Aquatic Biodiversity in the Hunter – Central Rivers Region

[an extract from: NSW DPI (2006) *Reducing the impact of road crossing on aquatic habitat in coastal waterways – Hunter - Central Rivers, NSW*, Report to the New South Wales Environmental Trust, NSW DPI, Flemington, NSW]

The aquatic habitats of the Hunter/Central Rivers region comprise freshwater, estuarine and marine environments. From montane streams to lowland floodplain wetlands and coastal lagoons, the extensive range of aquatic habitats supports a diverse assemblage of aquatic species including over 52 finfish species that inhabit freshwater and/or estuarine systems for at least part of their lives (refer Table 1).

The region supports an array of aquatic invertebrates including insects, prawns, crayfish and freshwater mussels, with the northern distribution of the threatened Adams emerald dragonfly (*Archaeophya adamsi*) potentially occurring within waterways of the Central Coast and southern Hunter subregions.

Estuaries within the North Coast Bioregion (within the Lower North Coast subregion) are characterised by mangrove communities and saltmarsh species, with freshwater margins dominated by swamp oak (*Casuarina glauca*) and paperbark (*Melaleuca quinquenervia*). Alluvial flats are occupied by flooded gum (*Eucalyptus grandis*) (DEC, 2004). Estuaries in the Sydney Basin Bioregion (remainder of the Hunter/Central Rivers area) are similar to those in the North Coast Bioregion, but with common reed (*Phragmites australis*) dividing swamp oak and salt marsh communities, and with dynamic boundaries to all these communities due to modern geomorphic processes. Riparian vegetation in this part of the Sydney Basin Bioregion is dominated by river oak (*Casuarina cunninghamiana*) and River red gum (*Eucalyptus camaldulensis*) (DEC, 2004).

The Hunter/Central Rivers region includes key protected estuarine and marine species such as the threatened Black cod (*Epinephelus daemelii*), Weedy seadragon (*Phyllopteryx aeniolatus*), and Estuary cod (*Epinephelus coioides*). It also potentially has remnant populations of the endangered estuary inhabiting Green sawfish (*Pristis zijsron*)[1], although the most recent confirmed record for this species is in 1972 from the Clarence River on the north coast of NSW.

Fifty-eight species of frog are found in the region including five endangered species (Green and golden bell frog, Giant barred frog, Stuttering frog, Booroolong frog, and the Tusked frog population from Nandewar and New England Tablelands Bioregions [from the upper reaches of a tributary to the Manning River]), and eight vulnerable species (Davies' Tree Frog, Green-thighed Frog, Giant Burrowing Frog, Glandular Frog, Littlejohn's Tree Frog, Red-crowned Toadlet, Sphagnum Frog, and Wallum Froglet) (DEC, 2006b). The introduced invasive Cane toad (*Bufo marinus*) has been recorded from the near Taree in northern part of the Hunter Central Rivers region (DEC, 2006b), and could further increase pressure on native species through predation and competition for food and resources.

Many reptiles are also found in wetlands within the region including skinks, snakes, water dragons and two species of freshwater turtle (the common Eastern long-necked turtle, *Chelodina longicollis*; and a single record of the Brisbane River short-necked turtle, *Emydura macquarii signata*, from the upper Hunter River). In addition, Platypus (*Ornithorhynchus anatinus*), Water rats (*Hydromys chrysogaster*), and Swamp rats (*Rattus lutreolus*) - mammals specialised for freshwater aquatic habitats - can be found in and around many waterways within the region (DEC, 2006b).

All these aquatic species are dependent on healthy streams and access to diverse habitats for their survival. Freshwater fish habitat in the Hunter/Central Rivers include swamps, floodplains, wetlands, streams and rivers. These broad habitat types provide niche habitats such as pools and riffles, gravel beds, boulders, snags, aquatic vegetation, riparian vegetation and riparian overhangs and undercuts. Birds and terrestrial-based animal species also rely on these habitats to support the food web within the broader ecosystem and also to provide fringe habitat.

[1] Listed under the NSW *Threatened Species Conservation Act* 1995.

Many freshwater and estuarine habitats are essential for conserving aquatic biodiversity and have been listed as Endangered Ecological Communities[2] (EECs) in recognition of their rarity, vulnerability and their importance as both aquatic and terrestrial habitat. These include river and floodplain communities in the Hunter/Central Rivers such as: Coastal saltmarsh, Freshwater wetlands on coastal floodplains, Hunter lowland redgum forest, Kurri sand swamp woodland, Montane peatlands and swamps, Coastal floodplains, Swamp oak floodplain forest, and Swamp Sclerophyll forest on coastal floodplains. Within the lower Hunter River, and potentially within other waterways of the Hunter/Central Rivers, an endangered submerged aquatic plant species has been found. This small plant, *Zannichellia palustris*, grows in fresh or slightly saline stationary or slowly flowing water, and dies back every summer (DEC, 2006a).

As with rivers and lakes, these wetland, saltmarsh and swamp communities are subject to pressures such as fragmentation, flood mitigation, draining and infilling and modification of freshwater and tidal flows due to artificial structures being erected. For example, the EEC freshwater wetlands on coastal floodplains have markedly reduced in size and distribution due to clearing and modification, with less than 66% remaining (3,500ha in the mid 1990s) within the Hunter Central Rivers region (DEC, 2006a).

In order to conserve some of these fragmented and stressed communities, several areas within the Hunter/Central rivers region have been placed within reserves or provided with protective legislation. For example, the Myall Lakes system in the Lower North Coast subregion is both within the Myall Lakes National Park, and is listed as a Wetland of International Importance under the 1971 Ramsar Convention in recognition of its importance to migratory waterfowl, its diversity of vegetation, and as a very good example of a coastal barrier lagoon system (DEC, 2006c). Within the Hunter subregion, the Hunter Estuary Wetlands, comprising two wetland areas: those within the Kooragang Nature Reserve, and the “Shortland Wetlands”, are also listed under the Ramsar convention due to their uniqueness, and as refuge to migratory birds (DEC, 2006c).

As with legislative protective measures, aquatic habitat rehabilitation, and in particular reinstating stream connectivity, is essential for maintaining aquatic biodiversity and protecting the integrity of rivers, lakes and wetlands in coastal NSW that are both inside and out of the reserve systems.

For the whole document, see

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[2] Listed under the NSW *Threatened Species Conservation Act* 1995.

Table 1: Freshwater and estuarine fish in the Hunter / Central Rivers, NSW

Scientific Name	Common Names	Status	Migration[3] and habitat
Acanthopagrus australis	Yellowfin bream Silver bream	Common	Amphidromous; coastal marine; estuaries and inshore reefs
Afurcagobius tamarensis	Tamar River goby	Common	Estuaries, coastal lakes and lower freshwater river reaches
Aldrichetta forsteri	Yellow-eye mullet	Common	Marine and estuarine; brackish coastal lakes and lower freshwater reaches
Ambassis marianus	Estuary perchlet; Glass perchlet	Common	Local migration; brackish mangrove estuaries and tidal creeks
Amniataba percoides	Banded grunter	Exotic; Noxious listing, NSW	Freshwater habitats – in Clarence River and has the potential to spread to the Hunter / Central Rivers region
Amoya bifrenatus	Bridled goby	Common	Estuarine and marine waters.
Anguillia australis	Short-finned eel	Common	Catadromous; coastal rivers & wetlands
Anguilla reinhardtii	Long-finned eel Marbled eel	Common	Catadromous; coastal rivers
Arrhamphus sclerolepis	Snub-nosed garfish	Common	Coastal bays and brackish estuaries.
Arius graeffei	Freshwater forktailed catfish	Common, although only occasional in Hunter/Central region	Can complete life cycle in freshwater, estuarine and marine populations are anadromous.
Atherinosoma microstoma	Smallmouthed hardyhead	Common	Unknown migration pattern; coastal estuarine and fresh waters
Caranx sexfasciatus	Bigeye trevally	Common	Marine; juveniles common in mangrove estuaries, tidal creeks and can enter freshwater.
Carassius auratus	Goldfish	Exotic	Widespread in lowland rivers.
Carcharhinus leucas	Bull shark	Common (not abundant)	Estuaries, lower reaches of rivers; coastal waters.
Chanos chanos	Milkfish	Common	Marine and warm water, shallow estuaries and rivers, will travel up rivers
Cyprinus carpio	Common carp	Exotic; Noxious listing	Still gentle flowing rivers in inland NSW and some catchments along the coast.
Elops hawaiensis	Giant herring	Common	Sheltered embayments and estuaries.
Epinephelus daemelii	Black cod	NSW Threatened Species (*vulnerable*)	Inshore marine caves and rocky reefs; larger juveniles around rocky shores in estuaries (natural distribution to south of Bega NSW)
Galaxias brevipinnis	Climbing galaxias	Uncertain; Distribution contracted	Amphidromous; headwaters and forested streams

[3] Migration patterns of freshwater fish include: *Potamodromous* – fish that migrate wholly within fresh water; *Anadromous* – fish that spend most of their life in the sea and migrate to fresh water to breed; *Catadromous* - fish that spend most of their life in fresh water and migrate to the sea to breed; *Amphidromous* - fish that migrate between sea and fresh water, but not for the purpose of breeding.

Scientific Name	Common Names	Status	Migration[3] and habitat
Galaxias maculatus	Common jollytail	Common	Catadromous; coastal streams, lakes and lagoons – salt and fresh water environs
Galaxias olidus	Mountain galaxias	Common	Local migration; moderate and high elevations in coastal and inland rivers.
Gambusia holbrooki	Gambusia, Plague minnow	Exotic; Noxious Listing	Widespread in coastal and inland NSW.
Gobiomorphus australis	Striped gudgeon	Common	Amphidromous; coastal streams generally at lower elevations.
Gobiomorphus coxii	Cox's gudgeon	Common	Potamodromous; freshwater reaches of coastal rivers
Hippichthys penicillus	Steep-nosed pipefish	Common	Mangrove estuaries, lower reaches of freshwater streams
Hypseleotris compressa	Empire gudgeon	Common throughout its range	Unknown migration; lower reaches of coastal rivers.
Hypseleotris galii	Firetailed gudgeon	Common	Potamodromous; freshwater reaches of coastal streams.
Hypseleotris klunzingeri	Western carp gudgeon	Common	Freshwater; around aquatic vegetation in slow moving rivers, lakes or wetlands.
Gerres subfasciatus	Silver biddy	Common	Marine estuaries and bays, brackish coastal rivers and lakes.
Leiopotherapon unicolor	Spangled perch	Common	Amphidromous; freshwater, although wide salinity tolerance; flowing streams, wetlands, lakes, dams, bores
Liza argentea	Flat-tail mullet	Common	Estuaries and sea beaches.
Lutjanus argentimaculatus	Mangrove Jack	Common	Estuaries and tidal river reaches.
Macquaria colonorum	Estuary perch	Uncertain	Amphidromous; estuarine areas in coastal rivers and lakes.
Macquaria novemaculeata	Australian bass	Uncertain	Catadromous; Coastal rivers up to 600m altitude.
Megalops cyprinoides	Oxeye herring	Abundant throughout its range	Amphidromous; tropical waters, estuaries and northern coastal fresh waters
Monodactylus argenteus	Diamondfish; Silver batfish	Common	Bays, mangrove estuaries, tidal creeks and lower reaches of freshwater streams
Mugil cephalus	Striped mullet Sea mullet	Common	Amphidromous; lower reaches and estuaries of coastal catchments
Mugilogobius platynotus	Flat backed goby	Common	Estuaries, can tolerate freshwater but mainly a marine species
Myxus elongatus	Sand mullet	Common	Amphidromous as juveniles; estuaries and brackish waters in lower river reaches.
Myxus petardi	Freshwater mullet	Common	Catadromous; freshwater reaches of coastal rivers north of Georges River into QLD
Notesthes robusta	Bullrout	Limited abundance but not threatened	Catadromous; tidal estuaries and fresh waters
Oncorhynchus mykiss	Rainbow trout	Exotic	Local migration; montane regions along the Great Dividing Range

Scientific Name	Common Names	Status	Migration[3] and habitat
Philypnodon grandiceps	Flathead gudgeon	Common	Unknown migration; inland and coastal waters especially lakes and dams
Philypnodon sp.1	Dwarf flathead gudgeon	Common	Unknown migration; coastal and inland streams
Platycephalus fuscus	Dusky flathead	Common	Amphidromous; marine and estuarine waters.
Potamalosa richmondia	Freshwater herring	Not common but not considered under threat	Catadromous; estuaries and coastal fresh water rivers
Pristis zijsron	Green sawfish	NSW Threatened Species (*Endangered*)	Amphidromous; lower reaches and estuaries of coastal catchments. Last confirmed sighting in 1972 from Clarence River (natural distribution to Jervis Bay, NSW)
Pseudogobius sp 9	Blue-spot goby	Common	Sheltered estuaries and coastal lakes.
Pseudomugil signifer	Southern blue-eye	Common	Amphidromous; eastern draining catchments
Redigobius macrostoma	Largemouth goby	Common	Amphidromous; estuaries, coastal rivers and some freshwater streams.
Retropinna semoni	Australian smelt	Common	Potamodromous; Inland and coastal freshwater
Rhabdosargus sarba	Tarwhine	Common	Coastal waters, often entering estuaries
Salvelinus fontinalis	Brook Char	**EXOTIC**	Restricted to cool-cold waters, restocking sustains populations in Tasmania, NSW, SA
Salmo trutta	Brown trout	Exotic	Restricted to cooler waters; montane waterways above 600m elevation.
Scatophagus argus	Spotted scat	Common	Estuarine and coastal, mangrove creeks, lower reaches of freshwater streams.
Selenotoca multifasciata	Banded scat	Common.	Estuarine and coastal, mangrove creeks, lower reaches of freshwater streams
Tandanus tandanus	Freshwater catfish	Common (eastern draining form)	Potamodromous, still and slow moving freshwater in mid to lowland slopes. Translocated from western species in most of Hunter/Central region; native subspecies in the Manning R and waterways north of this.
Terapon jarbua	Crescent Perch	Common	Marine, but also penetrating estuaries and lower river reaches.
Valamugil georgii	Fantail mullet	Common	Amphidromous; estuarine and marine, young entering freshwater.

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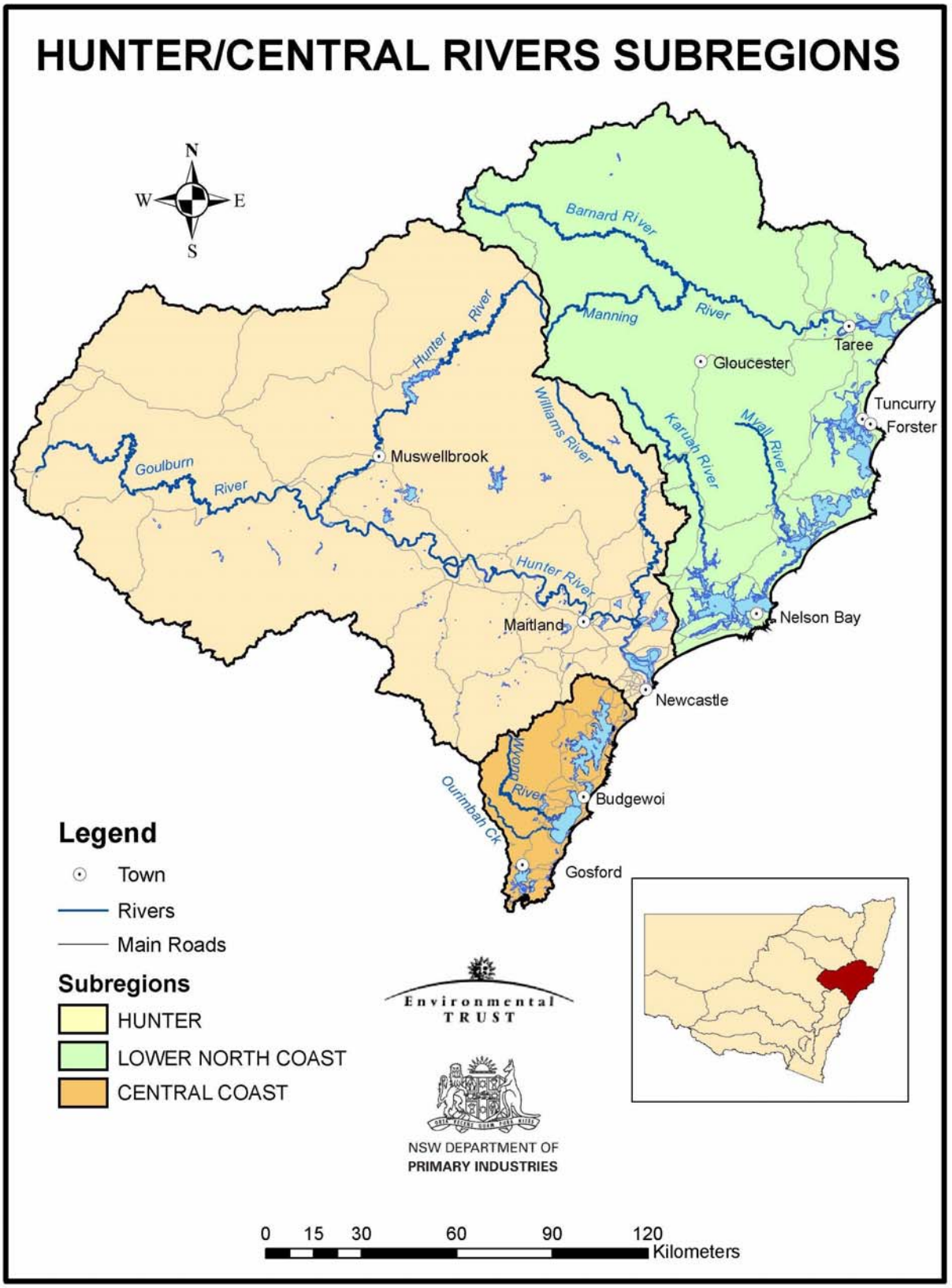
HUNTER/CENTRAL RIVERS SUBREGIONS
N
W
E
S
Barnard River
Manning River
Hunter River
Williams River
Karuah River
Myall River
Goulburn River
Hunter River
Wyong River
Ourimbah Ck
Taree
Gloucester
Tuncurry
Forster
Muswellbrook
Nelson Bay
Maitland
Newcastle
Budgewoi
Gosford
Legend
Town
Rivers
Main Roads
Subregions
HUNTER
LOWER NORTH COAST
CENTRAL COAST
Environmental TRUST
NSW DEPARTMENT OF PRIMARY INDUSTRIES
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Kilometers