

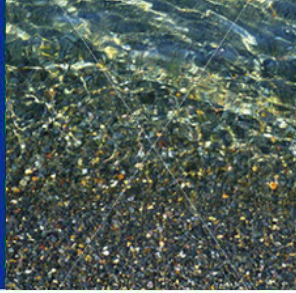


# **The Motueka River Plume Ecosystem**

**Paul Gillespie**

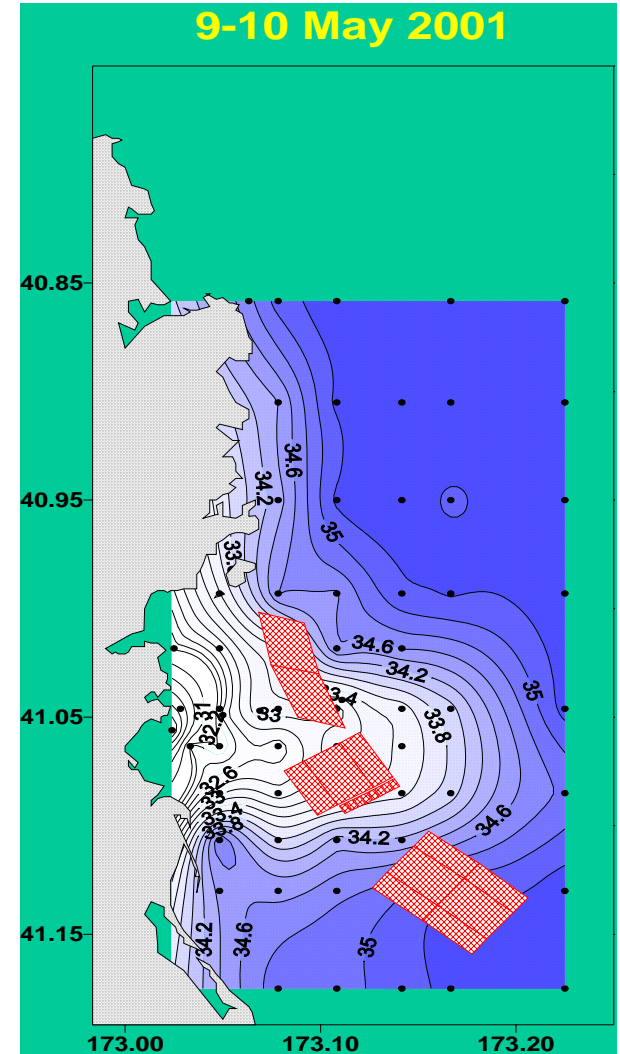
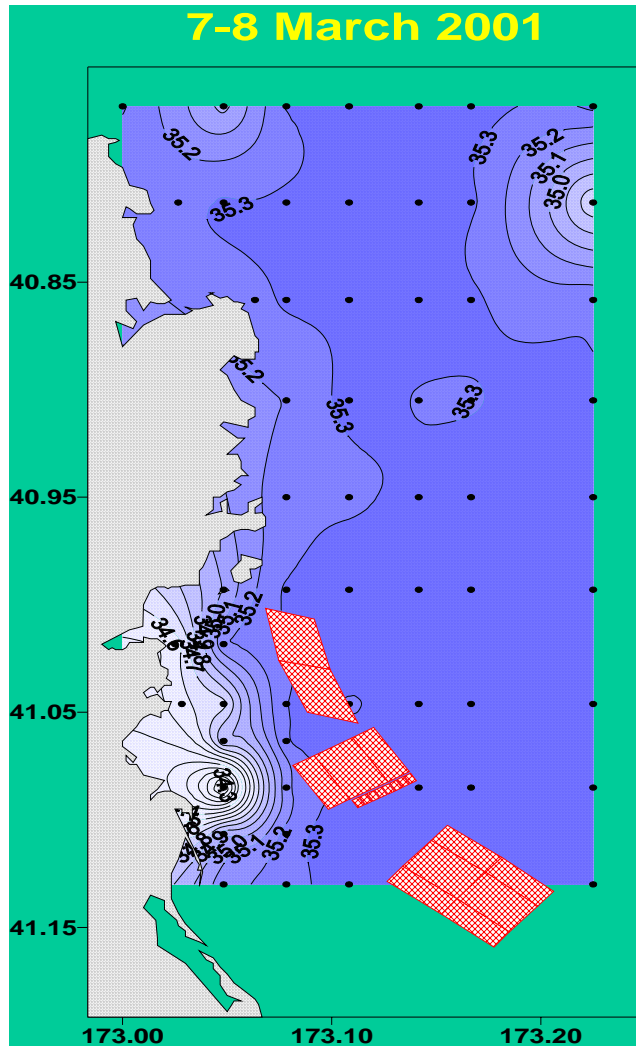
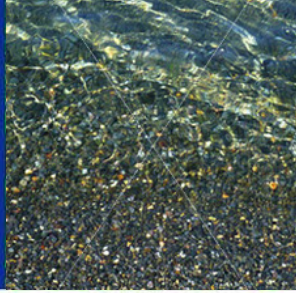
**Cawthron Institute  
Nelson New Zealand**

## Work to date describes:

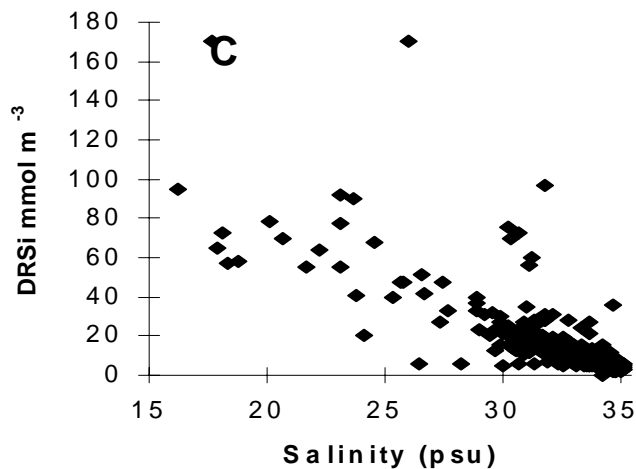
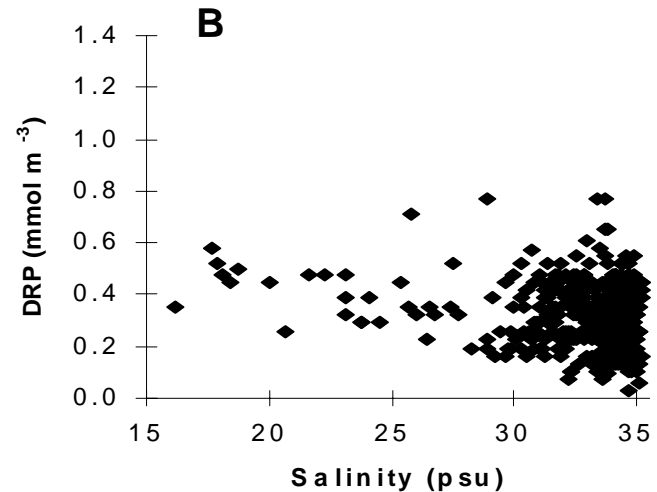
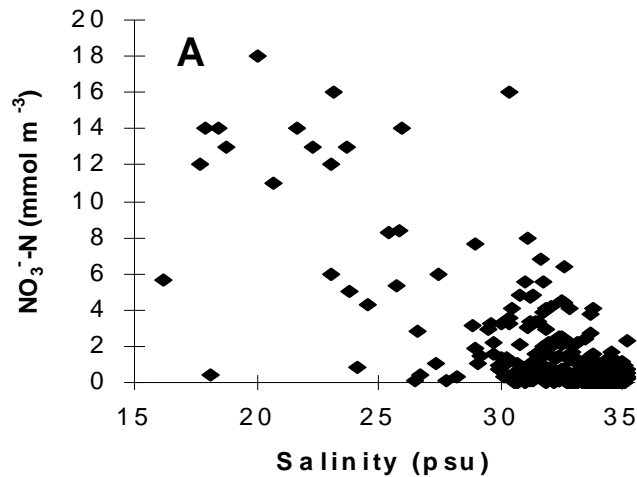
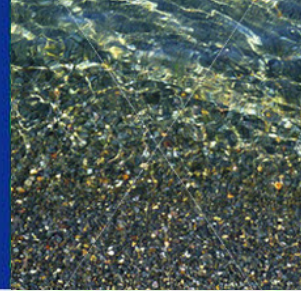


- o Stratification (water column stability)
- o Nutrient structure
- o Nitrogen sources and sinks
- o Phytoplankton and benthic microalgal biomass and production
- o Seawater circulation patterns and plume physical behaviour

# Sea surface salinity

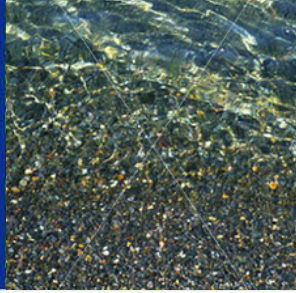


# Nutrients vs salinity

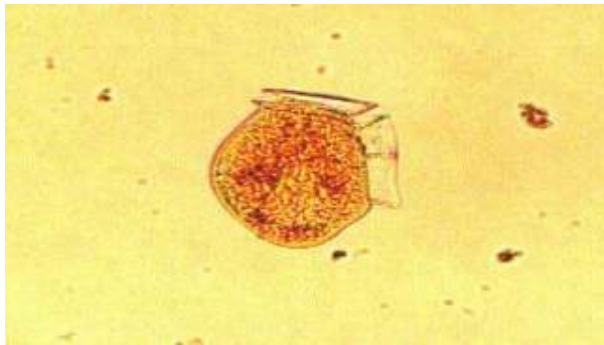
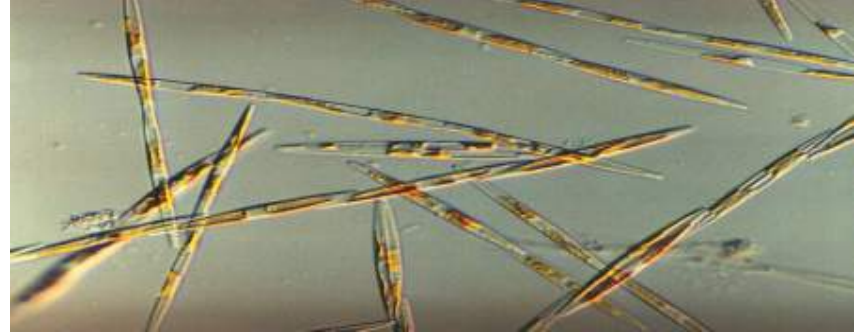


Highest dissolved nutrient concentrations associated with low salinities

# Primary production



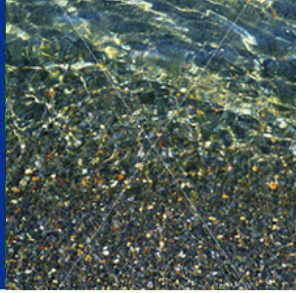
Phytoplankton →



Benthic diatoms →

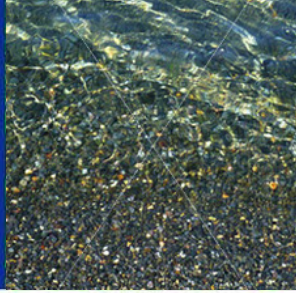


# Food for benthic filter feeders



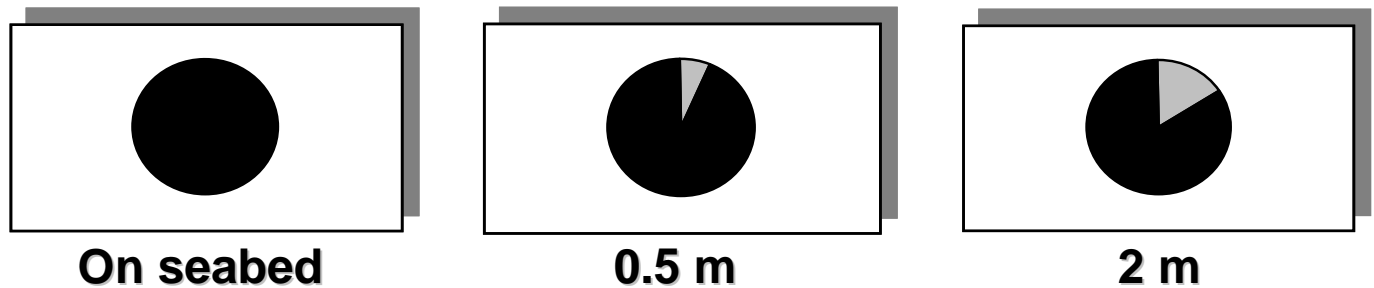
- o Planktonic microalgae: Primary food component during phytoplankton blooms; *e.g.* the winter/spring diatom bloom and summer dinoflagellate blooms.
- o Benthic microalgae: Primary food component during non-bloom periods. Maintenance diet??

# What do Tasman Bay scallops eat?



## Comparison of scallops on the seabed with others held in cages above the seabed

% Benthic ■ vs planktonic □ microalgae in scallop guts

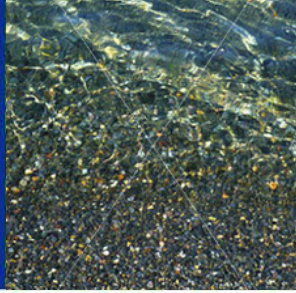


Analyses before (a) and during (b) a phytoplankton bloom (*Prorocentrum balticum*)





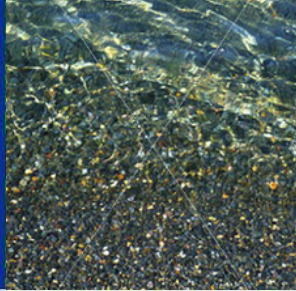
# Sediment effects



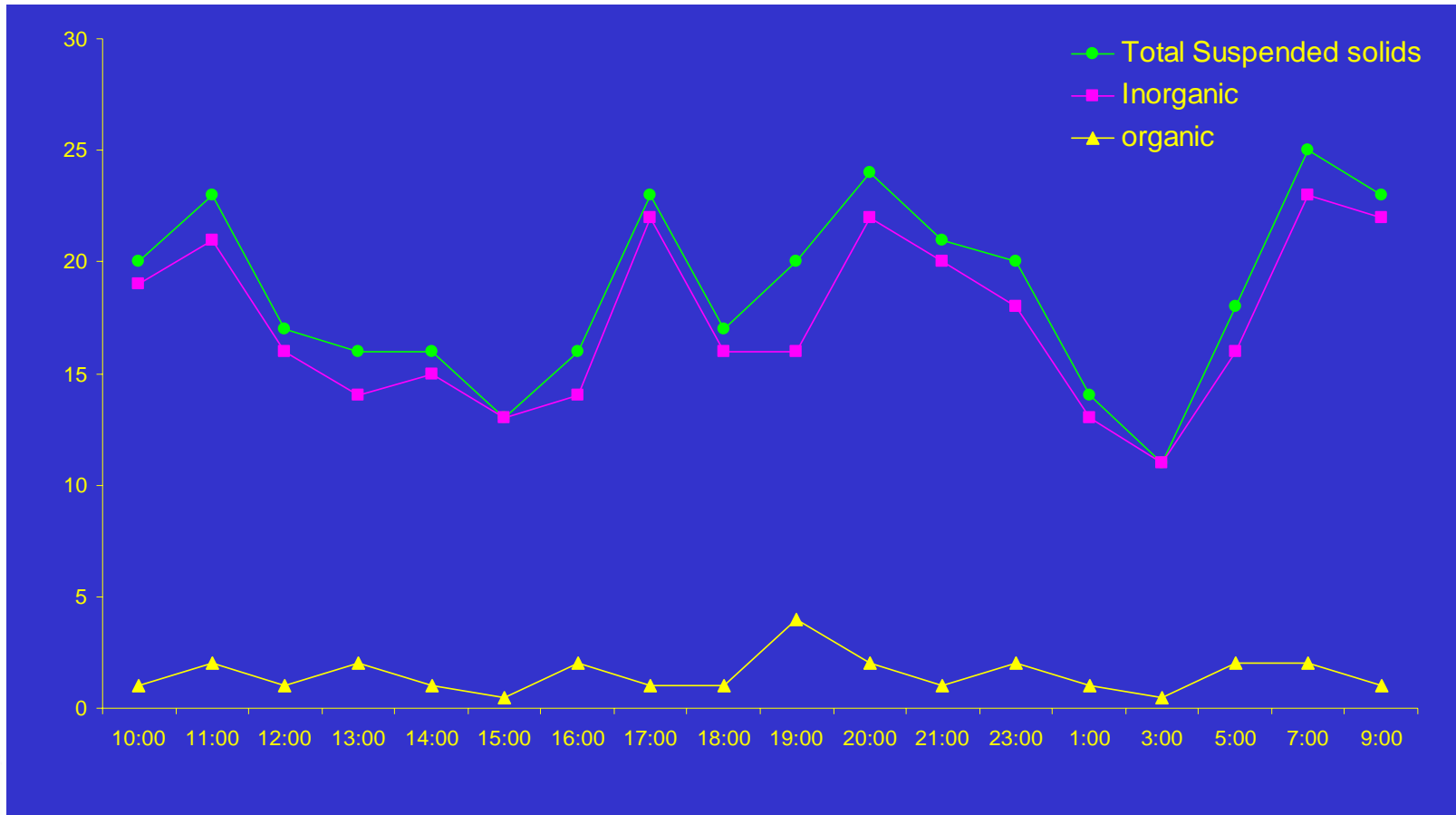
- o Near bottom high turbidity layer
  - Sediments delivered from the catchment during storm events.
  - Sedimentation and resuspension processes
  - Strong gradient (on a scale of centimeters) with water layers above
  - The proportion of inorganic/organic particles effects the nutritional value



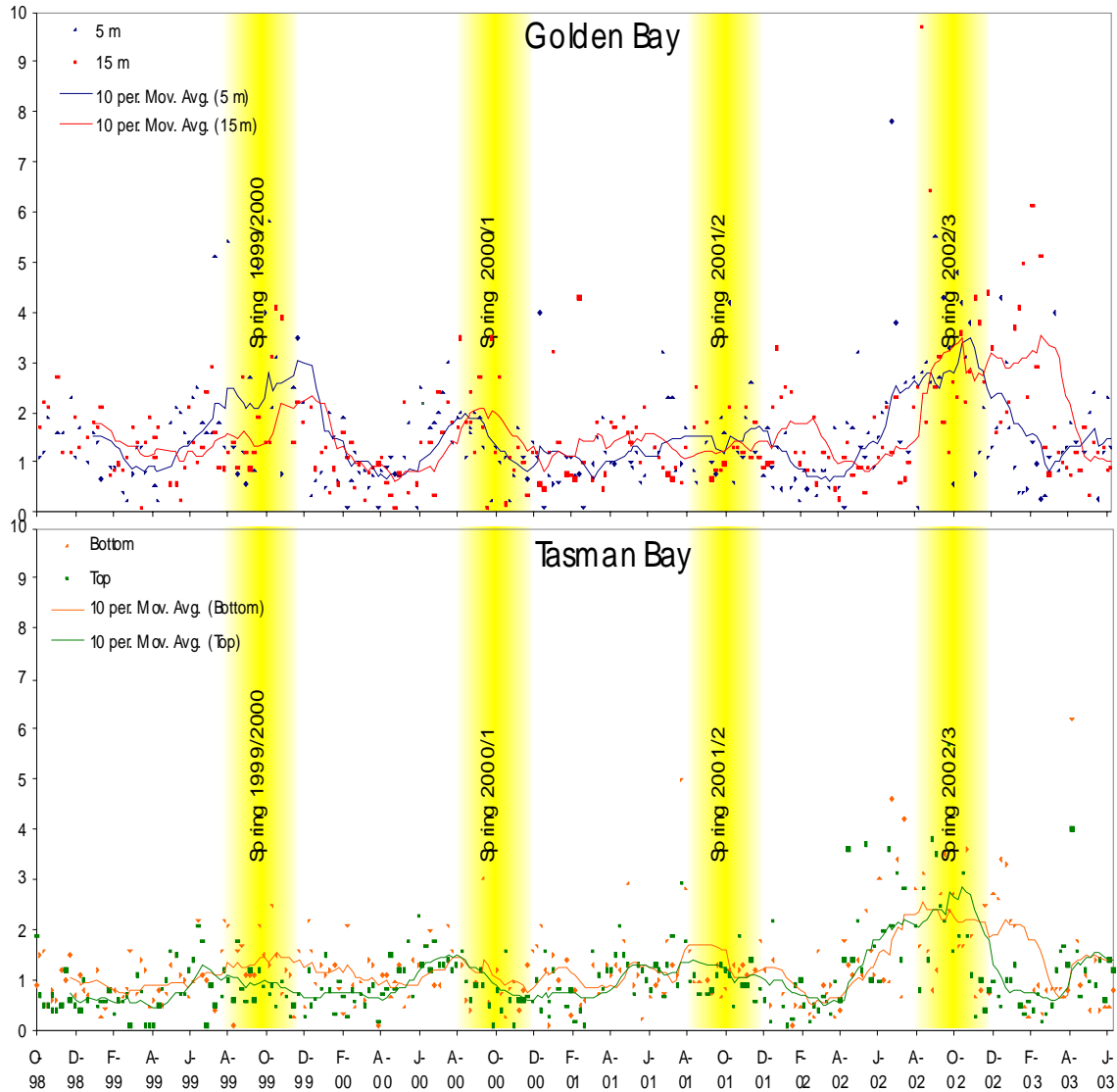
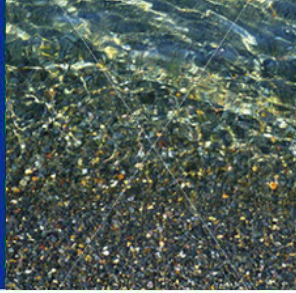
# Sediment effects



## Suspended Solids content of near-bottom waters Tasman Bay 24-25 Feb 1999



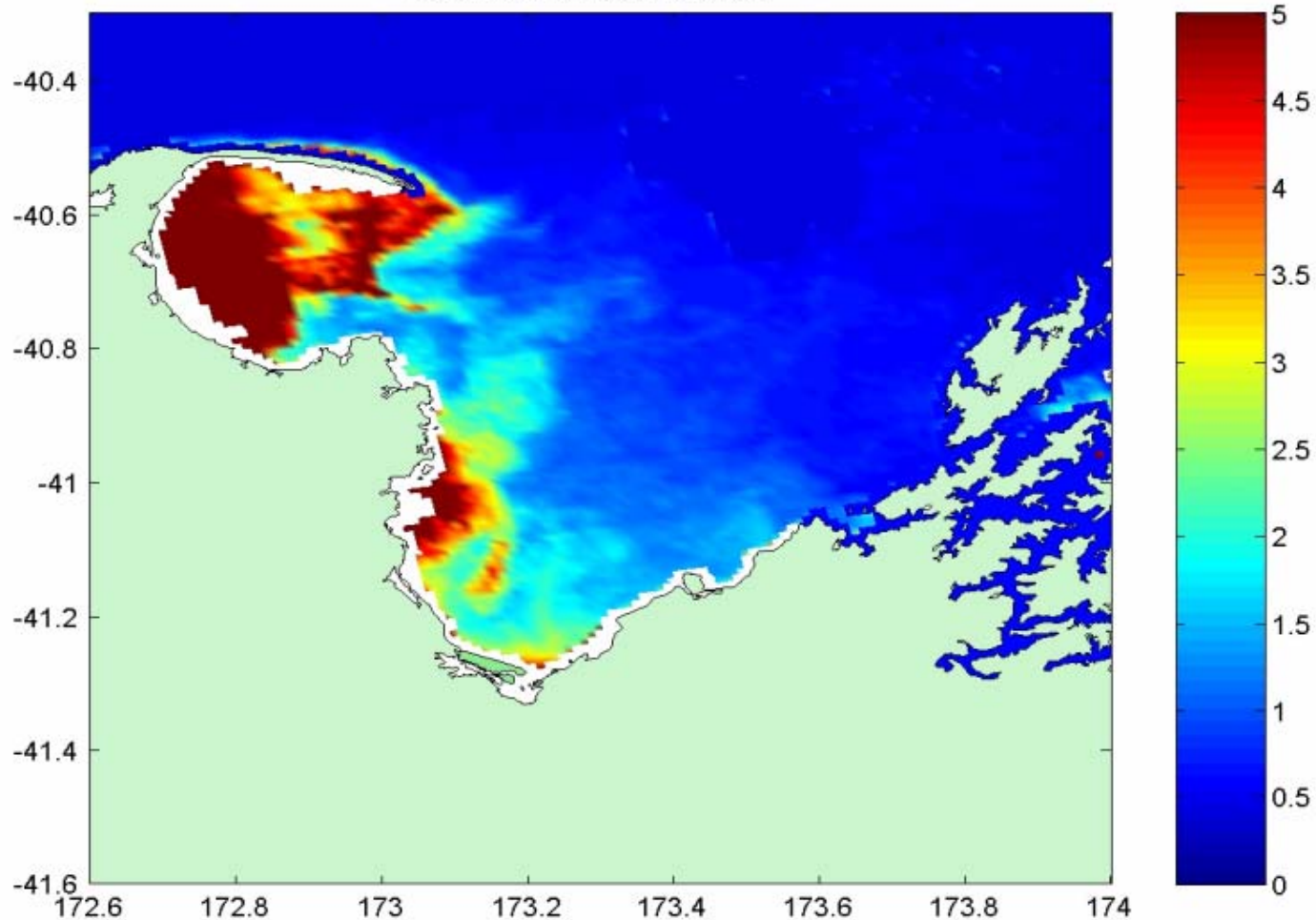
# Long term data collection



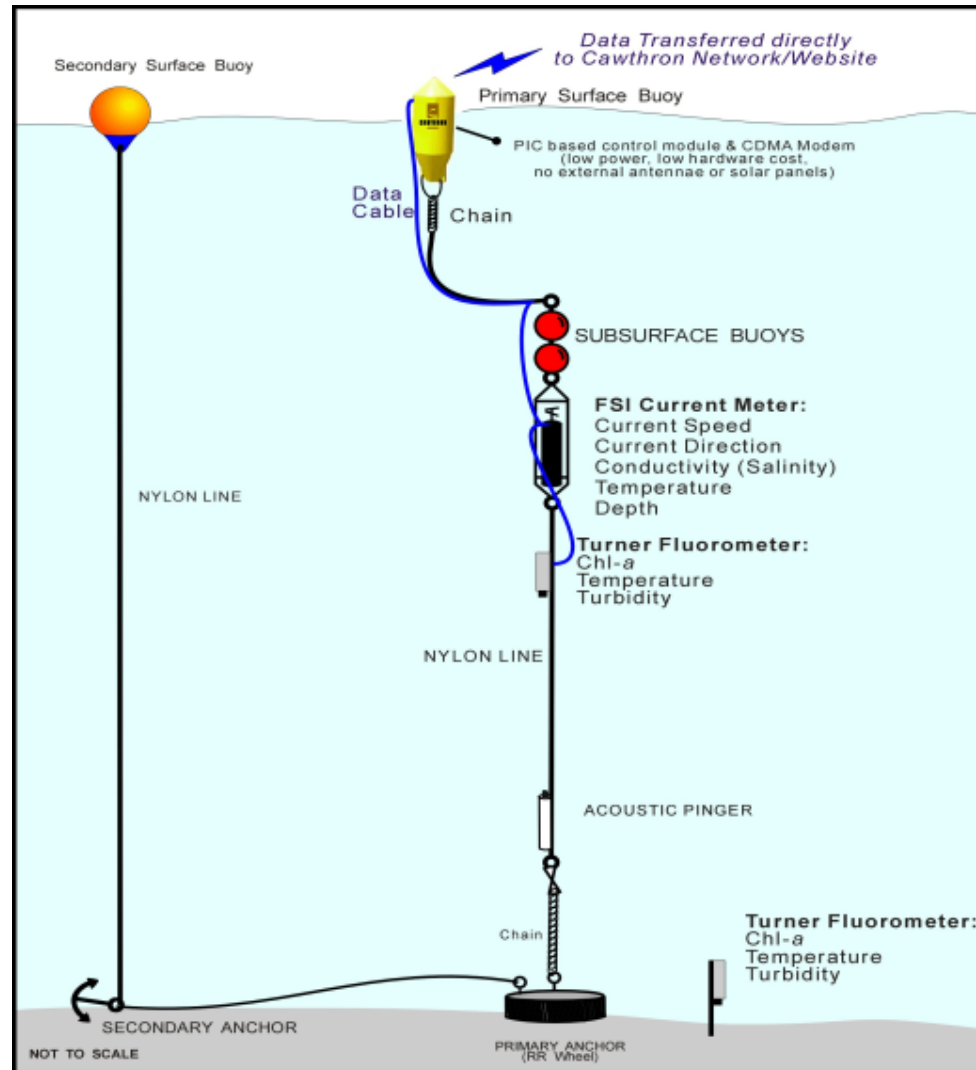
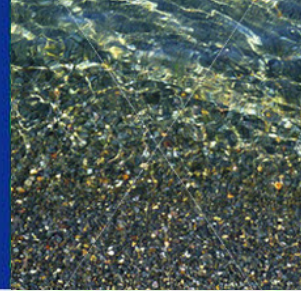
# Seawifs chlorophyll July 2003



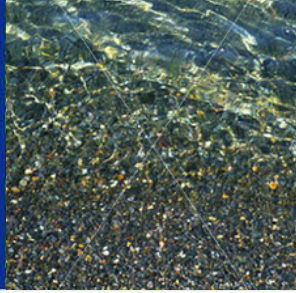
Chla Data as at: 07-Jul-2003



# Buoy-mounted data sensors



# LT *in situ* data collection, satellite imagery, coastal models

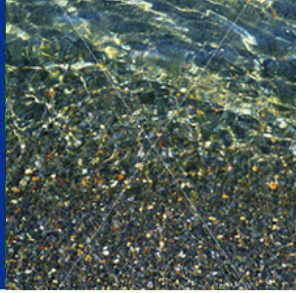


- o To develop an integrated system of tools that can be used to assess and possibly forecast marine productivity based on remotely-sensed information

## Uses...

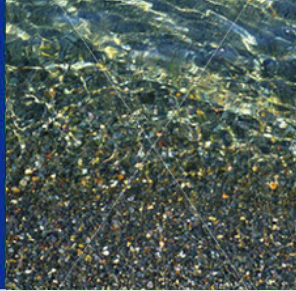
- o Validation of ecosystem components of coastal model
- o Management decisions based on real-time environmental conditions
- o Monitoring (e.g. storm effects, aquaculture effects)
- o Predictions based on climate/weather forecasting

# Nutrient discharge from the Motueka catchment

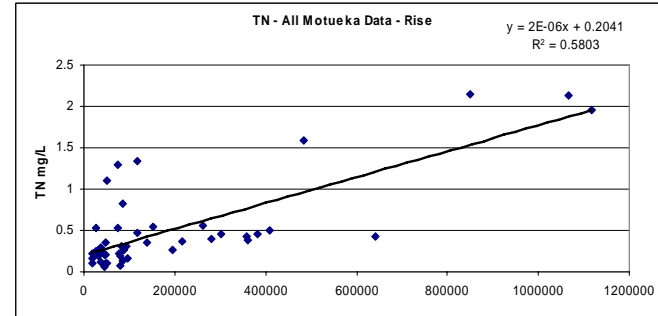


- o Dissolved inorganic nitrogen (nitrate, nitrite and ammonia-N)
- o Total nitrogen
- o Dissolved reactive phosphorus
- o Total phosphorus
- o Dissolved reactive silicate
- o Also looking at faecal indicator bacteria
- o Will make similar calculations for suspended solids

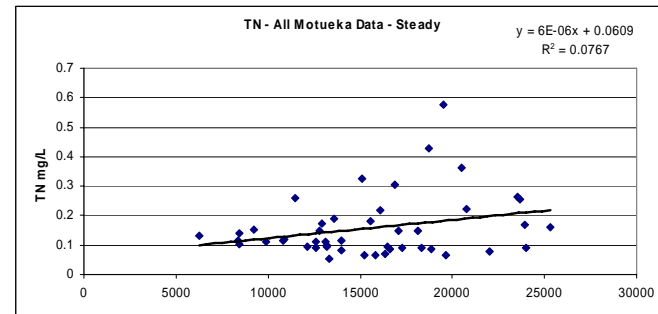
# River flow vs concentration



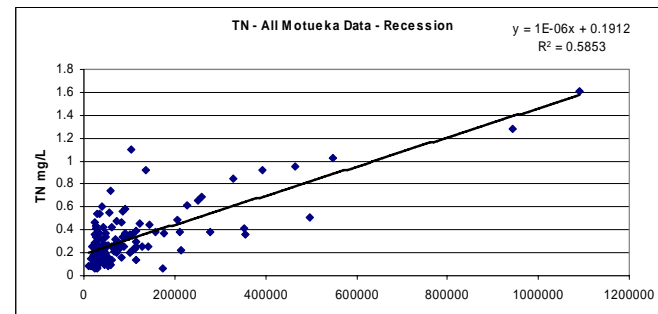
- o Woodmans Bend vs Woodstock
- o Summer vs winter
- o Steady (low) vs Rising vs receding flows



Steady



Rising



Receding