

Coorong Fish Monitoring

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SARDI Aquatic Sciences



Fishes of the Coorong and Lower Lakes

Estuarine

Jumping mullet
Yellow-eye mullet ■
River garfish
Black bream ■
Bridled goby
Smallmouth hardyhead
Tamar goby
Bluespot goby
Greenback flounder ■
Lagoon goby

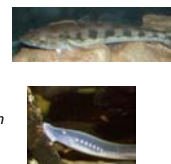
Liza argentea
Aldrichetta forsteri
Hyporhamphus regularis
Acanthopagrus butcheri
Arenigobius bifrenatus
Atherinosoma microstoma
Favonigobius tamarensis
Pseudogobius olorum
Rhombosolea tapirina
Tasmanogobius lasti



Diadromous

Common galaxias
Climbing galaxias ●
Pouched lamprey ●
Short-headed lamprey ●
Shortfin eel ●
Estuary perch ●
Congolli ●

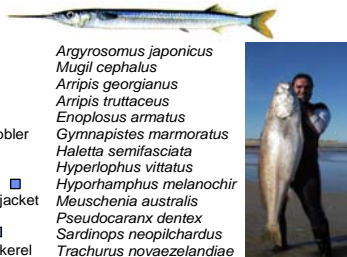
Galaxias maculatus
Galaxias brevipinnis
Geotria australis
Mordacia mordax
Anguilla australis
Macquaria colonorum
Pseudaphritis urvillii



Marine

Mulloway ■
Sea mullet
Australian herring ■
Australian salmon ■
Old wife
South Australian Cobbler
Blue rock whiting
Sandy sprat
Southern sea garfish ■
Brownstriped leatherjacket
Trevally
Australian pilchard ■
Yellowtail horse mackerel

Argyrosomus japonicus
Mugil cephalus
Arripis georgianus
Arripis truttaceus
Enoplosus armatus
Gymnapistes marmoratus
Haletta semifasciata
Hyperlophus vittatus
Hyporhamphus melanochir
Meuschenia australis
Pseudocaranx dentex
Sardinops neopilchardus
Trachurus novaezelandiae



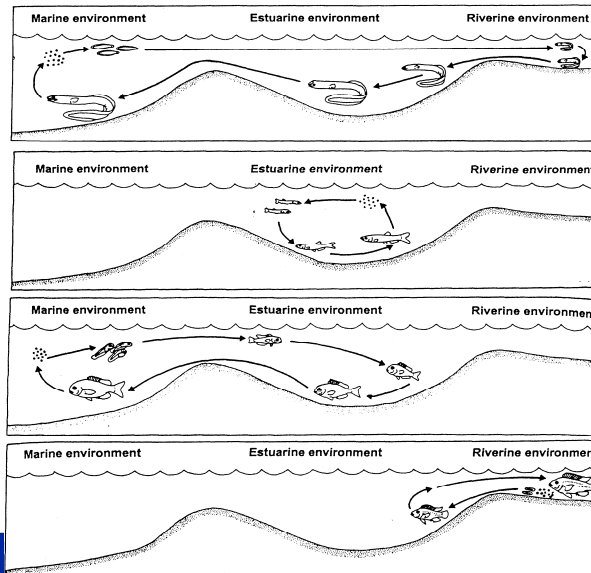
Freshwater

Flathead gudgeon
Silver perch ●
Goldfish
Murray hardyhead ●
Fly specked hardyhead
Carp ■
Carp gudgeon complex
Golden Perch ■
Southern Pygmy perch ●
Bony bream ■
Dwarf flathead gudgeon
Australian smelt
Freshwater catfish ●
Murray cod ●
Redfin perch ■

Philypnodon grandiceps
Bidyanus bidyanus
Carassius auratus#
Craterocephalus fluviatilis
Craterocephalus stercusmuscarum fulvus
Cryprinus carpio#
Hypseleotris spp.
Macquaria ambigua
Nannoperca australis
Nematolosa erebi
Philypnodonsp.
Retropinna semoni
Tandanus tandanus
Maccullochella peelii peellii
Perca fluviatilis #



Fishes and Estuaries



Diadromous

e.g. congolli, galaxias

Estuarine

e.g. black bream, smallmouth hardyhead

Marine

e.g. mulloway, yelloweye mullet

Freshwater

e.g. flathead gudgeon, Australian smelt

Adapted from Whitfield 1999

Coorong Fish Communities During the Recent Drought

CLLAMMecology/FRDC fish study 2006-2008 (Noell *et al.* 2009)

- Fish communities in the Coorong were considered at a historical low point
- Several key species, including black bream, greenback flounder, mulloway and congolli had likely been negatively impacted

TLM/DFW Coorong fish condition monitoring (2008-09 & 2009-10, Ye *et al.* 2011)

Black bream and greenback flounder (TLM target F4)

- a significant decline in abundance to a historically low level in 2008-09 and 2009-10
- contraction of distributional range to a reduced habitat in the Murray Estuary
- a decline in juvenile recruitment from 2008-09 to 2009-10.

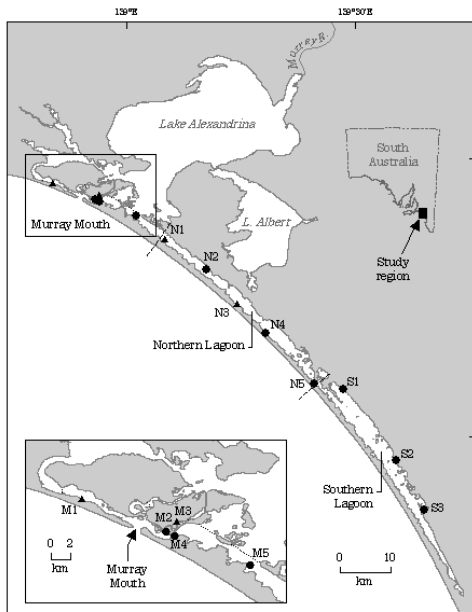
Smallmouth hardyhead (TLM target F3)

- almost no fish collected in the SL in 2008-09, with salinity ranging from 116-166 ppt
- small volumes of spring inflow (~100 ML day⁻¹) from the SE – positive biological response at a local scale in 2009-10

Objectives:

Response of fish assemblages in the Murray Estuary & Coorong following the barrage releases in 2010-11

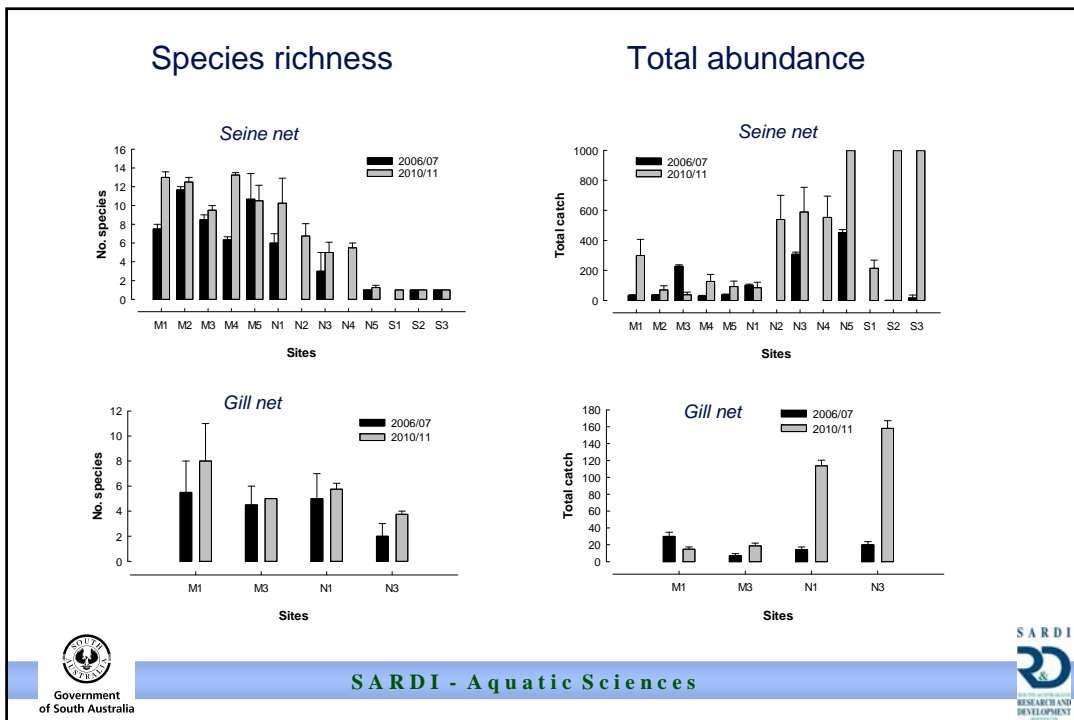
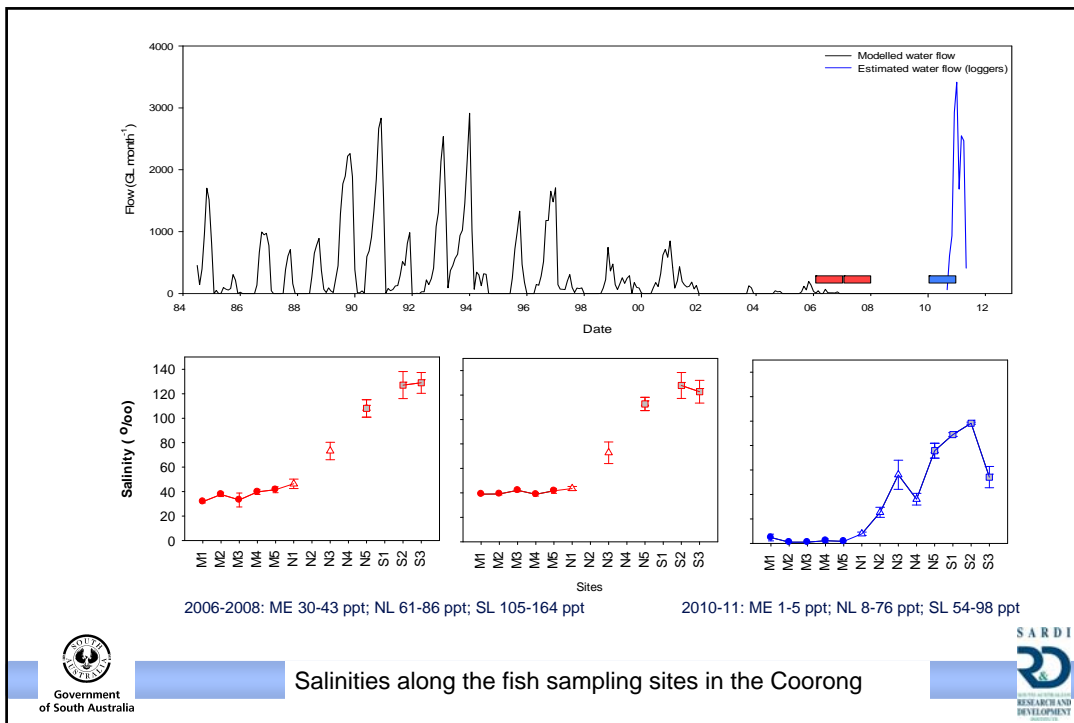
1. Changes in fish assemblage structure (**Recovery of estuarine fish assemblages**)
2. Enhanced recruitment in key species (i.e. black bream, greenback flounder, smallmouth hardyhead, Tamar goby, yellow-eye mullet, sandy sprat, congolli and mullet) (**Recruitment response**)
3. With salinity reductions in the NL, would estuarine fish recolonise and recruit in this part of the Coorong? (**Spatial scale of the ecological benefit**)
 - the freshening would result in an increase in species diversity and abundance and a greater southward distributional range of some species throughout the region.
 - recruitment of some estuarine species would be detected in the NL.



Fish Sampling

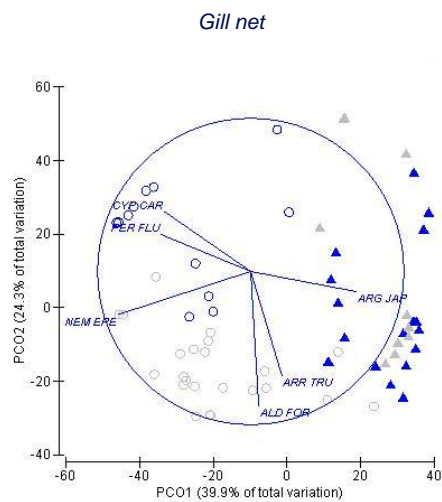
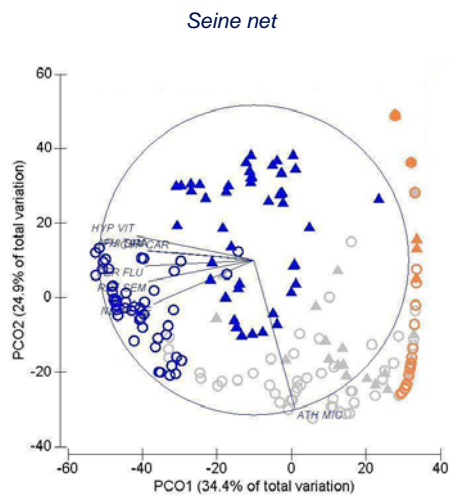
M1-5 (Estuary)
N1-5 (North Lagoon)
S1-3 (South Lagoon)

- Seine net (61m, 22 mm mesh)
 - Gill nets (9 m panels: 38, 50, 75, 115 and 155 mm stretched mesh)
(Only at M1, M3, N1 & N3)
- Nov, Dec, Feb & Mar 2010-11
- Water quality measurements

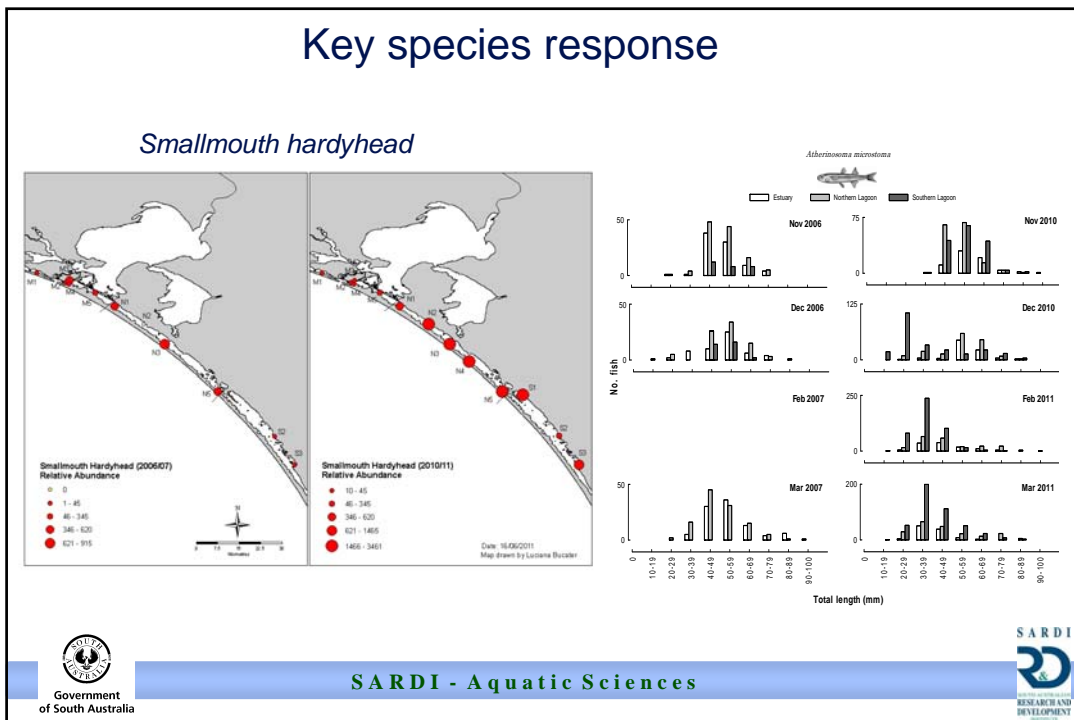
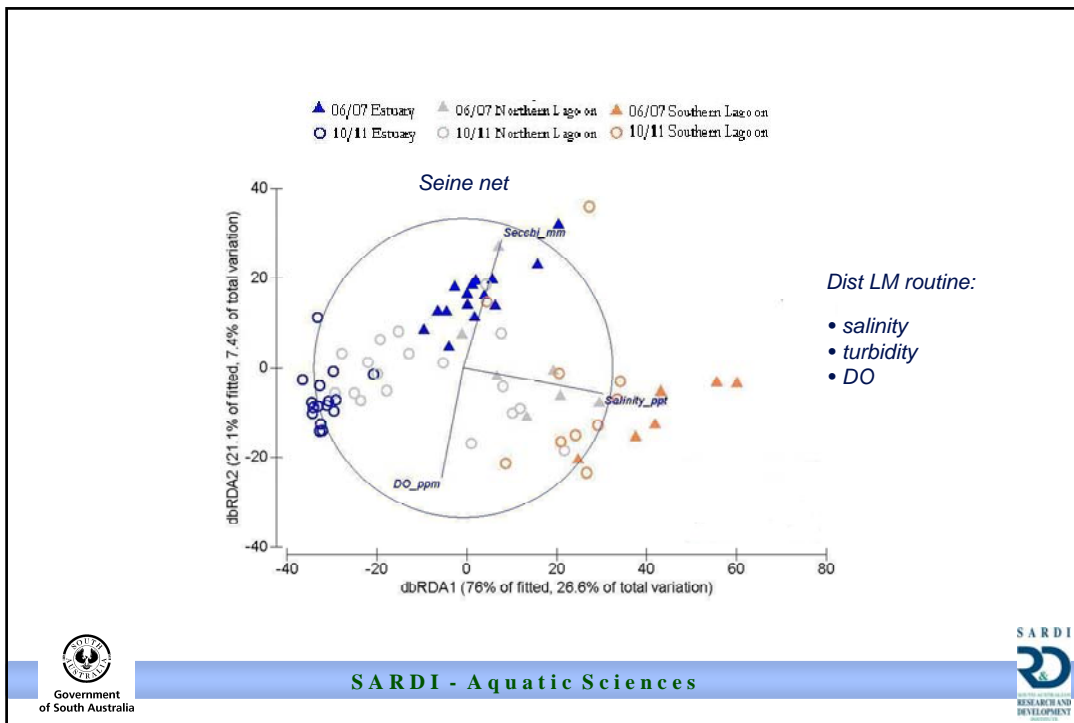


Fish species sampled in 2010-11 vs 2006-2008 from the Coorong

Year	2010/11		2006-2008	
ID	Scientific Name	Classification	Scientific Name	Classification
1	<i>Galaxias maculatus</i>	C	<i>Galaxias maculatus</i>	C
2	<i>Pseudaphritis urvilli</i>	C	<i>Pseudaphritis urvilli</i>	C
3	<i>Acanthopagrus butcheri</i>	E	<i>Acanthopagrus butcheri</i>	E
4	<i>Afurcagobius tamarensis</i>	E	<i>Afurcagobius tamarensis</i>	E
5	<i>Atherinosoma microstoma</i>	E	<i>Atherinosoma microstoma</i>	E
6	<i>Hyporhamphus regularis</i>	E	<i>Hyporhamphus regularis</i>	E
7	<i>Pseudogobius olorum</i>	E	<i>Pseudogobius olorum</i>	E
8	<i>Tasmanogobius lasti</i>	E	<i>Tasmanogobius lasti</i>	E
9	<i>Arenigobius bifrenatus</i>	E&M	<i>Arenigobius bifrenatus</i>	E&M
10	<i>Contusus brevicaudus</i>	E&M	Family Tetraodontidae	E&M
11	<i>Liza argentea</i>	E&M	<i>Liza argentea</i>	E&M
12	<i>Rhombosolea tapirina</i>	E&M	<i>Rhombosolea tapirina</i>	E&M
13	<i>Carassius auratus</i>	FE	<i>Engraulis australis</i>	E&M
14	<i>Cyprinus carpio</i>	FE	<i>Hyporhamphus melanochir</i>	E&M
15	<i>Perca fluviatilis</i>	FE	<i>Nematolosa erebi</i>	F
16	<i>Macquaria ambigua</i>	FN	<i>Retropinna semoni</i>	F
17	<i>Nematolosa erebi</i>	FN	<i>Aldrichetta forsteri</i>	O
18	<i>Philyponodon grandiceps</i>	FN	<i>Ammotretis rostratus</i>	O
19	<i>Retropinna semoni</i>	FN	<i>Argyrosomus hololepidotus</i>	O
20	<i>Aldrichetta forsteri</i>	O	<i>Arripis georgianus</i>	O
21	<i>Ammotretis rostratus</i>	O	<i>Arripis truttaceus</i>	O
22	<i>Argyrosomus hololepidotus</i>	O	<i>Gymnapistes marmoratus</i>	O
23	<i>Arripis georgianus</i>	O	<i>Heteroclinus heptaolus</i>	O
24	<i>Arripis truttaceus</i>	O	<i>Hyperlophus vittatus</i>	O
25	<i>Favonigobius lateralis</i>	O	<i>Myliobatis australis</i>	O
26	<i>Gymnapistes marmoratus</i>	O	<i>Mugil cephalus</i>	O
27	<i>Hyperlophus vittatus</i>	O	<i>Pomatomus saltatrix</i>	O
28	<i>Mugil cephalus</i>	O	<i>Pelates octolineatus</i>	O
29	<i>Sillago schomburgkii</i>	O	<i>Sardinops neophilichardus</i>	S
30			<i>Stigmatopora argus</i>	S
31			<i>Pseudocaranx dentex</i>	S

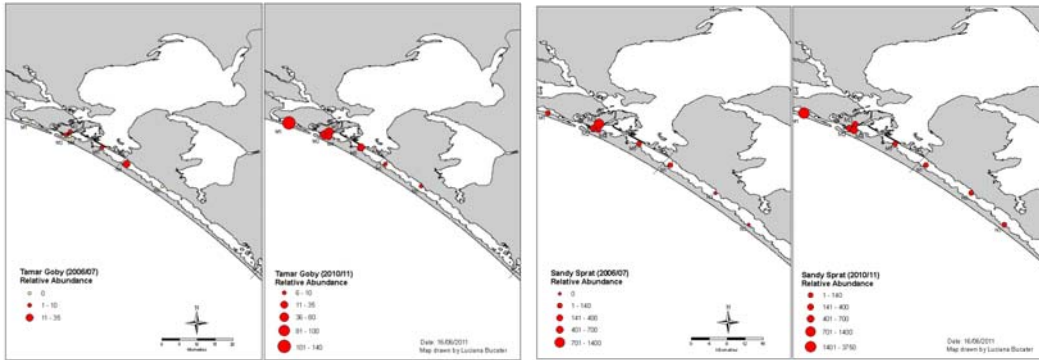


▲ 06/07 Estuary ▲ 06/07 Northern Lagoon ▲ 06/07 Southern Lagoon
○ 10/11 Estuary ○ 10/11 Northern Lagoon ○ 10/11 Southern Lagoon



Tamar goby

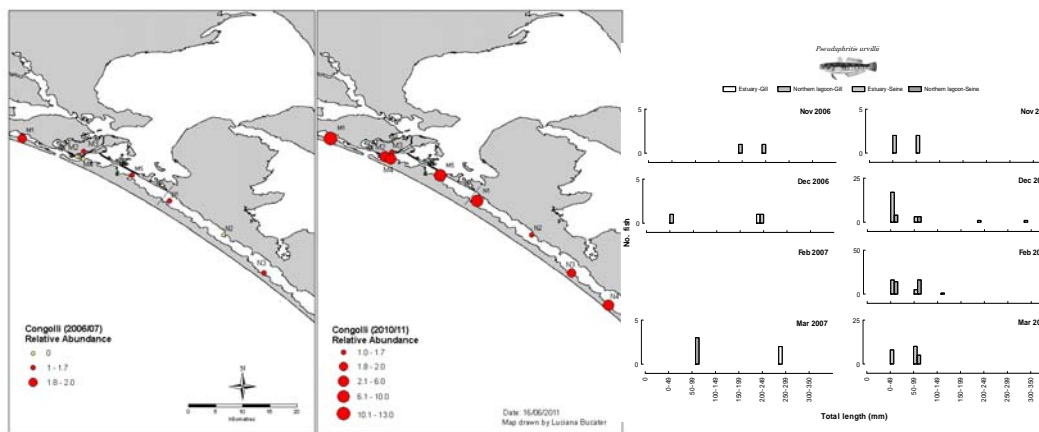
Sandy sprat



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Congoli

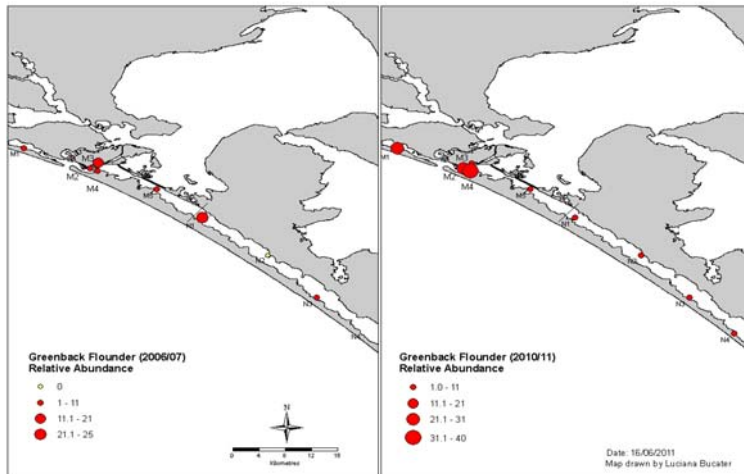


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Greenback flounder

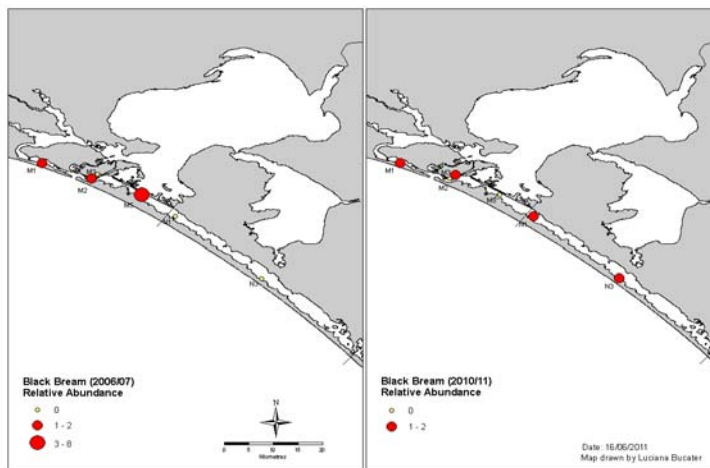
- enhanced recruitment
- potential southward range expansion



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Black bream – southward range expansion



Only adult caught in 2010-11
Juveniles?



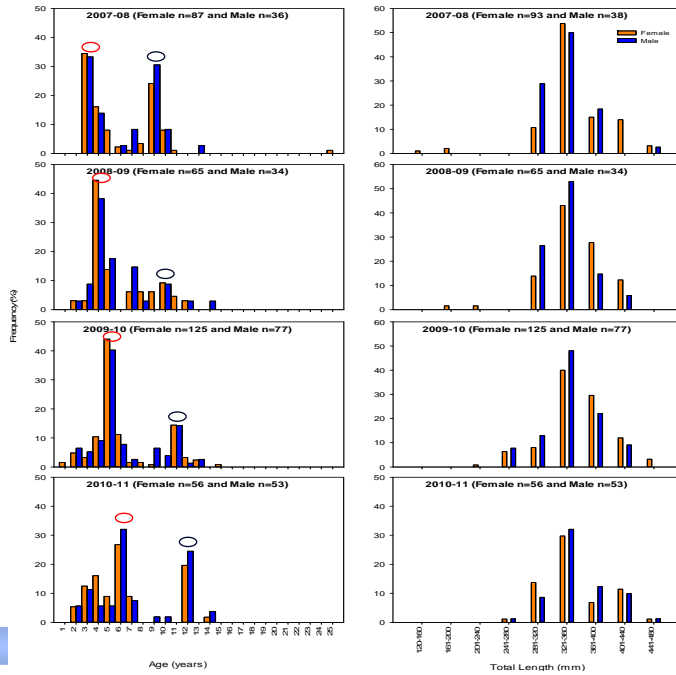
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Black bream

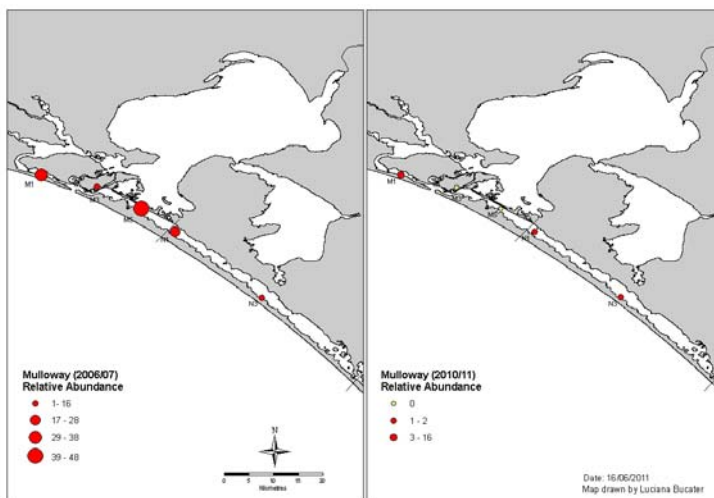
Strong year classes:

- 2003/04 & 1997/98
- none were major inflows
- flow regime is likely important
- need to id. requirements



Mulloway

- reduction in abundance
- very low salinities over a long period



Freshwater flows are important:

- spawning aggregations
- spring/summer Nov-Mar
- Larval development at sea
- Juveniles enter MM months later ~10-15 cm
- future monitoring would detect this 2010/11 cohort

Summary

1. Broadly decreased salinities, coupled with other freshwater induced environment changes, have elicited significant ecological responses in fish assemblages in the region.
2. The fish assemblage changed. mainly attributed to an increase in the diversity and abundance of freshwater species, and increased abundances of small-bodied estuarine/opportunist species and catadromous species (congolli) following enhanced recruitment. (early signs of ecological recovery).
3. The freshening of the Coorong also resulted in a southward range expansion of some key species, such as black bream (adult), and potentially yelloweye mullet, congolli and greenback flounder
4. Successful recruitment was detected for most of the key species, and many new recruits occurred in the NL, where they were formerly absent or less abundant.
5. However, it is uncertain how/whether some commercially important large-bodied estuarine associated species (e.g. black bream and mullocky) would benefit from the current and potentially future freshwater inflows to the Coorong.
6. Further monitoring will be required in subsequent years to continue to investigate the response and recovery of estuarine fish assemblages and assess the recruitment response of key large-bodied estuarine species to flow events.

Acknowledgements



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