The Motueka River Plume Ecosystem

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Work to date describes:

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

7-8 March 2001

9-10 May 2001
Nutrients vs salinity

A. Highest dissolved nutrient concentrations associated with low salinities
Primary production

Phytoplankton

Benthic diatoms
Food for benthic filter feeders

- Planktonic microalgae: Primary food component during phytoplankton blooms; e.g. the winter/spring diatom bloom and summer dinoflagellate blooms.

- 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

On seabed

0.5 m

2 m

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

(a)  
(b)
Sediment effects

- 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

- Total Suspended solids
- Inorganic
- Organic
Long term data collection

![Graphs showing data collection over time for Golden Bay and Tasman Bay.](image)

The graphs illustrate data collection for Golden Bay and Tasman Bay from Spring 1999/2000 to Spring 2002/3. The graphs show data points for 5 m and 15 m depth levels, with moving averages over 10 periods. The graphs are annotated with dates and months, indicating the collection periods.
Seawifs chlorophyll July 2003
Buoy-mounted data sensors

- Secondary Surface Buoy
- Data Cable
- Chain
- Primary Surface Buoy
- PIC based control module & CDMA Modem (low power, low hardware cost, no external antennae or solar panels)
- FSI Current Meter:
  - Current Speed
  - Current Direction
  - Conductivity (Salinity)
  - Temperature
  - Depth
- Turner Fluorometer:
  - Chi-a
  - Temperature
  - Turbidity
- Nylon Line
- Subsurface Buoys
- Acoustic Pinger
- Secondary Anchor
- Primary Anchor

Data Transferred directly to Cawthron Network/Website

NOT TO SCALE
LT *in situ* data collection, satellite imagery, coastal models

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

**Uses...**

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

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

- Woodmans Bend vs Woodstock

- Summer vs winter

- Steady (low) vs Rising vs receding flows