



APPENDIX 06

Commercial and recreational fish species

06 COMMERCIAL AND RECREATIONAL FISH SPECIES

06.1 INTRODUCTION

This appendix provides descriptions of the most important commercial and recreational fish and crustacean species in Spencer Gulf, to inform the assessment of impacts arising from brine discharge or the construction of infrastructure for the desalination plant and landing facility.

Upper Spencer Gulf supports an important commercial and recreational fishing industry. The zone between Whyalla and Port Pirie is particularly productive; with a commercial catch over 6,000 tonnes annually (Knight et al. 2005). The principal species caught in Upper Spencer Gulf are the Australian Herring (or Tommy Ruff) *Arripis georgianus*, Australian Salmon *Arripis truttacea*, Blue Swimmer Crab *Portunus pelagicus*, Garfish *Hyporhamphus melanochir*, King George (or Spotted) Whiting *Sillaginodes punctatus*, Western King Prawn *Melicertus latisulcatus*, Snapper *Pagrus auratus*, Snook *Sphyraena novaehollandiae*, Southern Calamary *Sepioteuthis australis*, Yellow-eye Mullet *Aldrichetta forsteri* and Yellowfin Whiting *Sillago schomburgkii*. The Australian Sardine *Sardinops sagax* and four other fish from the family Clupeidae are also caught in Spencer Gulf.

These species depend on shallow seagrass and mangrove habitats for at least part of their life cycle, and the Western King Prawn and Snapper are caught in the deepwater channels of Upper Spencer Gulf.

06.2 AUSTRALIAN HERRING (TOMMY RUFF)

Australian Herring *Arripis georgiana* are a far-ranging migratory fish with a westward migration along southern Australia to the lower west coast of Western Australia prior to spawning. Since the beginning of the decade, the commercial catch in Upper Spencer Gulf has increased from one third to more than a half of the South Australia total. Spencer Gulf is the second most important area recreationally, behind Gulf St Vincent. Habitats include mangroves, seagrass, tidal flats, tidal creeks and unvegetated soft bottoms (Bryars 2003).

06.3 AUSTRALIAN SALMON

Western Australian Salmon *Arripis truttacea* is a far-ranging migratory fish that often inhabits the waters of Upper Spencer Gulf as juveniles. Juveniles typically inhabit shallow sand flats and *Posidonia* seagrass meadows of Spencer Gulf (SEA 1981).

Note that the Eastern Australian salmon *Arripis trutta* is unlikely to be found in Spencer Gulf as the south-east of South Australia is considered to be the western most range of that species (Jones and Westlake 2003).

06.4 BLUE SWIMMER CRAB

There are distinct populations of Blue Swimmer Crabs *Portunus pelagicus* in the upper reaches of both Spencer Gulf and Gulf St Vincent (Bryars and Adams 1999; Knight et al. 2005; Currie and Hooper 2006). Blue Swimmer Crabs are thus another geographically isolated 'tropical/subtropical' species restricted by temperature (Svane and Bryars 2005; Bryars and Havenhand 2006). In South Australia this species was first commercially fished in the early 1970s, with controls instigated in the late 1990s. There is a significant recreational harvest (Knight et al. 2005). The abundance of the Blue Swimmer Crab in Spencer Gulf has declined in recent years, possibly reflecting a reduction in recruitment (Currie and Hooper 2006). The persistence of populations of Blue Swimmer Crab is said to depend upon the capacity for the larvae to disperse, and is thus intimately linked to temperature and oceanography (Svane and Bryars 2005). In Spencer Gulf, larvae become entrained in gyres created by temperature and salinity gradients (Grove-Jones 1987), but juveniles prefer shallow intertidal *Zostera* spp. beds to bare substrate and/or subtidal seagrasses (Robertson and Duke 1987; Svane and Bryars 2005). It is most likely that the threats to crab numbers are those factors that impact on the habitat for juvenile growth.

06.5 GARFISH

Garfish *Hyporhamphus melanochir* are generally associated with shallow inshore regions and are thought to feed on epiphytes of seagrasses and copepod crustaceans. They are known to spawn in all areas of Spencer Gulf supporting the seagrasses *Zostera* and *Posidonia*. Little is known about their nursery grounds, but it is likely that they are similar to those of King George Whiting (SEA 1981).

06.6 KING GEORGE WHITING

King George Whiting *Sillaginodes punctatus* is traditionally the most valuable marine scalefish species in South Australia. King George whiting is a demersal (bottom-dwelling) species, and juvenile and sub-adult stages are highly dependent on seagrass areas occurring in sheltered waters. Within Spencer Gulf, the most important nursery area is Franklin Harbor. Spawning occurs in the south of Spencer Gulf (McGarvey et al. 2005).

The catch from the Spencer Gulf fishery is the second largest after the Far West Coast, contributing 35% of the South Australian commercial catch. However, only 12–15% of the catch is from Upper Spencer Gulf (McGarvey et al. 2005). The recreational harvest in Upper Spencer Gulf is approximately one third to one half of the total catch, and 20% of the total recreational catch for the state (McGarvey et al. 2005).

06.7 SARDINES AND OTHER CLUPEOIDS

There are five fish recognised as clupeoids in South Australia, including Sardines *Sardinops sagax*, Australian Anchovy *Engraulis australis*, Red Herring *Etrumes teres*, Sandy Sprat *Hyperlophus vittatus* and Blue Sprat *Spratelooides robustus*. Of these, only the Blue and Sandy Sprat are limited to gulf waters and they generally occur in sheltered bays and river mouths (Rogers et al. 2003). Blue Sprat has a life history more akin to tropical and subtropical clupeoids than other southern temperate members of the assemblage (Rogers et al. 2003), which would suggest a tolerance, if not a preference, for warmer water.

Little is known about Red Herring, but spawning probably occurs in southern gulf and shelf areas (Rogers et al. 2005). However, wherever they occur, clupeoids are often important components of local food chains (Goldsworthy et al. 2003; Rogers et al. 2003). Since the early 1990s, sardines have been a major feed resource for the highly successful Southern Bluefin Tuna *Thunnus maccoyii* aquaculture (Rogers et al. 2005). The population has been known to suffer significant downturns with 70% of the breeding population lost in mass mortality incidents in 1995 and 1998, although in both instances the numbers have recovered (Rogers et al. 2005).

Sardines occur broadly across southern temperate waters from Queensland to Western Australia (Gomon et al. 1994). In South Australia during summer and autumn, the larvae are common in shelf and southern gulf waters, with aggregations at the mouth of Spencer Gulf where sea surface temperature and salinity fronts occur (Bruce and Short 1992). This would suggest that Sardines are unable to tolerate non-oceanic waters such as those that occur at Point Lowly and in Upper Spencer Gulf. In contrast, Australian Anchovy occurs throughout southern shelf and gulf waters, with egg numbers highest in the Upper Spencer Gulf, possibly due to the higher water temperature (Dimmlich et al. 2004). Both Sardine and Anchovy biomass is thought to closely follow fluctuations in the biomass of their planktonic food (Rogers et al. 2005). The impact of temperature and salinity changes on certain zooplankton and phytoplankton assemblages is thus likely to be more influential on Sardine and Anchovy numbers than direct exposure, which the Sardines would appear likely to avoid.

06.8 SNAPPER

Upper Spencer Gulf historically accounts for the highest proportion of the South Australian commercial catch of Snapper *Pagrus auratus*, representing over half of the total for the past two seasons. At Point Lowly, Snapper are frequently caught in the deep channels close to shore. The harvest of Snapper by recreational fishers in Upper Spencer Gulf is considerable, representing 42% of the total catch, and 67% of the recreational catch in South Australia. The main spawning grounds are reported to be the northern reaches of Spencer Gulf and Gulf St Vincent, with juvenile fish generally foraging on bare, muddy tidal flats (Fowler et al. 2007). Recent studies have shown that Snapper probably remain in nursery areas in the northern reaches of the gulfs until four years of age, before dispersing south (Fowler et al. 2007).

06.9 SNOOK

Snook *Sphyraena novaehollandiae* are distributed across southern Australia. They are normally a by-catch of haul nets, but are also taken by commercial troll line fishers (O'Sullivan and Jones 2003). The recreational fishery also targets Snook. Upper Spencer Gulf accounts for the highest proportion of the recreational catch of Snook in South Australia (Jones and Doohan 2005). Habitats include reef, seagrass beds and unvegetated soft bottoms (Bryars 2003).

06.10 SOUTHERN CALAMARY

The commercial Southern Calamary *Sepiotheuthis australis* catch from Upper Spencer Gulf represents between 15–25% of the state catch. On a catch per unit effort basis the Upper Spencer Gulf is one of the most productive calamary fishing regions in the state. Calamary generally breed in shallow water and attach their eggs to the leaves and stems of seagrass (SEA 1981).

06.11 WESTERN KING PRAWN

Spencer Gulf supports one of the largest prawn fisheries in Australia, and is the largest of the three prawn fisheries in South Australia (Dixon et al. 2007). One of the major fishing grounds within Spencer Gulf lies between Fairway Bank and Eastern Shoal, and extends north to within 1 km of Point Lowly (see Figure 16.9 of Chapter 16, Marine Environment).

Most of the Upper Spencer Gulf is regarded as a prawn nursery and consequently, trawling is banned north of Point Lowly. Western King Prawns *Melicertus latisulcatus* aggregate, mature, mate and spawn in deep offshore waters during October to April (Carrick 1996). Prawn larvae are dispersed by tidal and wind driven currents, with the greatest prawn larval densities occurring between

Whyalla and Germein Bay (Carrick 2003). Larvae metamorphose and settle in inshore nursery areas, with peak settlement predicted to occur in nursery areas south of Whyalla (Noye 1996). Juvenile prawns disperse from these nursery areas in either May/June, or in the following February (Carrick 2003).

06.12 YELLOW-EYE MULLET

Yellow-eye Mullet are distributed across southern Australia, with South Australian stocks considered to be closely related to the western population.

The majority (70%) of the catch comes from the Lakes and Coorong fishery, with about half of the remainder coming from Spencer Gulf.

Schools of Yellow-eye Mullet occur in brackish and inshore coastal waters and tidally inundated saltmarsh, although the preferred habitats are shallow estuaries. Larger Yellow-eye Mullet show a preference for deeper habitats such as channels or 'gutters' on beaches, whereas juveniles remain in the shallow bank sections of estuaries and beaches (Higham et al. 2005).

06.13 YELLOWFIN WHITING

Yellowfin Whiting are found throughout the inshore tidal sand / mud flats of Spencer Gulf. While adults are found throughout these waters, juveniles are confined to the central and more northern waters. They are not generally found in seagrasses, but do indirectly derive some food from them (K Jones, PIRSA, pers. comm., 9 September 2008).

06.14 REFERENCES

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