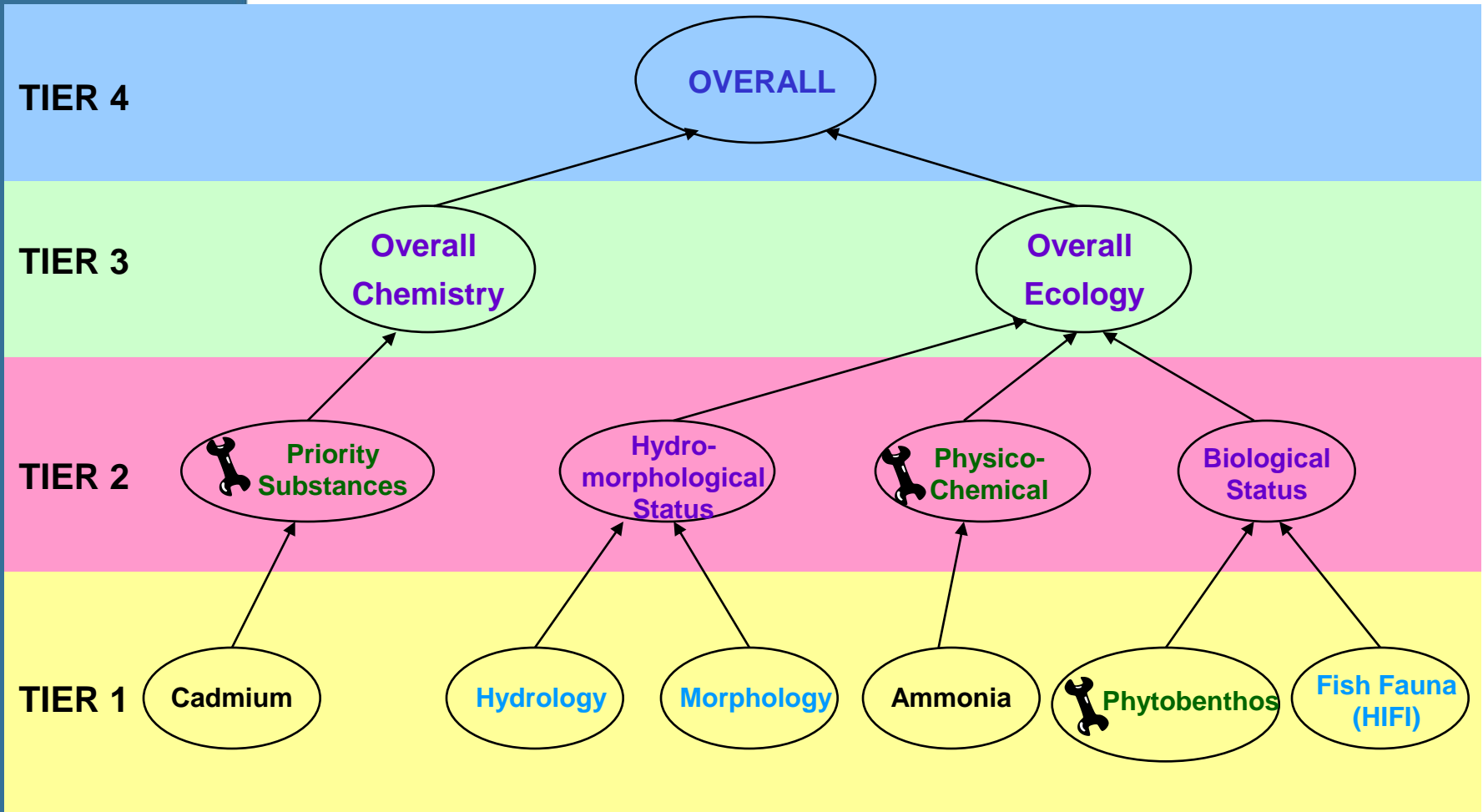


Forth Estuary Environmental Appraisal

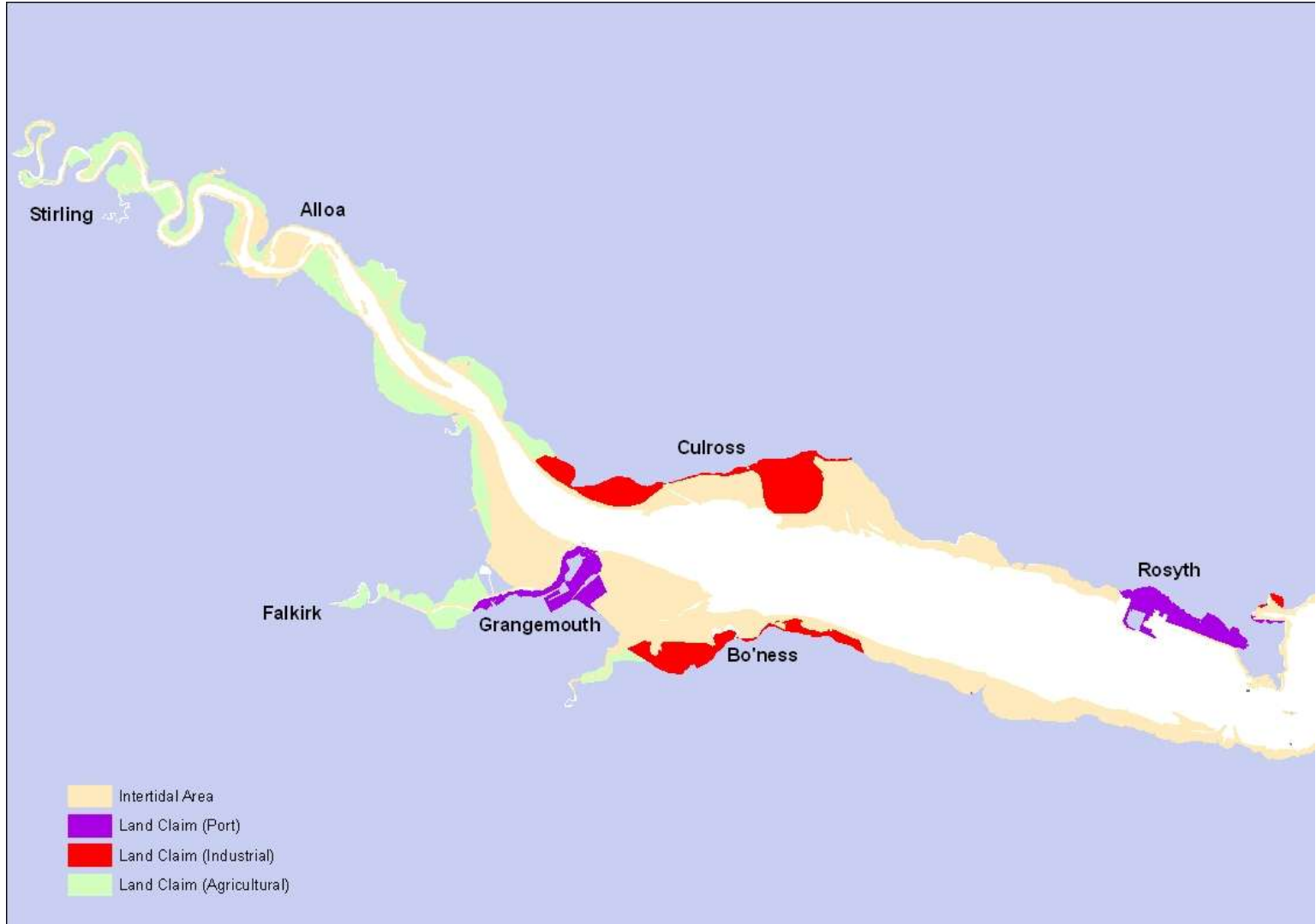
Judy Dobson, SEPA

Ross Brown, Brixham, Craig Robinson, MSS

WFD Classification Scheme



Hydromorphology



Classification of the Forth estuary

Water Body Map - Coloured by current class

Overall Class



Poor Ecological Potential

Moderate Ecological Potential

Good

Water Body Map - Coloured by current class for selected parameter

Ecology (benthic invertebrates)

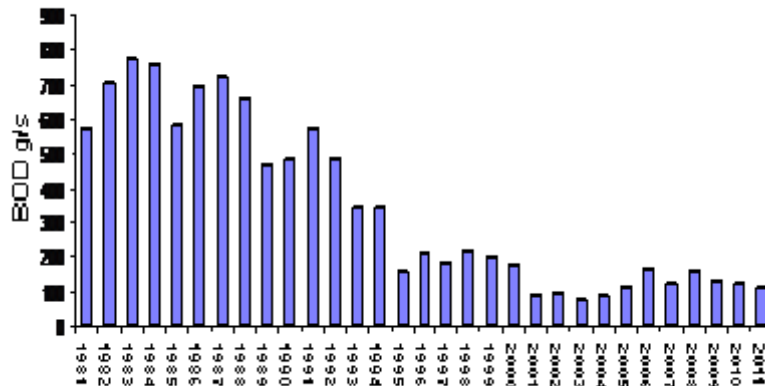
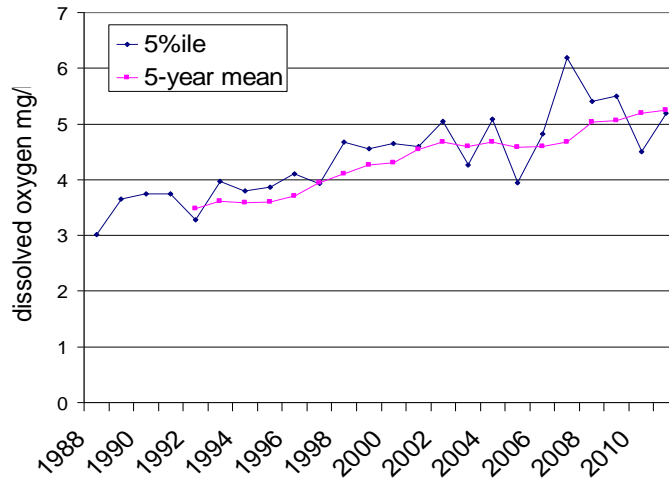


Water Body Map - Coloured by current class for selected parameter

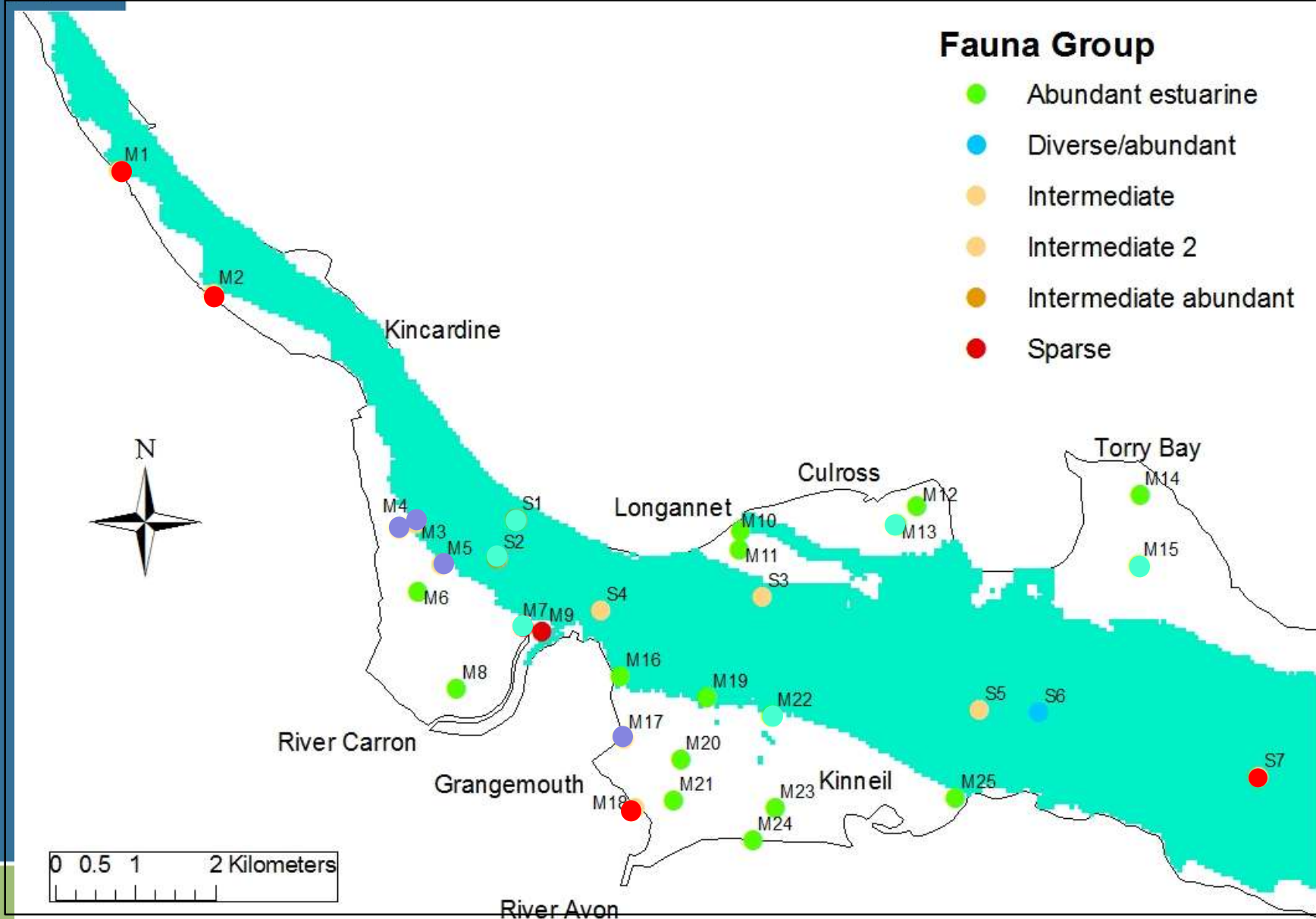
Water Quality



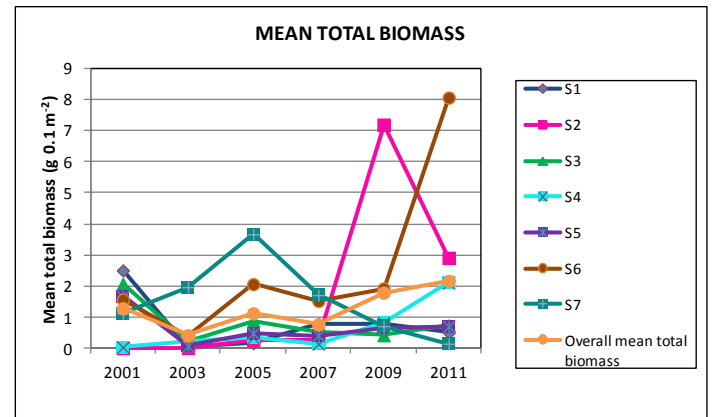
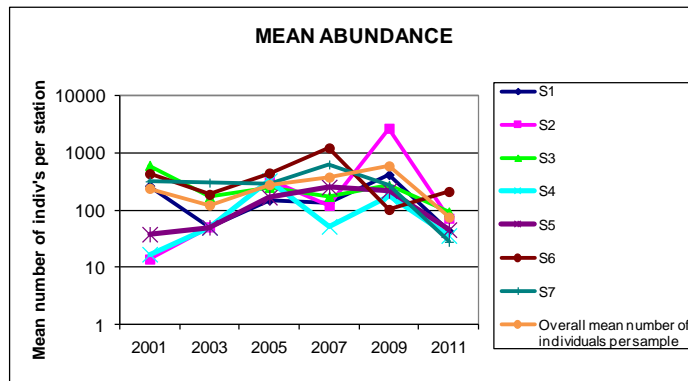
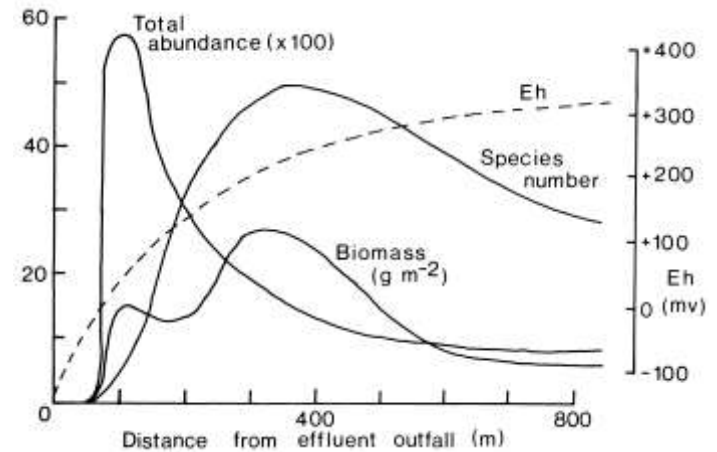
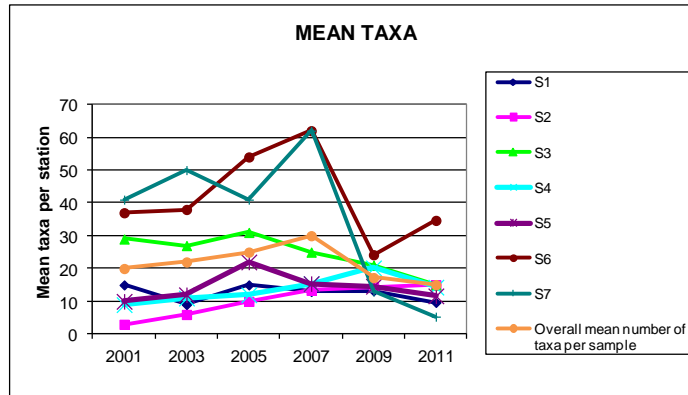
Dissolved oxygen



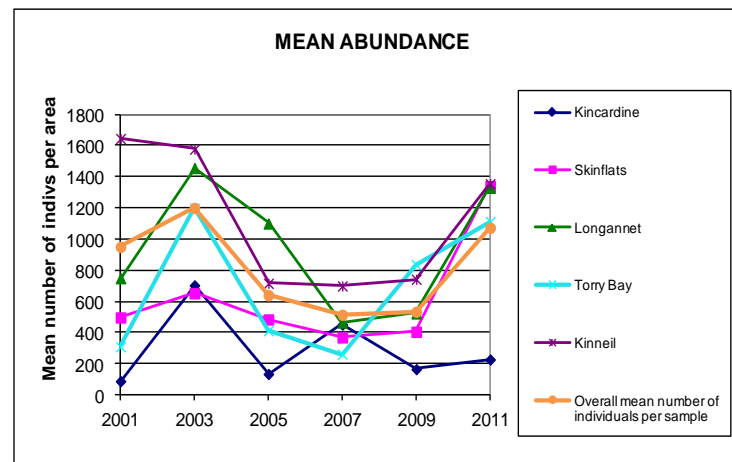
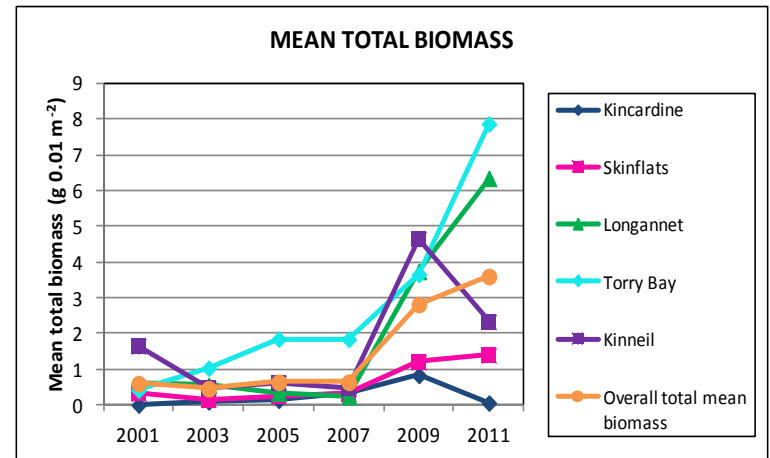
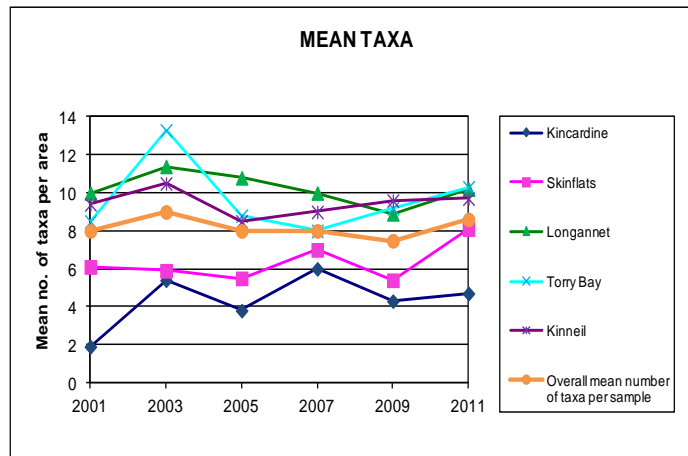
Benthic invertebrate status 2011



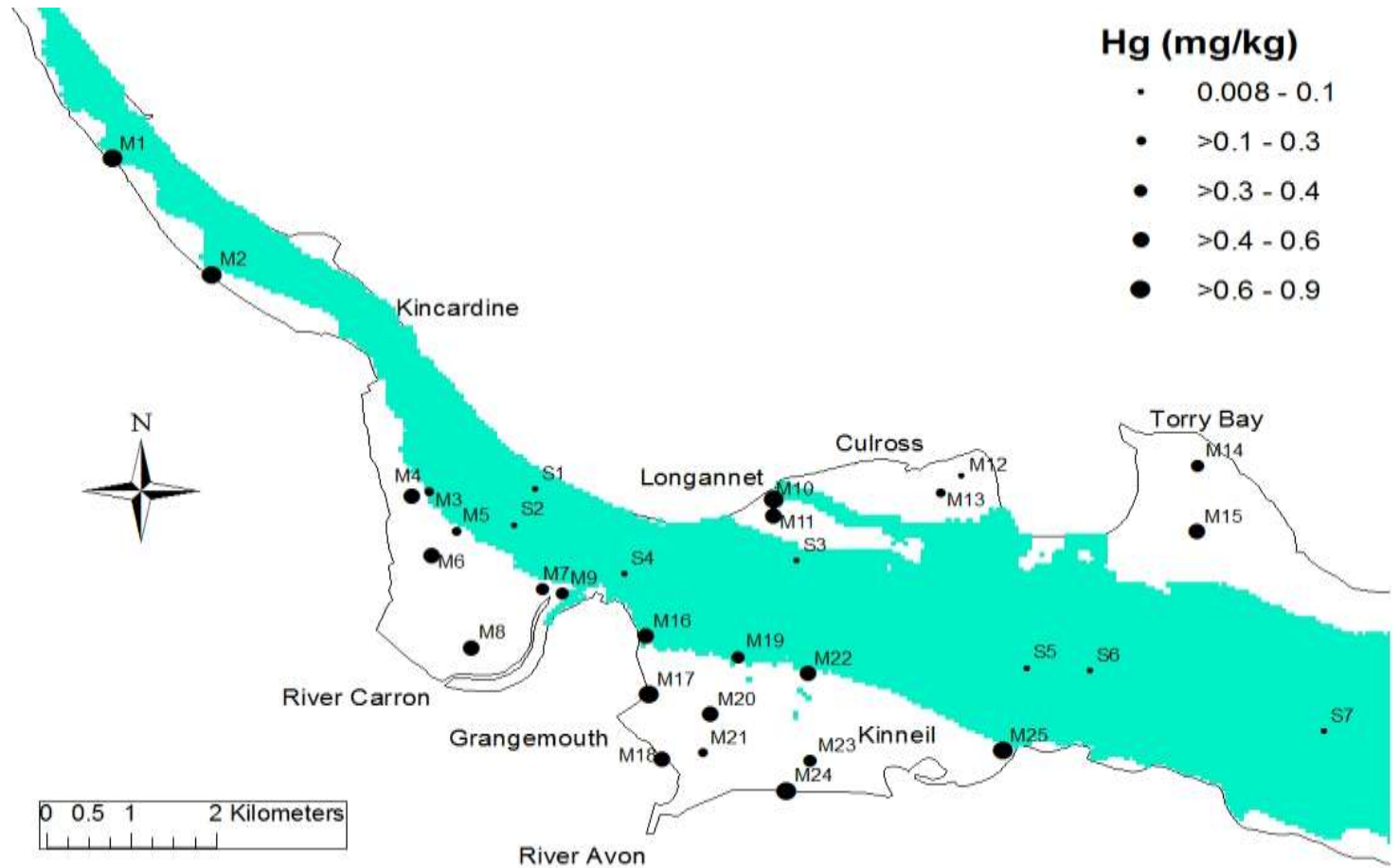
Subtidal benthic invertebrate trends



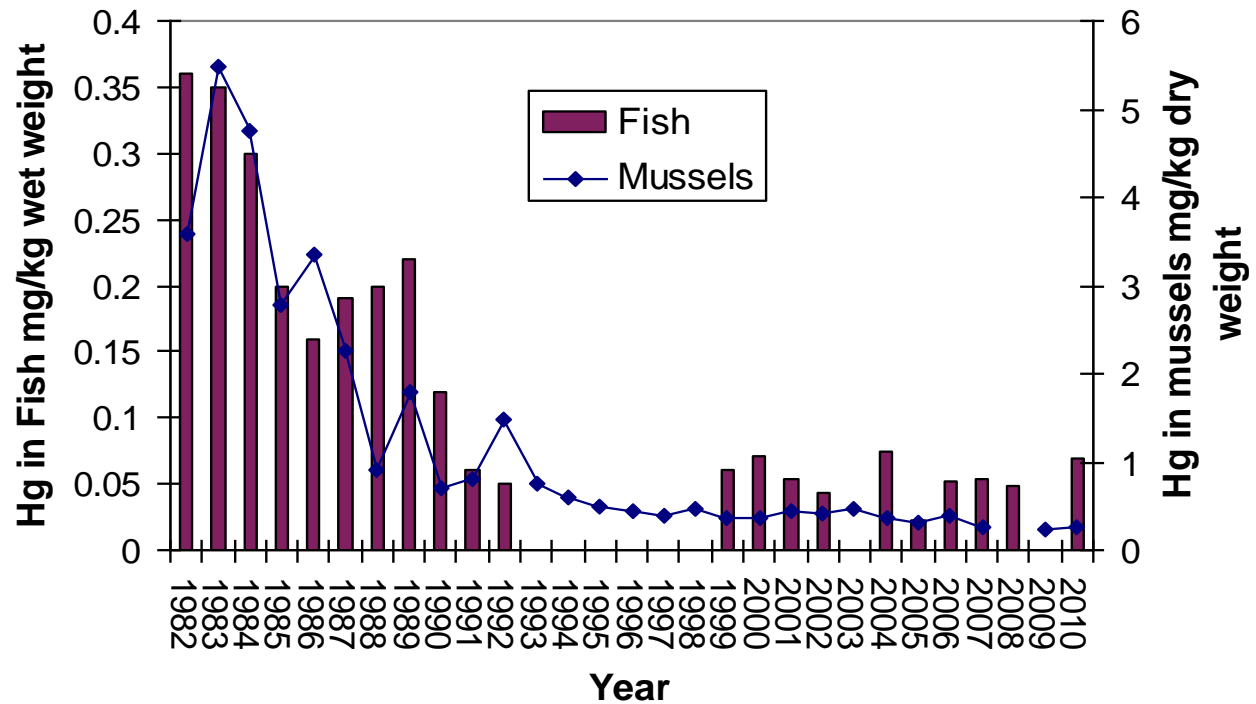
Intertidal benthic invertebrate trends



Mercury in sediments



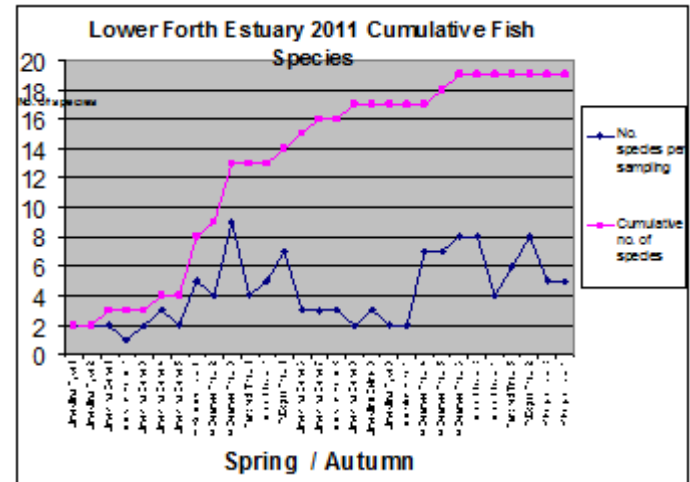
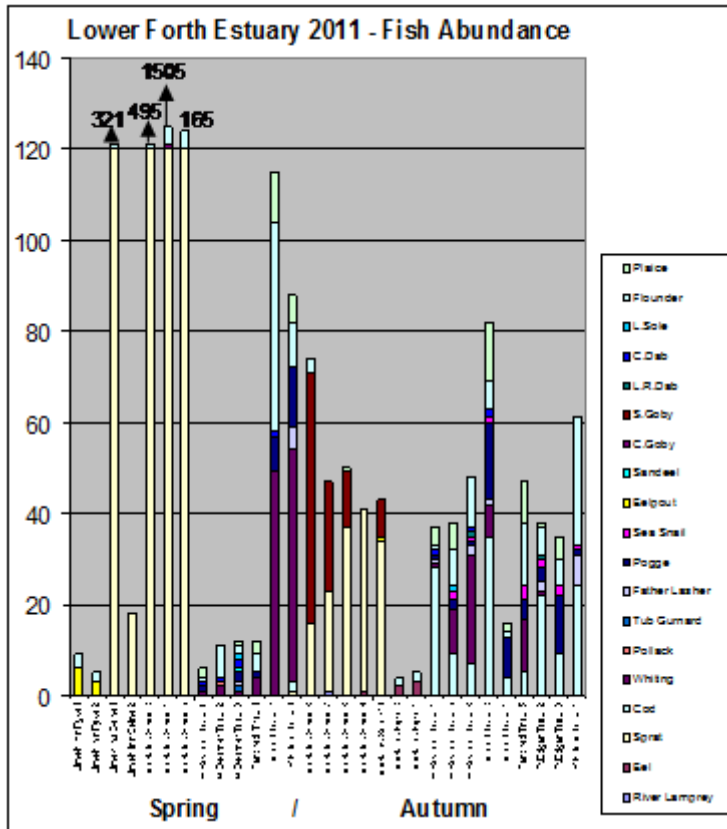
Mercury in biota



Fish in the Forth estuary



Fish in the Forth estuary



Biological Effects of Contaminants

		WATER			SEDIMENTS		MUSSELS		FISH	
		Upper	Middle	Lower	Middle	Lower	Upper	Middle	Upper	Lower
Contaminants	PAH	Green	Green	Green	Red	Red	Green	Green		
	PCB	Green	Green	Blue	Green	Green	Green	Green	Green	Green
	Cd	Green	Green	Green	White	Blue	Blue	Blue	Green	Green
	Pb	Green	Green	Green	White	Red	Green	Green	Green	Green
	Hg	Green	Green	Green	White	Red	Red	Red	Red	Red
Exposure	Comet						Green			
	EROD								Blue	Blue
	VTG								Blue	Blue
	Intersex								Blue	Blue
Effect	LMS						Red			
	Bile								Blue	Green
	External disease								Green	Blue
	Liver neoplasms								Blue	Blue
	Histology							Green	Green	Blue
	Stress on stress							Green		

Summary

- Upper and Middle Forth heavily modified
- Upper poor status (DO) but improving
- Middle moderate status (benthic invertebrates) but improving
- Lower good status
- Overall water chemistry pass, sediments and biota recovering from past discharges.
- Some evidence of biological effects in mussels