From a limited number of records it appears that within the Queensland Gulf, humpback dolphins are significantly fewer than dugong (Marsh *et al.*), further decreasing the chance of interactions with the fishery. Reports indicate very low numbers of these dolphins being caught in the N3 fishery. In fact, DPI&F observers have reported only a single dolphin death from a probable interaction with a net. Given the low risk the N3 poses to the sustainability of dugong, that humpback dolphins are fewer in number than dugongs and the minimal number of interactions with humpback dolphins species substantiated by independent observer reports, the Workshop considered that there was little evidence to indicate that the N3 fishery was having other than a negligible impact on the Qld Gulf population.

ERA Risk Rating: Impact on breeding stock (Negligible)

Irrawaddy Dolphin (*Orcaella brevirostris*)

There have been few reports of entanglement with this species in N3 fishing gear and given the very low number of substantiated reports of interaction with this species, the Workshop considered there was little evidence the N3 fishery was having an impact on the Qld Gulf population that was more than negligible.

ERA Risk Rating: Impact on breeding stock (Negligible)

Bottlenose Dolphin (*Tursiops spp.*)

There are no data indicating interaction of these species with the N3 fishery. Marsh *et al.* reported these species to be relatively abundant among the cetacean species surveyed in coastal waters of the Queensland Gulf.¹⁹ The Workshop considered that there was likely to be a higher level of impact on these species in the N9 fishery.²⁰ Little evidence exists indicating the N3 fishery is having other than a negligible impact on the Qld Gulf population.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions for Dugong and Cetaceans

Through its Protected Species Awareness Program, the DPI&F is promoting increased fisher awareness of possible interactions with bottlenose dolphins and recommending to fishers methods to avoid or minimise interactions to obtain positive outcomes (DPI&F 2005b). DPI&F will monitor SOCI logbook returns for catch trends of this species.

Whales (*Balaenopteridae* and *Delphinidae*)

In the Ecological Assessment of the fishery, Roelofs (2003) listed only three whale species that potentially have distributional overlaps with the N3 fishery area. Over the six year life of the N3 Observer Program, only a single whale has been reported caught in a N3 net (*ca.* in 2002).

Given the fishery area covers shallow inshore and estuarine habitats generally unsuitable for the long-term residency of large migratory whales, and the fishery area lies far from their main migratory paths, the Workshop considered the fishery would have no effect upon either the Australian east or west coast stocks of humpback whales (*Megaptera novaeangliae*). Similarly, While Bryde's whale (*Balaenoptera edeni*) and the killer whale (*Orcinus orca*) may also occur in the fishery area, there are no data indicating the N3 fishery is having other than a negligible impact on the populations of these species.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

DPI&F will monitor SOCI logbook returns for the incidence of interactions with these and other whale species.

Crocodiles (*Crocodylus porosus*)

Interactions with saltwater crocodiles appear to be increasing in the N3 fishery. Crocodiles above 1 m in length are most frequently caught. Where possible they are returned to the water alive, but larger crocodiles can't be handled safely. DPI&F observers report that seven crocodiles have been caught since 1999. Three of these were returned to the water alive. Anecdotal information suggests more are caught than reported. Crocodiles appear to learn how to interact with the nets. The low incidental

¹⁹ Bottlenose dolphins made up 78% of the dolphins identified

²⁰ See the N9 fishery assessment for details

catch of large crocodiles suggests they may be able to free themselves from the mesh nets used in the fishery. Although the general belief from members of the workshop was that the overall population of saltwater crocodile is increasing, there may still be potential for localised depletion in areas where interactions are relatively high.

Considering that Gulf crocodile numbers may be increasing, the Workshop considered the current low level of interaction between the N3 fishery and *C. porosus* was having a negligible impact on their population.

ERA Risk Rating: Impact on breeding stock (C1 L4 Low)

Proposed Management Actions

Through its Protected Species Awareness Program, the DPI&F is promoting increased fisher awareness of possible interactions with crocodiles and recommending to fishers methods to avoid or minimise interactions to obtain positive outcomes (DPI&F 2005b). DPI&F will monitor SOCI logbook returns for catch trends of this species.

Seabirds

Incidental capture of seabirds in the fishery appears to be an uncommon event. However, marine raptors, for example the Brahminy Kite (*Haliastur indus*) and osprey (*Pandion haliaetus*) can sometimes feed on fish in the net at low tide and can become entangled. Captured birds remain alive but are generally immobilised until freed by the fisher retrieving the catch. The Workshop considered there are no data to suggest the N3 fishery is having greater than a negligible impact on the populations of these species.

ERA Risk Rating: Impact on breeding stocks (Negligible)

Proposed Management Actions

Through its Protected Species Awareness Program, the DPI&F is promoting increased fisher awareness of possible interactions with marine raptors and other seabirds, recommending to fishers methods to avoid or minimise interactions and ways of caring for and handling seabirds to enhance their survival (Gillespie 2005). DPI&F will monitor SOCI logbook returns for catch trends of seabird species.

Non Listed Species

Sawfish (Pristidae)

Issues associated with risk to the sustainability of non-EPBC Act listed sawfish and Gulf sawfish in general from interactions with the N3 fishery, are considered in the *Non Retained Listed Species* section of the N3 fishery assessment.

Other species

Other species taken as bycatch have been reported in Roelofs (2003). Catfish (*Arius* spp.), bony bream (*Nematalosa erebi*), sharks and rays are the dominant bycatch species, making up about 40%, 20% and 20% respectively of the total N3 bycatch by number. A further 20 or so species comprise the remaining 20% of the bycatch, with scats (Scatophagidae) and diamondfish (*Monodactylus argenteus*) the most numerous, but no species representing more than 1% of the total catch (Halliday *et al.* 2001).

Other northern Australian commercial, recreational and indigenous fisheries are also likely to catch substantial quantities of a number of these species. For example the most recent data available indicates Western Australian commercial fisheries in 2003/4 reported a 10 t catch of catfish (Penn *et al.* 2005). The Queensland Gulf recreational catfish catch could be about 2 t / year (DPI&F, unpublished 2001 RFISH survey data). After mullet, catfish species had the highest total indigenous catch reported in the National Recreational and Indigenous Fishing Survey (Coleman *et al.* 2003). Based on these data, about 10, 000 catfish / year could be harvested by indigenous communities in the Qld Gulf.²¹

The Workshop considered that given the percentage of bycatch species in the total N3 catch was quite low (only 13%) in terms of the total number of fish caught in the fishery (Halliday *et al.* 2001), and that when all catches of EPBC Act listed and non-listed marine species and major bycatch species are removed from the bycatch, the fishery is probably discarding relatively small quantities of the remaining 20 or so individual bycatch species. In conclusion the Workshop considered the fishery has a relatively small impact upon the bycatch species excluding sharks, rays, sawfish and guitarfish²² reported in Halliday *et al.* 2001 and that the risk to their sustainability from the N3 fishery was negligible.

ERA Risk Rating: Impact on breeding stock (C1 L3 Low)

Proposed Management Actions

No specific actions proposed. Monitoring and education programs are in place.

Non Captures

Dolphins (Delphinidae)

The assessable dolphin component is part of the *Non-retained Species Component Tree* but was not specifically discussed at the Workshop. Due to their high mobility and rapid swimming speed, the risk from boat strikes from typically displacement hulled vessels used in the N3 fishery is probably non-existent. The Workshop considered that the risk from non-capture impacts from this fishery on dolphins would be negligible.

ERA Risk Rating: Impact on breeding stocks (Negligible)

Dugong (*Dugong dugon*) and Turtles (Cheloniidae)

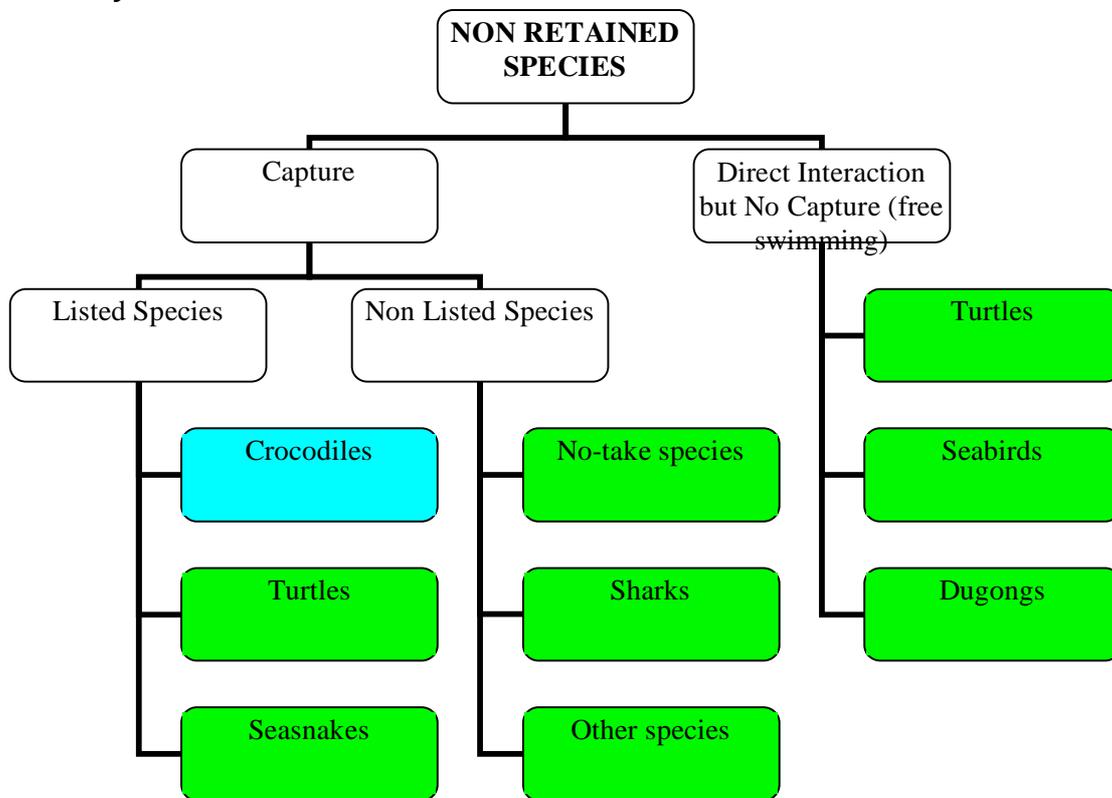
Non-capture interactions (e.g. boat strikes) are uncommon given the small numbers and displacement hull design of N3 boats. This issue may be more significant in the recreational and charter fishing sectors where typically high speed planing hull vessels are employed. The Workshop considered that the risk to sustainability of the dugong population from non-capture impacts in this fishery would be negligible.

²¹ Assuming that the indigenous take in the Queensland Gulf is half of the total northern Queensland indigenous catch reported in Coleman *et al.* (2003) and the Queensland north east indigenous take accounts for the other half

²² These species are specifically considered elsewhere in the assessment

ERA Risk Rating: Impact on breeding stocks (*Negligible*)

Component Tree for Non-Retained Species in the Crab Pot Fishery



Listed Species

Crocodiles (*Crocodylus porosus*)

On the east coast of Queensland, around 20 saltwater crocodiles are captured in the Mud Crab Pot Fishery annually. Crocodiles are caught less frequently in the Queensland Gulf Pot Fishery. Commercial crabbing effort on the east coast is five times higher than in the Gulf, so crocodile catches in the Gulf should be considerably less. The workshop participants generally believe that the Gulf crocodile population is increasing, which infers the fishery is having a sustainable impact on the population. The frequency of fishery interactions in future may increase if crocodile numbers continue to increase.

The Workshop considered that it is possible that the Gulf Mud Crab Pot Fishery is impacting crocodiles in the Gulf but at the low catch levels reported it is likely there is no significant impact on the Gulf crocodile stock.

ERA Risk Rating: Impact on breeding stock (C1 L4 Low)

Proposed Management Actions

DPI&F will continue to monitor interactions with crocodiles through the SOCI logbook. No specific management actions are proposed.

Turtles (Cheloniidae)

In three years of DPI&F observer records, a total of 223 fishing days, as well as during the Tropical Resource Assessment Program (TRAP) Phase II, 1998-2001, there have been no reports of any turtles in crab pots in this fishery. Turtles have also not been reported in fishery independent crab pot surveys of several Queensland Gulf estuaries within the fishery area (Jebreen *et al.* in prep.). Pot capture of turtles in the Northern Territory mud crab fishery is also not recorded. Considering that available data provide no evidence of turtle catch in this fishery, the Workshop considered the risk to turtle populations is likely to be negligible.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

In response to general public concerns regarding possible turtle entrapments in crab pots, DPI&F are considering a proposal to modify pots to reduce the potential for turtles to get trapped. Regulatory changes to fishing gear are subject to extensive public consultation. The Workshop noted that the significance of any reduction in perceived impact on turtles overall will be proportional to the number of turtles interacting with this fishery compared to other fisheries in a whole of Gulf assessment.

Sea Snakes (Hydrophiidae)

Some fishers have seen estuarine seasnakes in pots, probably attracted by the scent of flesh baits. While in the pot, the animals may not be trapped as they have the potential to leave the pot by swimming through the entrance openings. The Workshop considered that these interactions constitute no more than a negligible impact on Gulf seasnake stocks.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

DPI&F will continue to monitor interactions with seasnakes through the SOCI logbook. No specific management actions are proposed.

Non Listed Species

No-Take Species

Queensland grouper (*Epinephelus lanceolatus*) are mainly recovered during pot lifts alive unless trapped or enmeshed. It appears that their numbers are increasing throughout the Queensland Gulf (S. Peverell, DPI&F, *pers. comm.*, 2005). The Workshop considered that given their numbers appear to be increasing these interactions would constitute no more than a negligible impact on Gulf Queensland grouper stocks.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Sharks (Lamniformes)

A few small sharks are captured in crab pots but it is considered to be an uncommon event and negligible by comparison with the take in the N3 and N9 fisheries.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

No specific management actions are proposed.

Other Species

Catfish (*Arius* spp.) were identified as a major part of the bycatch in the Ecological Assessment for the N3 net fishery and this pot fishery respectively (Roelofs 2003; Ryan *et al.* 2003) and according to fishery independent data from LTMP bycatch samples surveyed in Gulf estuaries, are the most abundant crab pot bycatch species group (Jebreen *et al.* in prep.). Other N3 bycatch species are also reported in the fish bycatch of Gulf LTMP crab pot samples including sciaenids (black jewfish and jewfish), scats (Scatophagidae) and pikey bream (*Acanthopagrus berda*) (Jebreen *et al.* in prep.). However, based on the LTMP data, individual species comprising the bycatch, varies among estuaries. In the fishery, it is reported that because the fish do not mesh in the pots, most incidental captures are released alive.

The Workshop considered that ‘Other species’ in the N3 bycatch could be grouped based on the relatively low level of risk to the sustainability of their breeding stock (see the N3 Non-Retained species assessment). Based on the LTMP data can be relied upon as indicative of fish bycatch in the Queensland Gulf Crab Pot Fishery, then the bycatch species composition in this fishery appears to be similar to that of the N3 net fishery, although the quantities discarded and detrimental outcomes of the interaction with crab pots compared to mesh nets are likely to be much lower. The Workshop considered that the risk to the sustainability of ‘Other Species’ in the bycatch of this fishery was lower than the “low risk” associated with the N3 ‘Other Species’ bycatch category. The impact of the fishery on the breeding stocks of these species was therefore likely to be negligible.

ERA Risk Rating: Impact on breeding stock (*Negligible*)

Proposed Management Actions

No specific management actions are proposed.

Non Captures

Dugong

Boat strikes may occur in this fishery, but there are no data to indicate there is a risk to dugong sustainability. Generally there is a disjunction between crab fishing areas and dugong habitats. For example there are high levels of crabbing effort around Weipa and Karumba and between Staaten River and Cape Keer Weer – regions that do not support significant dugong numbers (Marsh *et al.*). The major region for potential interactions is inshore of the Wellesley Islands where both dugong numbers and effort are relatively high (Marsh *et al.*; DPI&F 2005a).

The Workshop considered that the slow moving, displacement hull vessels employed in the fishery would be unlikely to cause frequent injury to dugong. In addition, only a slight overlap occurs between the major dugong habitat and high fishing effort areas. Given also the likely significant indigenous dugong catch, the impact of this fishery on dugongs in the Queensland Gulf appears to be negligible.

ERA Risk Rating: Impact on breeding stocks (*Negligible*)

Proposed Management Actions

No specific management actions are proposed. However, the DPI&F will continue to monitor interactions with this species through its Observer and Long Term Monitoring Programs.

Seabirds

There is a low incidence of seabirds observed near pots at low tide. There is no evidence that crab fishing gear leads to their mortality in this fishery. The Workshop considered there was no indication that the fishery was having any more than a negligible impact on seabird populations of the Queensland Gulf.

ERA Risk Rating: Impact on breeding stocks (*Negligible*)

Proposed Management Actions

No specific management actions are proposed. However, the DPI&F will continue to monitor interactions with seabirds through its Observer and Long Term Monitoring Programs.

Turtles (Cheloniidae)

There is a possibility for turtle entanglement in pot lines, however, this interaction has not been known to occur in the Gulf. Although turtles dragging pots has been observed on the east coast, this has not been reported in the Gulf. Boat strikes with small tender vessels are possible, however, occur only rarely and with this level of interaction are unlikely to cause a significant impact on turtles. The Workshop considered that without data to indicate otherwise, the impact of the fishery upon turtle populations was likely to be negligible.

ERA Risk Rating: Impact on breeding stocks (*Negligible*)

Proposed Management Actions

No specific management actions are proposed. However, the DPI&F will continue to monitor interactions with turtles through its Observer and Long Term Monitoring Programs.