

APPENDIX 17B-1-V1.4

AQUATIC ECOLOGY – Fish Species

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Spangled Perch

Spangled perch are Australia's most widespread native fish, being abundant within most habitats (Allen et al 2002). They can tolerate wide ranges of temperature (5 – 44 °C), salinity (0 –34 ppt) and pH (4 – 10.2). Of particular relevance to their abundance in western and central Queensland creeks is their ability to aestivate in wet mud or under moist leaf litter in ephemeral water holes during droughts (Allen et al 2002). As an adaptation to living in quick-drying waterholes, spangled perch eggs hatch in 2 days and the larvae develop in 24 days (Ivanstovff & Crowley 1996, Allen et al 2002). Spangled perch are likely to persist in the creeks within the study areas throughout the year; they were sampled in both March and August 2008.

Agassiz's Glassfish

Agassiz's glassfish is commonly found in rivers, creeks, ponds, reservoirs, drainage ditches and swamps from Cairns in Queensland to Lake Hiawatha in New South Wales, and in the Murray-Darling system (McDowall 1996, Allen et al 2003). This species has a temperature range of 18 – 27 °C (Merrick & Schmida 1984), although they are not tolerant of low dissolved oxygen levels (Tait & Perna 2002). The diet of this species consists largely of small crustaceans and insect adults and larvae, including mosquitos (McDowall 1996). This species deposits and fertilises demersal eggs on aquatic vegetation (Merrick & Schmida 1984). The Agassiz's glassfish was relatively common across the study areas. However, these creeks are unlikely to provide a regionally important breeding habitat due to the lack of aquatic vegetation (although terrestrial grasses on the edge of the creeks may provide some suitable substrate for the deposition of eggs).

Carp Gudgeons

Carp gudgeons (*Hypseleotris* spp.) are common in coastal drainage basins of eastern Australia, from the northern section of the Murray-Darling Basin to Tully in north Queensland. This species is commonly confused with *Hypseleotris galii* (firetail gudgeon), especially as a juvenile; ecologically, the two species are probably very similar (Pusey et al 2004). Firetail gudgeons are usually found in open water, around aquatic plants in streams, ponds, swamps and drains (Allen et al 2002). Adult carp and firetail gudgeons are known to feed on invertebrates, such as mosquito larvae (Diptera: Culicidae), and small crustacea such as cladocerans and ostracods (Merrick & Schmida 1984, Allen et al 2003). These species are quite tolerant to changes in water quality, and under ideal conditions can rapidly increase in numbers (Merrick & Schmida 1984). This species was relatively abundant during the surveys of the MLA and gas supply pipeline study areas.

Hyrtl's Tandan

This species is very common and widespread in coastal drainages of northern Australia, as far south as Mary River on the east coast and the Pilbara on the west coast (Allen et al 2002). It also occurs widely throughout central Australia (Allen et al 2002) and is known to occur in the Fitzroy River (Merrick & Schmida 1984). Hyrtl's tandan is a shoaling species that occupies a diverse range of habitats including still or flowing waters, pools and billabongs (Allen et al 2002). This species feeds on insects, molluscs, small crustaceans

and worms (Allen et al 2002). The spawning behaviours of interior populations are unknown; however, northern populations breed at the beginning of the wet season in shallow, sandy areas in the upper reaches of streams (Allen et al 2002). Further research is required as this species may actually represent more than one species (Allen et al 2002). The present study captured the majority of specimens at the largest waterway surveyed (Juandah Creek, downstream of the MLAs), and it is likely that they would inhabit large pools in this creek throughout the year.

Bony Bream

Bony bream are abundant detritivores / algivores that form the basis of the food chain for a number of higher order consumers including larger fishes and birds such as cormorants and pelicans (Pusey et al. 2004).

Bony bream commonly occur in the shallows of still or slow-flowing streams, particularly in turbid conditions such as those of the region (Allen et al. 2002). Within the Fitzroy River system, bony bream have been recorded from water temperatures between 24 and 29 °C (Pusey et al. 2004). They have a wide pH (4.8 – 8.6) tolerance and have been recorded from waters with salinity levels approaching those of the seawater (Ruello 1976). High salinity tolerance is undoubtedly one of the factors influencing the widespread distribution of bony bream throughout Australia's freshwater habitats. However, they cannot tolerate low dissolved oxygen levels (Allen et al. 2002) and are the first species to perish when ephemeral habitats start to dry up (Allen et al. 2002). Bony bream were only caught at the largest waterway surveyed during surveys of the MLA and gas supply pipeline study areas (at Juandah Creek, downstream of the MLAs); they were not found in small ephemeral pools that characterise the waterways of the MLAs or the gas supply pipeline route.

Eastern Rainbowfish

The eastern rainbowfish is the common rainbowfish of many parts of north-eastern and central Australia, and is usually abundant wherever it occurs (Allen et al 2002). This species spawns all year round, although spawning peaks immediately before and during flood periods (Merrick & Schmida 1984). Surveys of the MLA study area captured eastern rainbowfish at the majority of sites; however, the creeks of the MLAs are unlikely to provide suitable breeding habitat because spawning tends to occur in slow-flowing, weedy areas (Merrick & Schmida 1984). Eastern rainbowfish were not found in the creeks along the gas supply pipeline route.

Golden Perch

Golden perch are large piscivorous predatory fish that are sought after by anglers. Golden perch inhabit numerous water bodies east of the Great Dividing Range, due to transplanting and stocking, however the Fitzroy River Basin is the only drainage (east of the Great Dividing Range) where they naturally occur as the subspecies *Macquaria ambigua orientalis*. Golden perch can tolerate extremes in temperature (4 – 35 °C) (Allen et al 2002) although in the Fitzroy River they have been recorded in waters ranging from 24 – 31 °C (Midgely 1942, cited in Pusey et al 2004). Golden perch are very tolerant of high turbidity (Gehrke et al 1993), and may move long distances upstream during floods (Allen et al 2002). This species was recorded in Juandah Creek, downstream of the MLAs (site 10) during the post-wet season survey; although they are unlikely to be common in the

smaller, isolated pools that characterise the waterways of the MLAs or the gas supply pipeline route.

Sleepy Cod

Sleepy cod are common and widespread in northern Australia between Ord River on the west coast and Noosa on the east coast (Allen et al 2002). They are a hardy species inhabit rivers, creeks and billabongs, usually in quiet or slow-flowing water among vegetation, around woody debris or beneath undercut banks (Merrick & Schmida 1984, Allen et al 2002). This species is a sluggish bottom dwelling carnivore that feeds on insects, small fishes and crustaceans (Merrick & Schmida 1984, Allen et al 2002). Sleepy cod appear to have a lower thermal limit of 15 °C and Northern Territory populations can withstand temperatures to 32 °C (Merrick & Schmida 1984). Spawning usually occurs between October and February (Allen et al 2002), when water temperatures reach 24 °C. The nest is located on a solid surface (usually rock, tree roots or submerged log) and the male guards the nest for the incubation period of 5 – 7 days (Merrick & Schmida 1984, Allen et al 2002). The present study captured the majority of specimens at the largest waterway surveyed (Juandah Creek, downstream of the MLAs), and it is likely that this species would persist in this pool throughout the year.

APPENDIX 17B-2-V1.4

AQUATIC ECOLOGY

- Creek Crossing Recommendations for the Gas Supply Pipeline

APPENDIX 17B-2-V1.4

Table A17B.2-1: Creek crossing recommendations for the gas supply pipeline

Site	Recommended pipeline crossing		Recommended Road crossing for equipment		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of re-planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
1	Open Cut	Isolate and open cut ¹	Ford	Ford	No	No	Small drainage in the headwaters, not of fisheries concern. No specific aquatic rehabilitation required.	—
2	Open Cut	Isolate with steel plates and open cut ¹	Temporary ford	Temporary box culvert ¹	Yes in wet conditions.	Yes in wet conditions.	Avoid clearing trees if possible. Revegetate banks when works are complete. Place any fallen trees into channel to provide habitat.	20 m
3	Open Cut	Isolate with steel plates and open cut	Create temporary ford	Use isolated area to create a ford or install temporary culvert	Yes in wet conditions.	Yes in wet conditions.	Replace bed and bank vegetation. Replace bed habitat when complete.	Left bank 25 m, right bank 10 m.
4a	Open Cut	Isolate with steel plates and open cut	Create temporary ford	Install temporary box culvert	Yes in wet conditions.	Yes in wet conditions.	Avoid clearing trees if possible. Revegetate banks when works are complete, stabilise with seeded soil wrap if required. Place any fallen trees into channel to provide habitat.	10 m
4b	Open Cut	Isolate with steel plates and open cut	Create temporary ford	Install temporary box culvert	Yes in wet conditions.	Yes in wet conditions.	Avoid clearing trees if possible. Revegetate banks when works are complete, stabilise with seeded soil wrap if required. Place any fallen trees into channel to provide habitat.	5 m

Site	Recommended pipeline crossing		Recommended Road crossing for equipment		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of re-planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
6	Open Cut	Isolate with steel plates and open cut ¹	Create temporary ford	Temporary box culvert ¹	Yes in wet conditions.	Yes in wet conditions.	Avoid clearing trees if possible. Revegetate banks when works are complete. Place any fallen trees into channel to provide habitat.	15 m
7	Open Cut at location already disturbed by cattle access	Isolate with steel plates or coffer dam in high flow. Drill if water levels are high; this will also help to avoid clearing riparian trees.	Temporary ford	Temporary single – span bridge or culvert	Yes in wet conditions if isolated.	Yes in wet conditions if isolated or drill used.	Erosion control required. When complete, slope bank and stabilise with seeded sediment wrap, crib wall and /or planted vegetation. Do not remove large trees. Place any fallen trees into creek bed to provide habitat.	Left bank 5 m, right bank 10 m.

1 Small ephemeral stream, not expected to flow for very long after rain