

Saline Dynamics From Different Environmental Flow Regimes on the Shoalhaven River, Australia

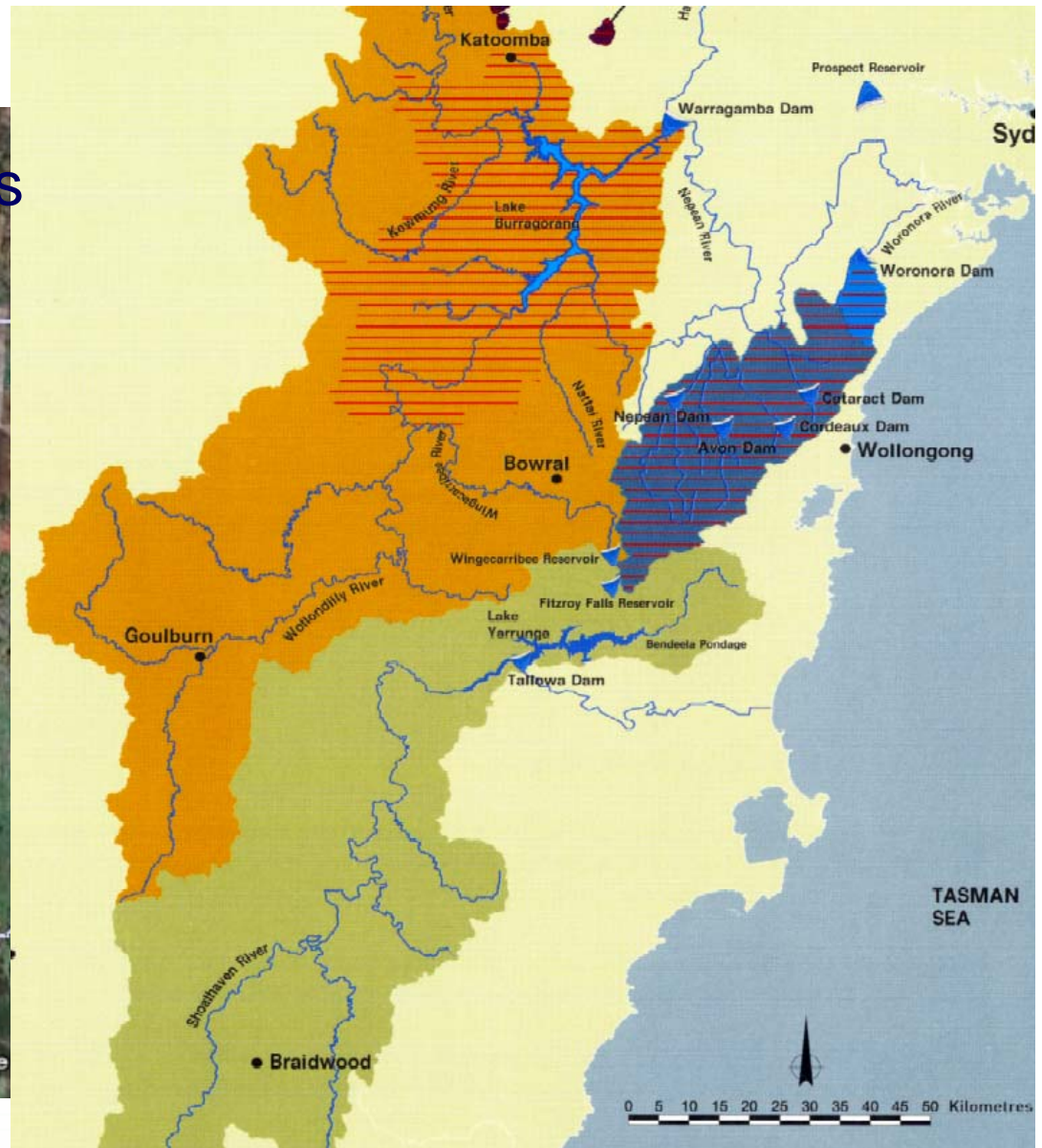
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Where is it?

- Total transfer volumes
- 150 GL for year to June 06
- 175 GL for year to June 07
- Sydney's Supply ~600 GL / year



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The Question?

- What is the influence on the saline dynamics of the Shoalhaven Estuary with differing discharges from Tallowa Dam (*different amounts taken to Sydney*)
- Not just a volumetric problem because both discharge and duration effect the saline conditions
- A “natural” scenario is used as a base case for comparing improvements



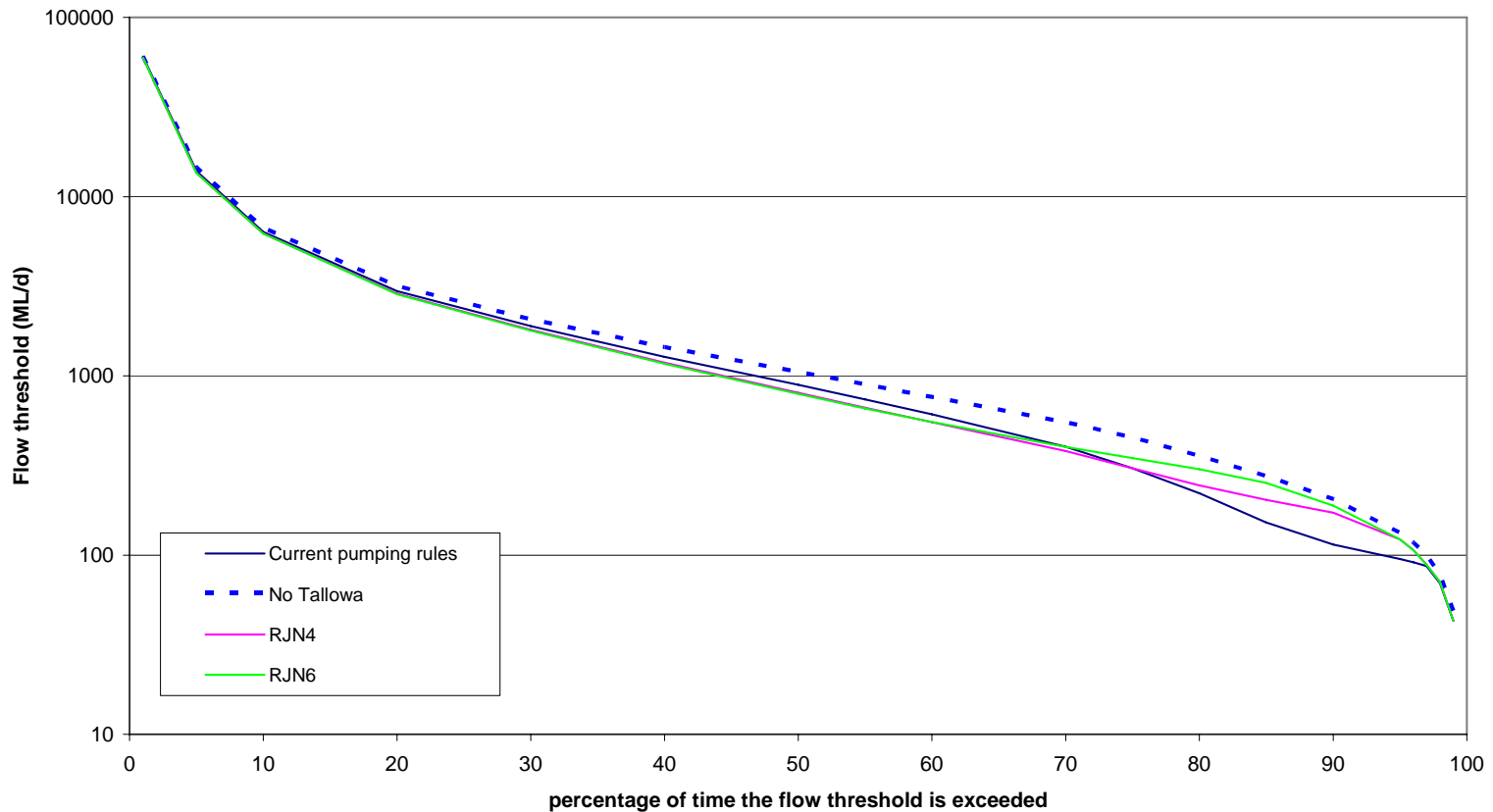
The Scenarios?

- **No Tallowa (the natural case)**
 - What flows down the river goes directly to the estuary
- **The existing conditions**
 - All inflows < 90ML/day must be released
 - Inflows > 90 ML/day are not protected
- **90/30 Scenario (RJN4)**
 - Flows up to the 90th percentile must be fully released
 - Flows > than the 90th %ile must have 30% released
- **80/20 Scenario (RJN6)**
 - Flows up to the 80th percentile must be fully released
 - Flows > than the 80th %ile must have 20% released



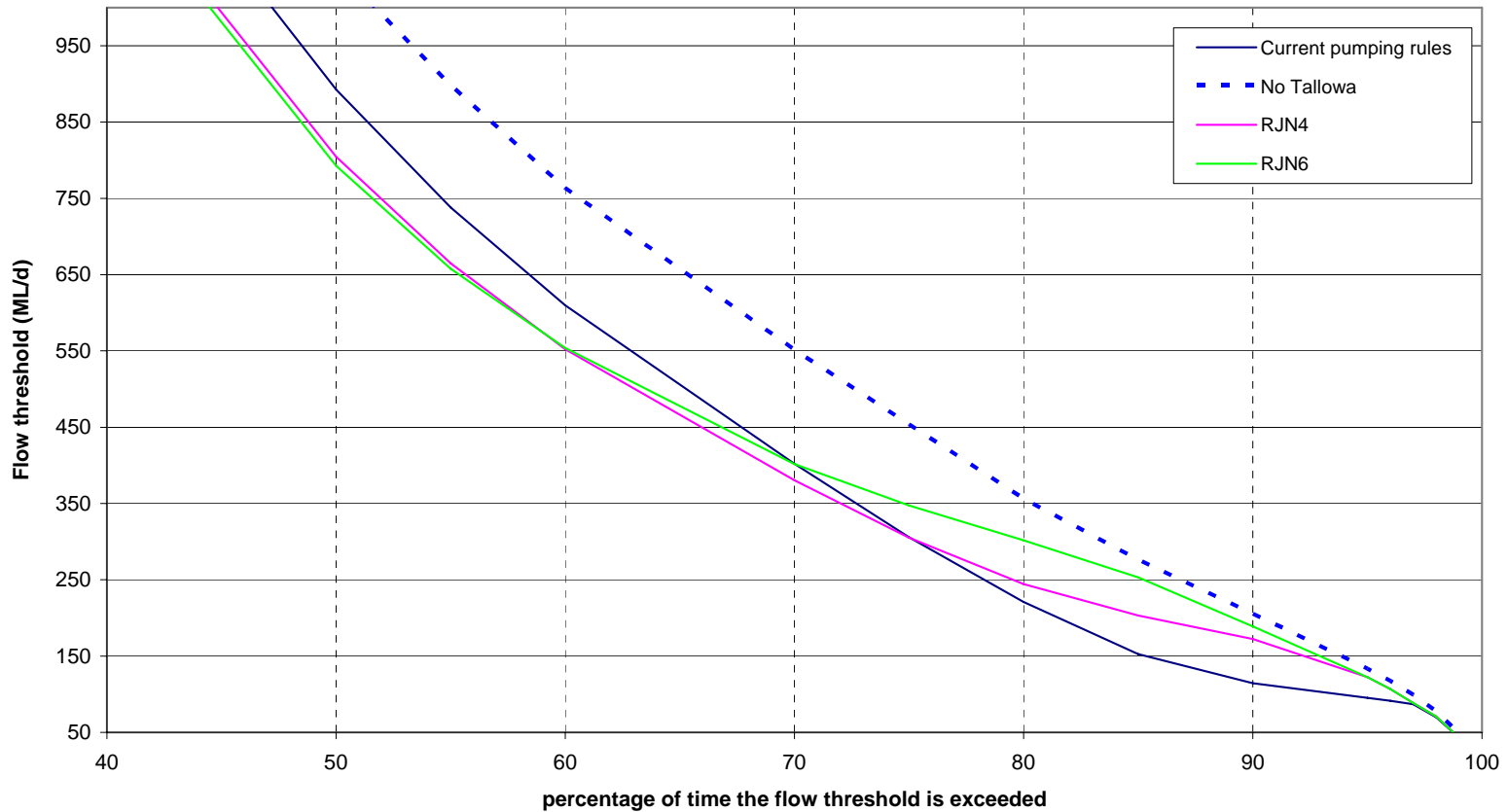
Flow Down the River?

Flow exceedence statistics at Burrier 1909-2004



Statistics of Flow

Flow statistics at Burrier 1909-2004

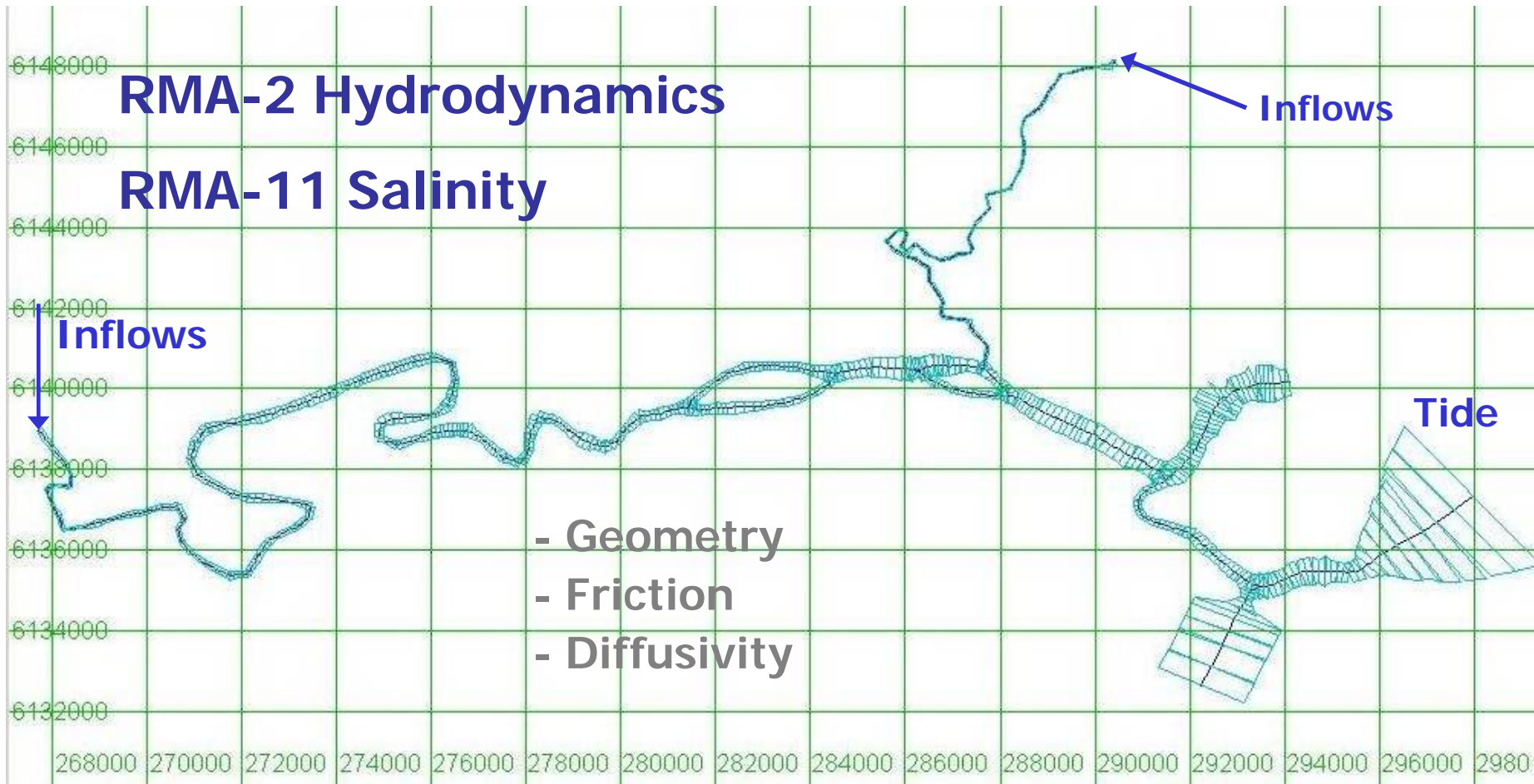


How to Compare?

- The saline structure of an estuary continually varies with natural changes in dry and wet periods.
- Calibrate a hydrodynamic model and a saline dynamic model
- Run long simulations predicting the salinity at all locations throughout the estuary on an hourly basis for long periods (~100 years)
- Compare scenarios using salinity statistics



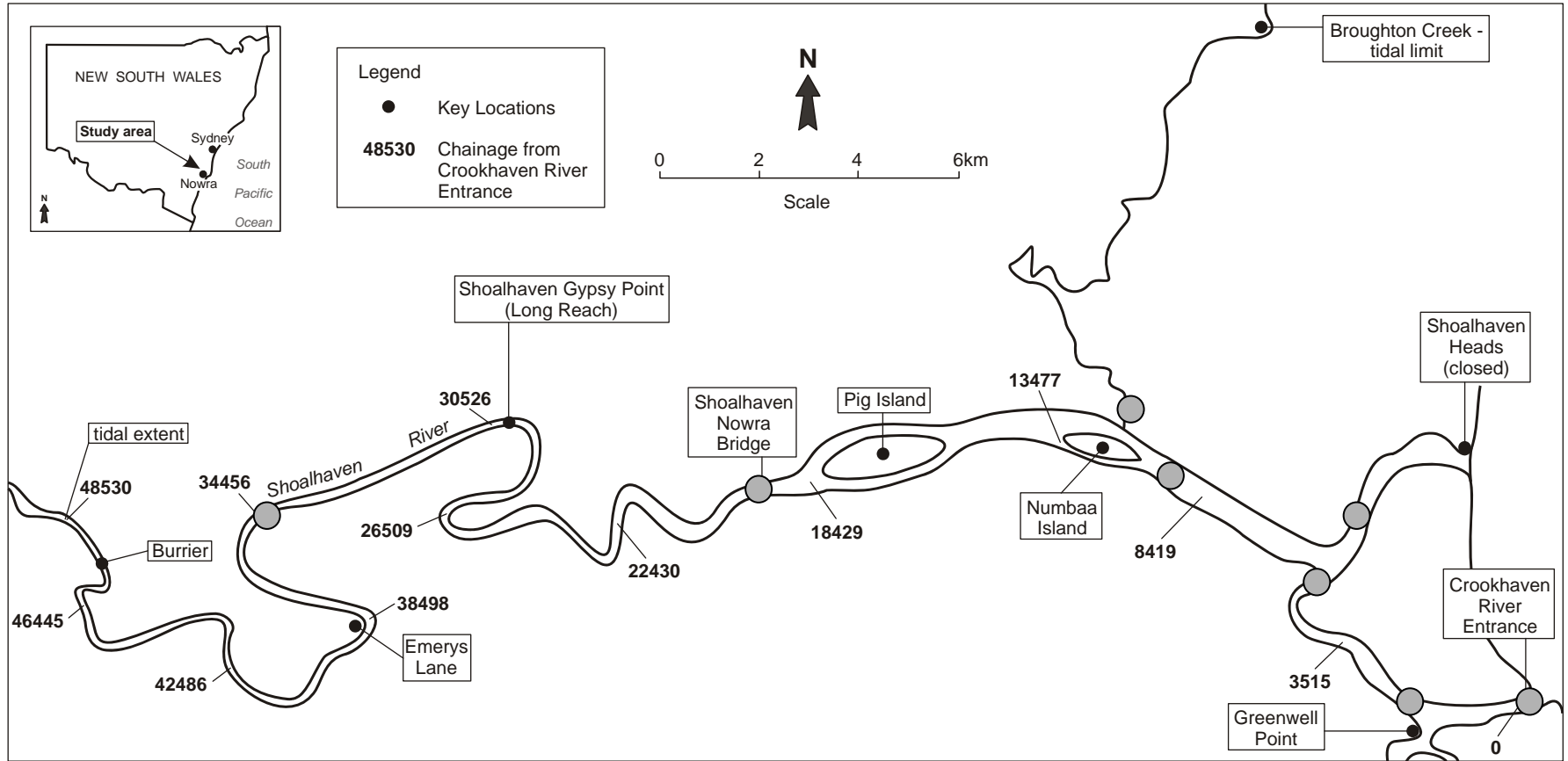
Modelling of the Estuary



Hydrodynamic Calibration

Flow Gauging

- One day, 21 Sept 2006



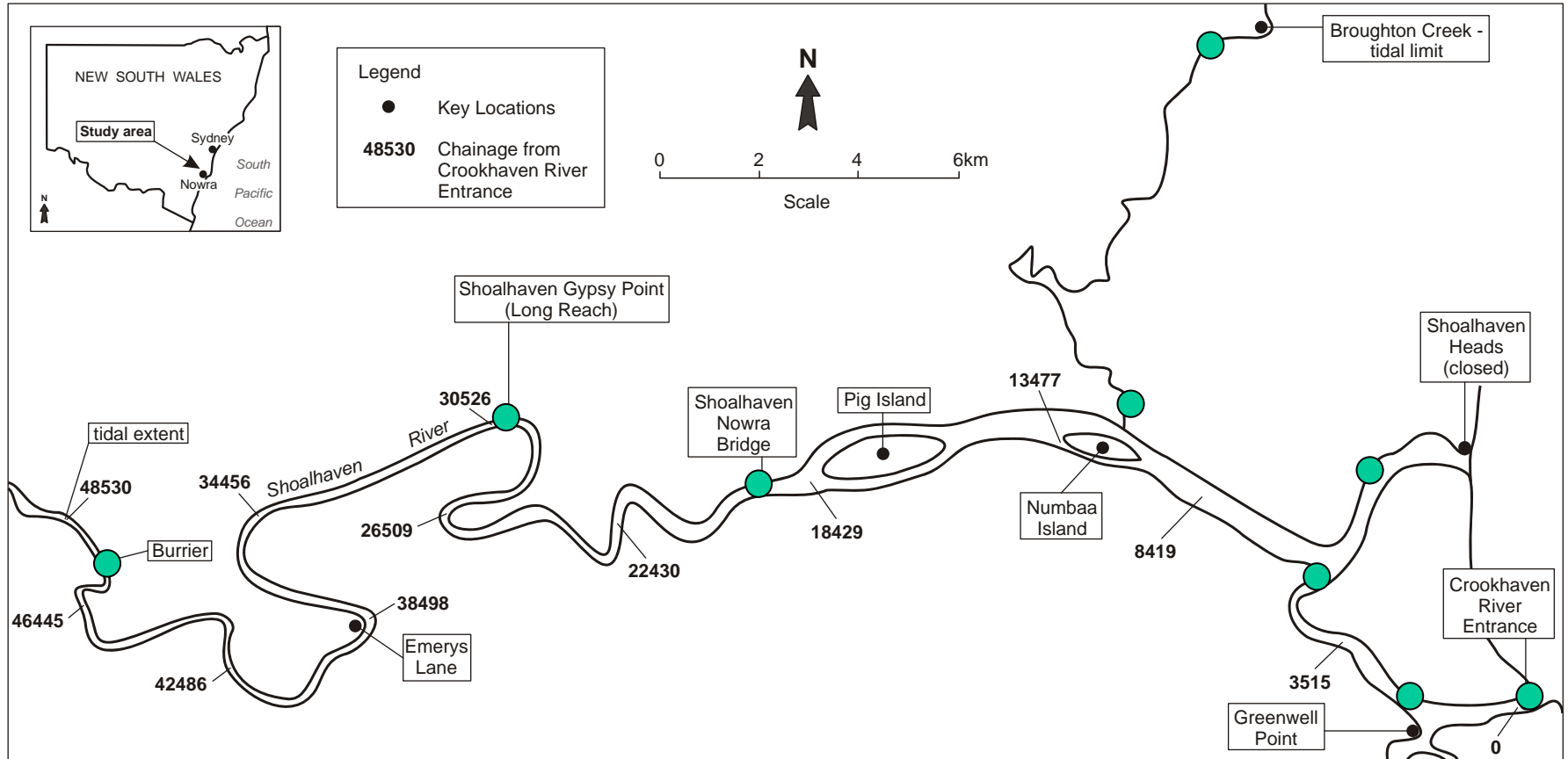
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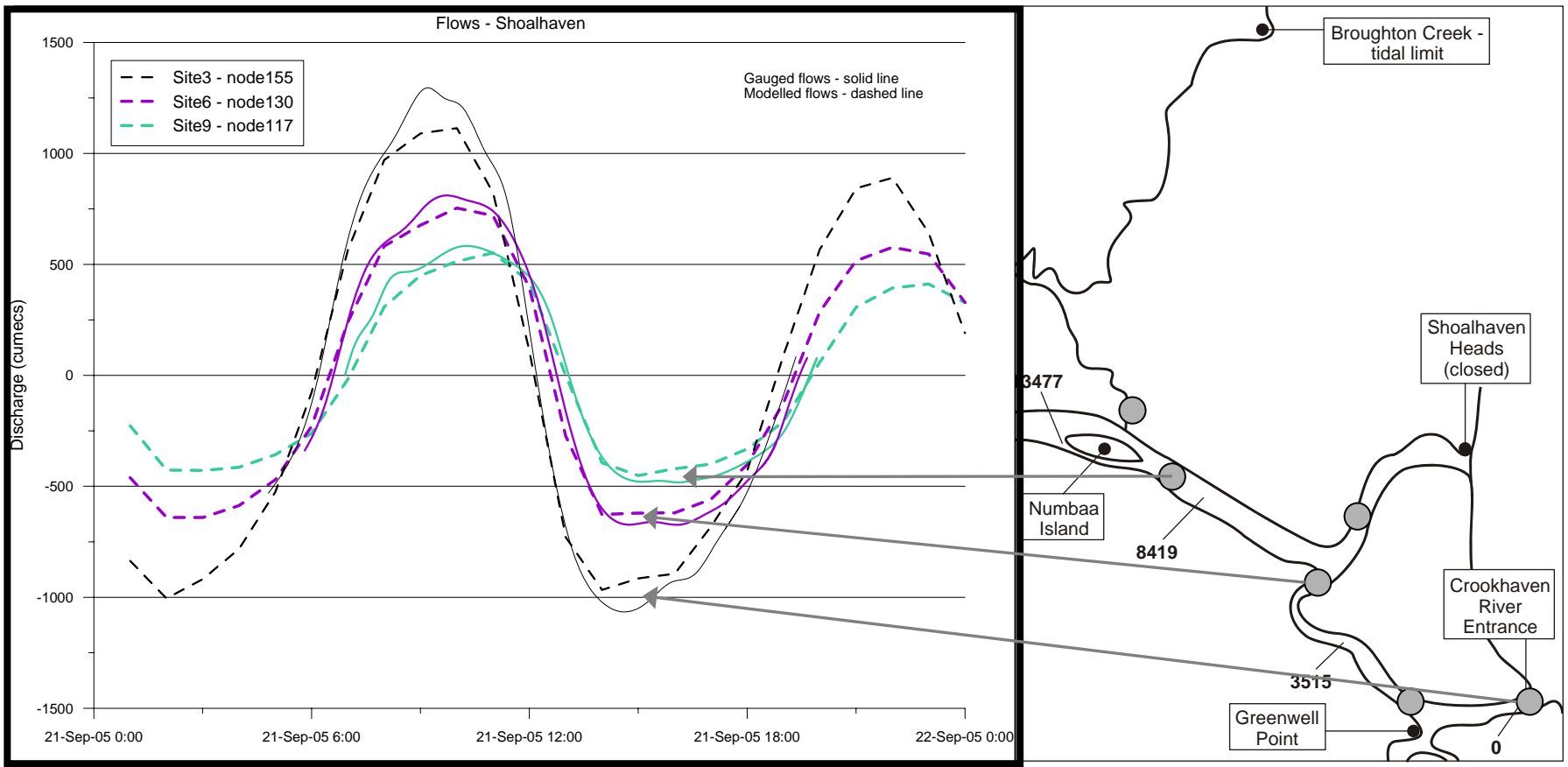
Hydrodynamic Calibration

Water Elevation

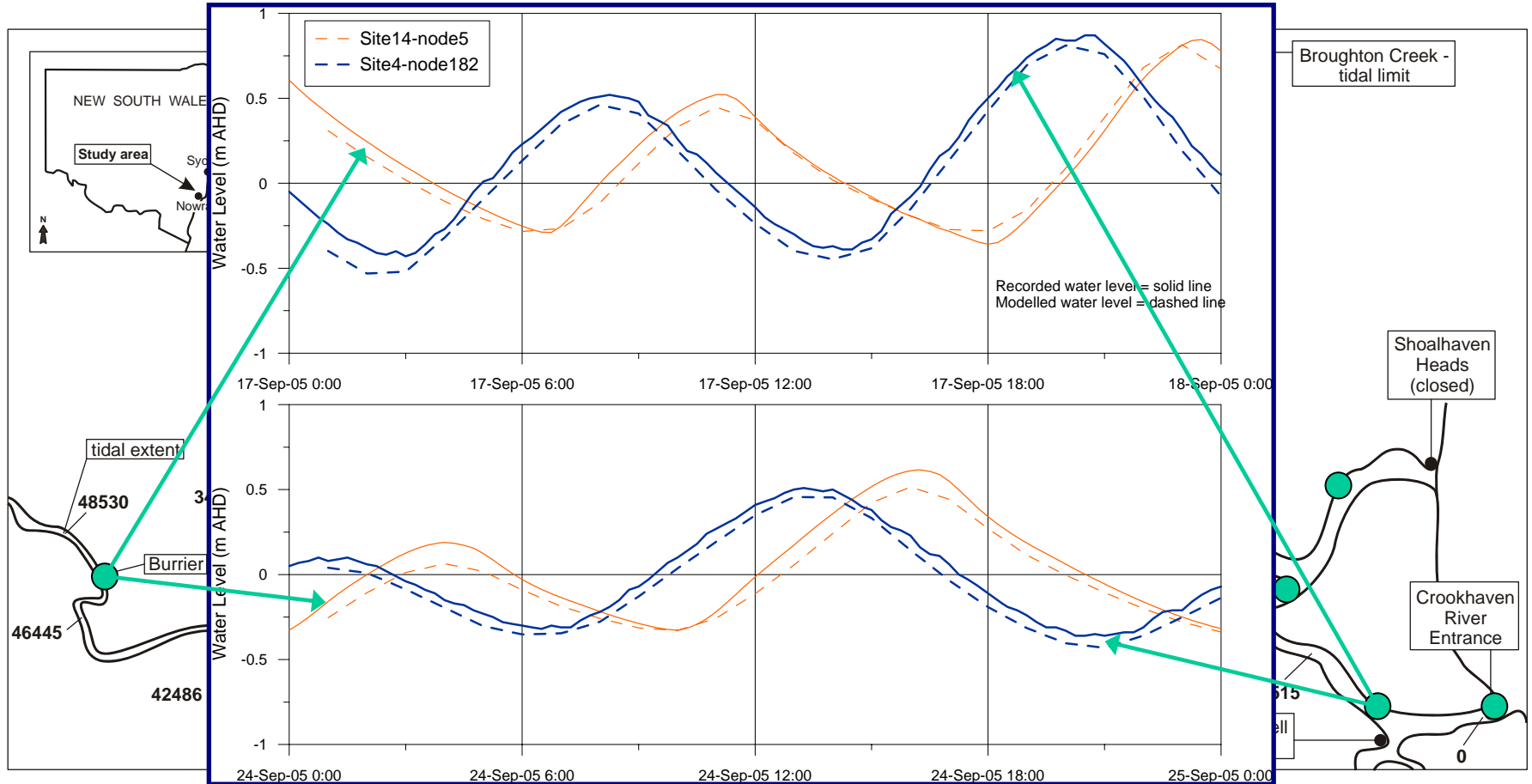
- 9 months 2005 – 2006
- 15 minute data



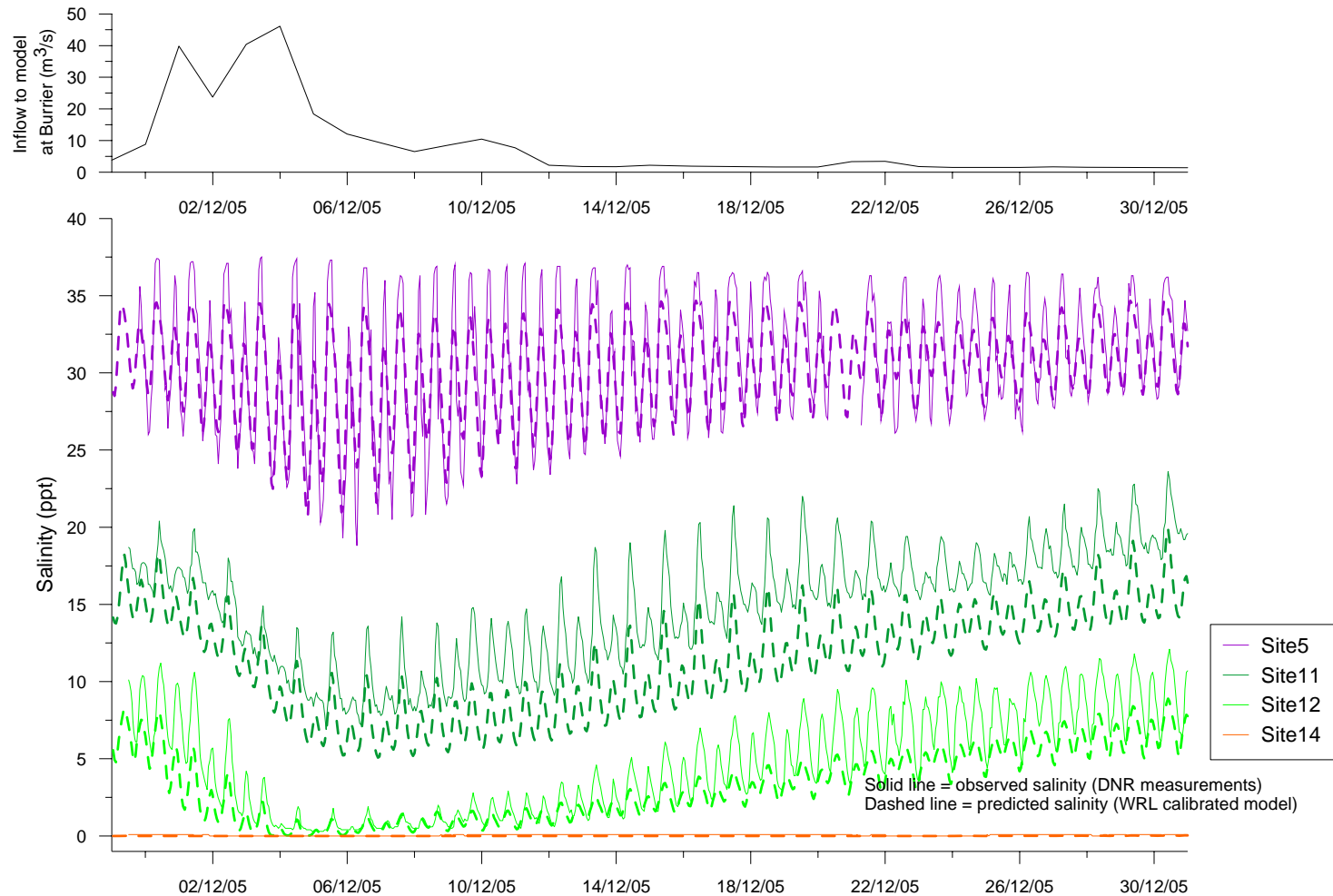
Discharges



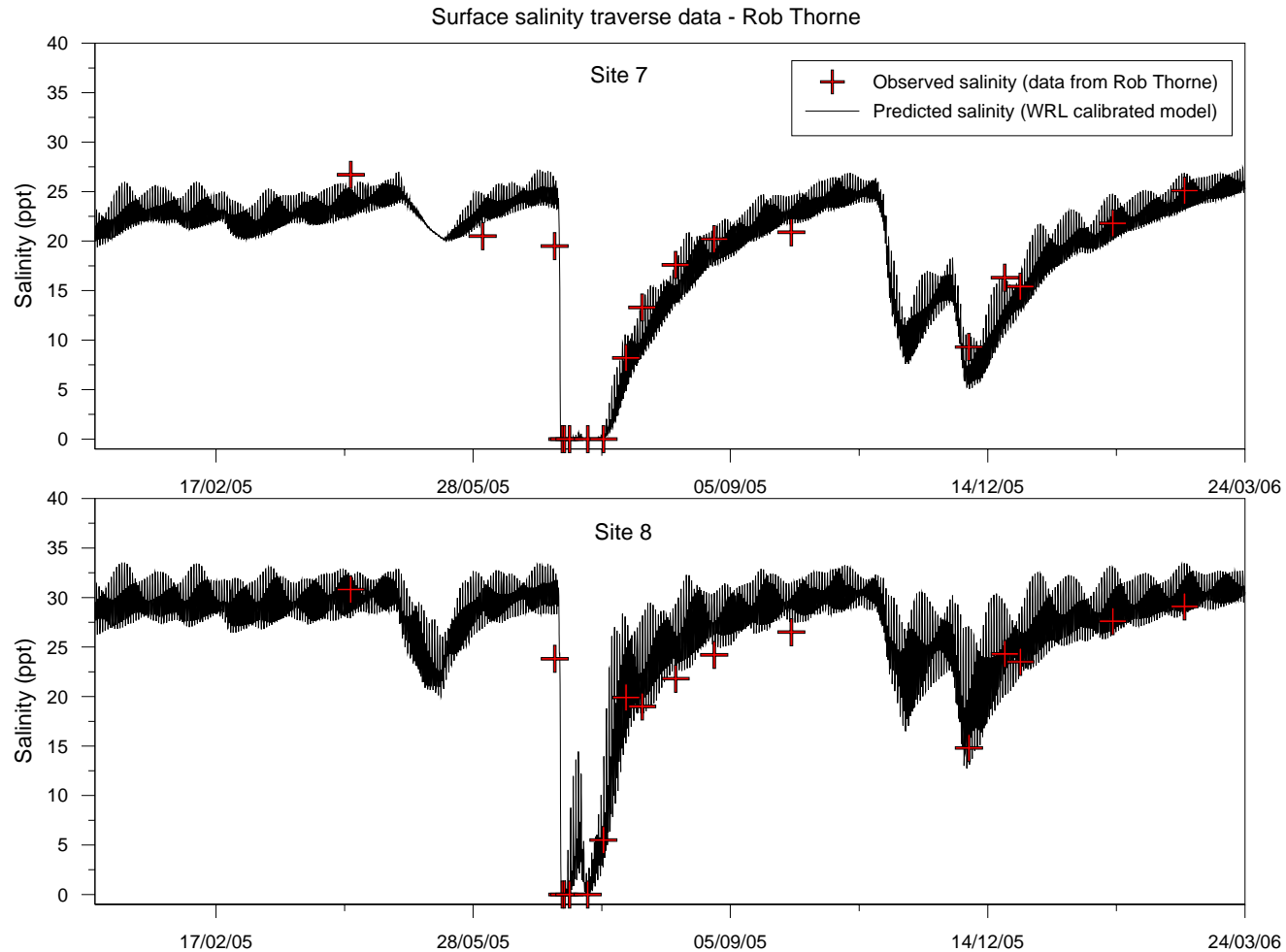
Water Levels



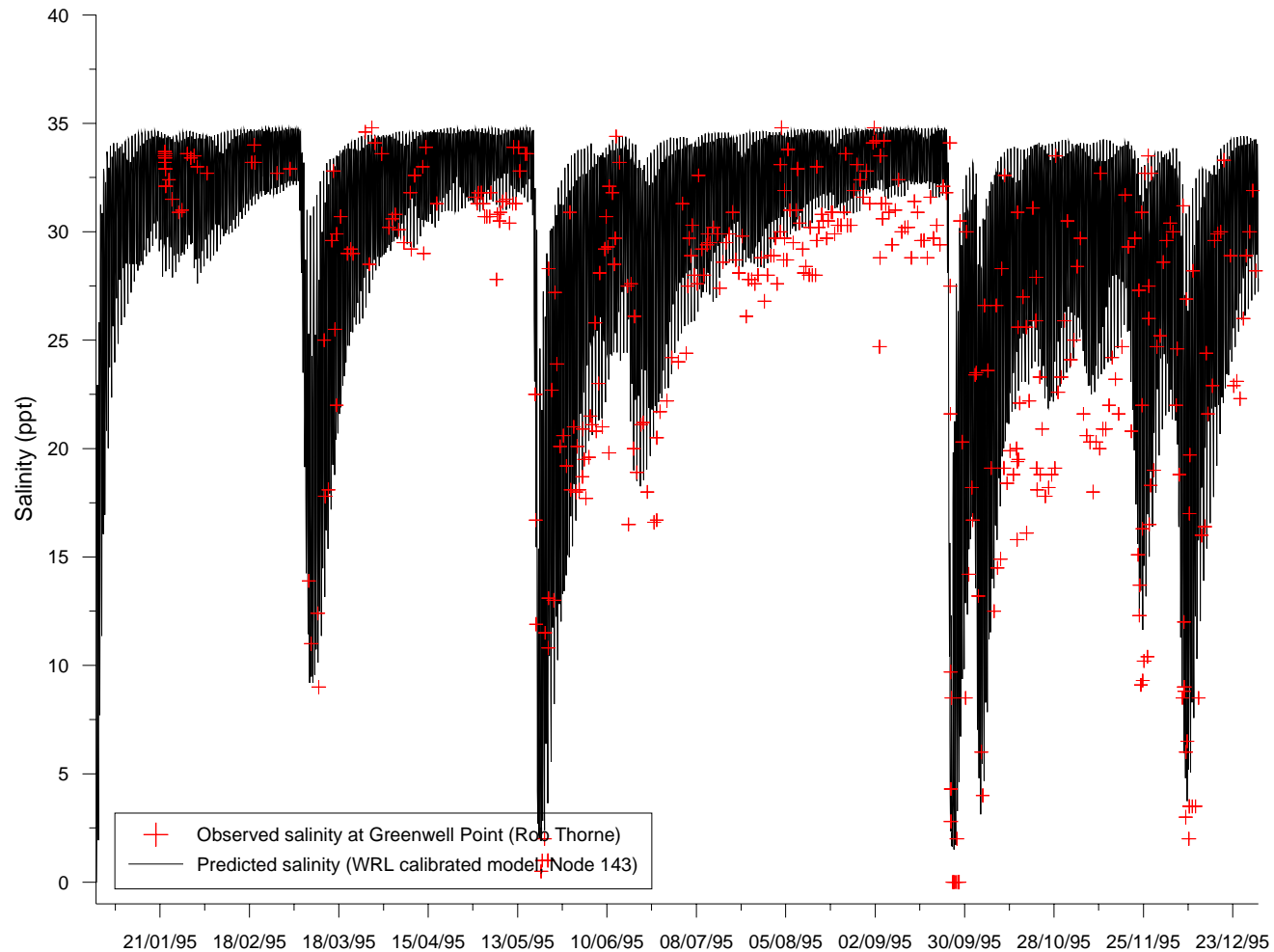
Salinity - Calibration



Salinity - Verification



Salinity - Verification



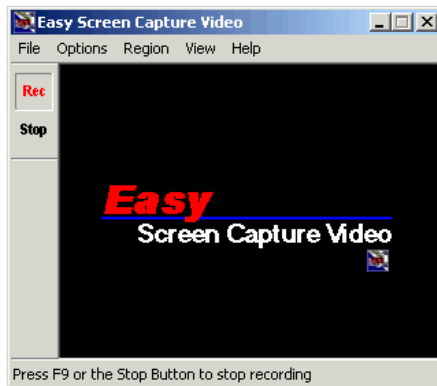
So How Does the Estuary Behave?

Conditions in the Natural Case – Hourly February to March 2002



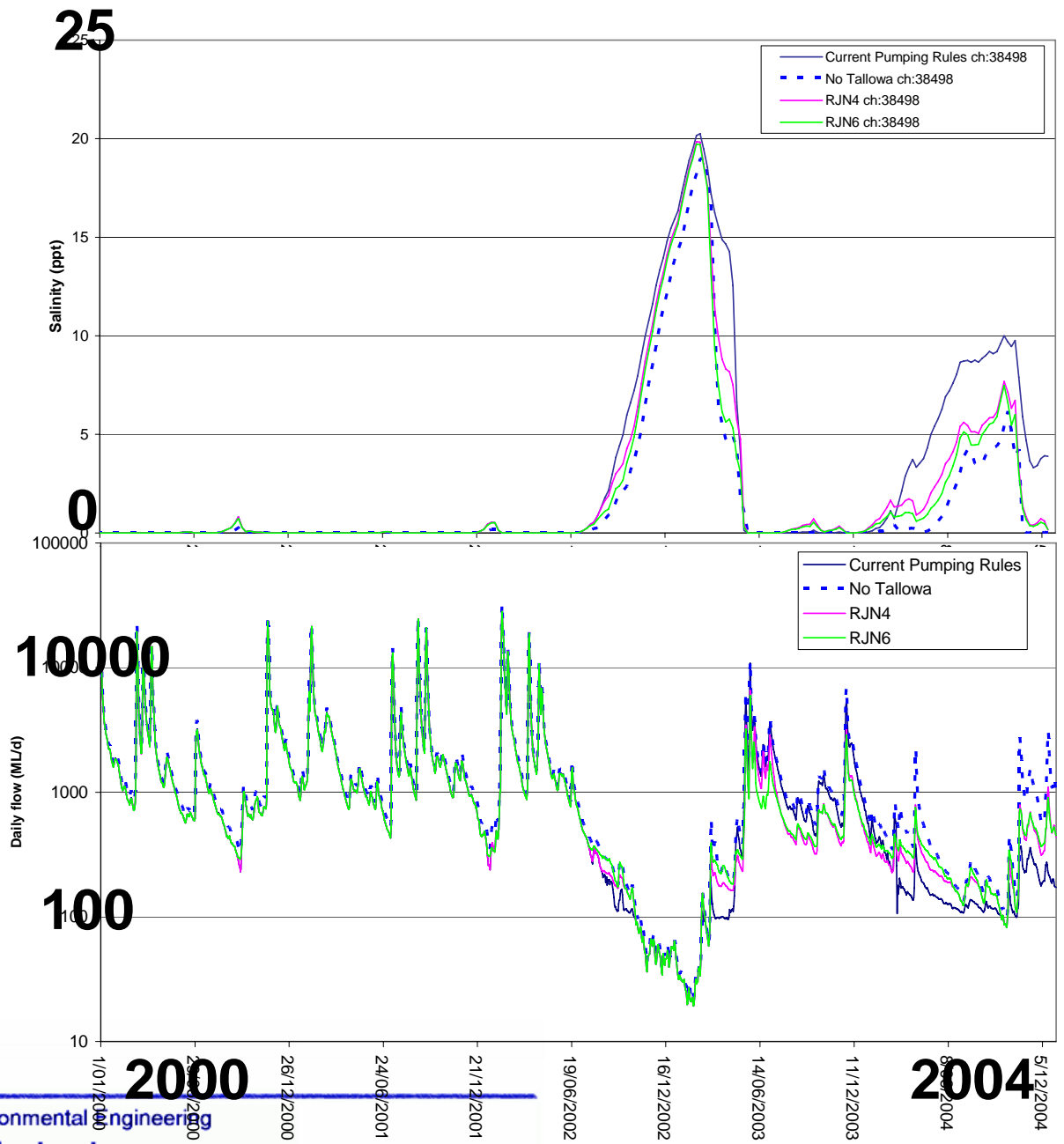
So How Does the Estuary Behave?

Conditions in the Natural Case Daily Averages, All of 2002



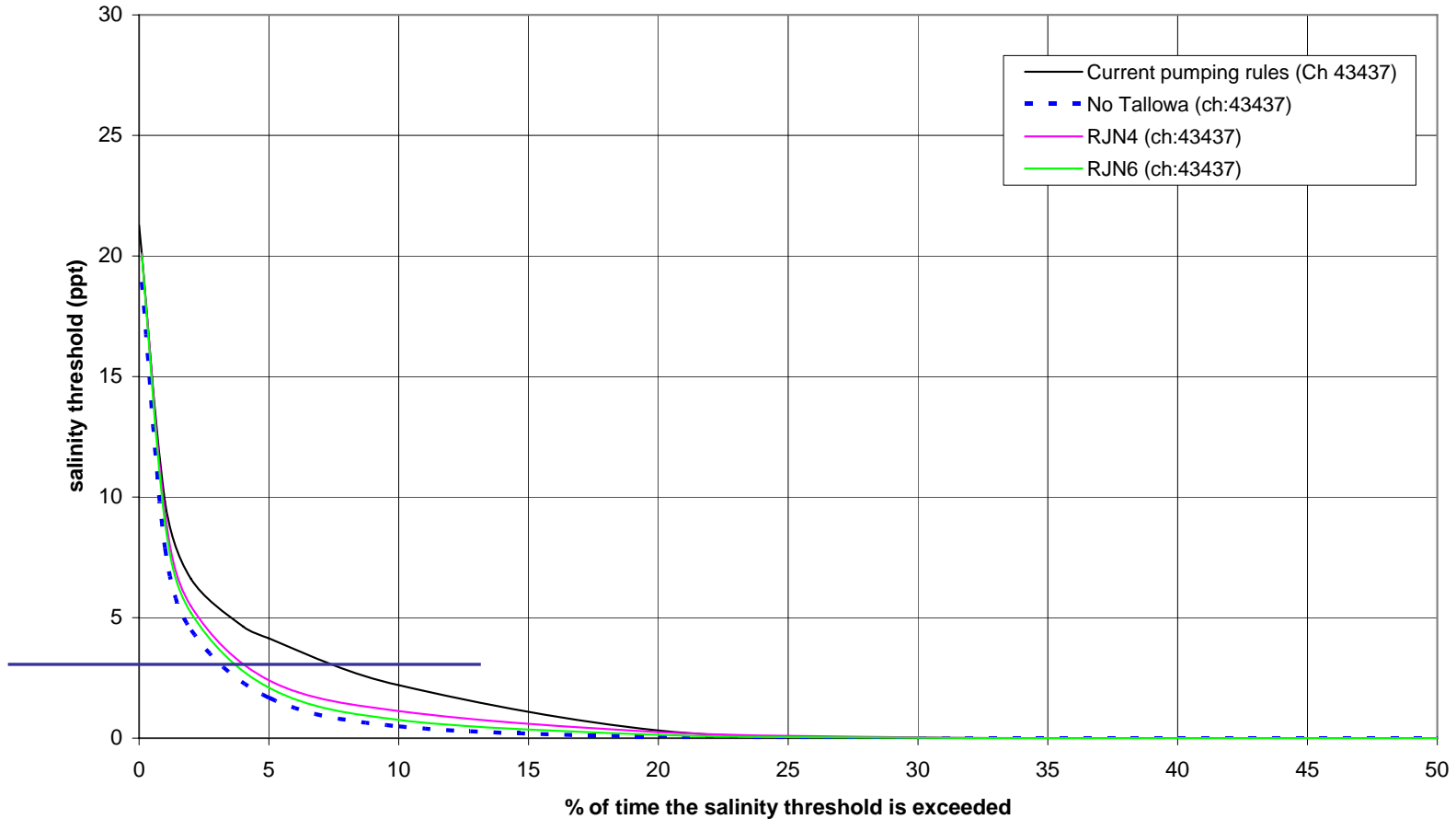
Time series of weekly average salinity 10km downstream of Burrier

Salinity at a Location 10km d/s from the Tidal Limit



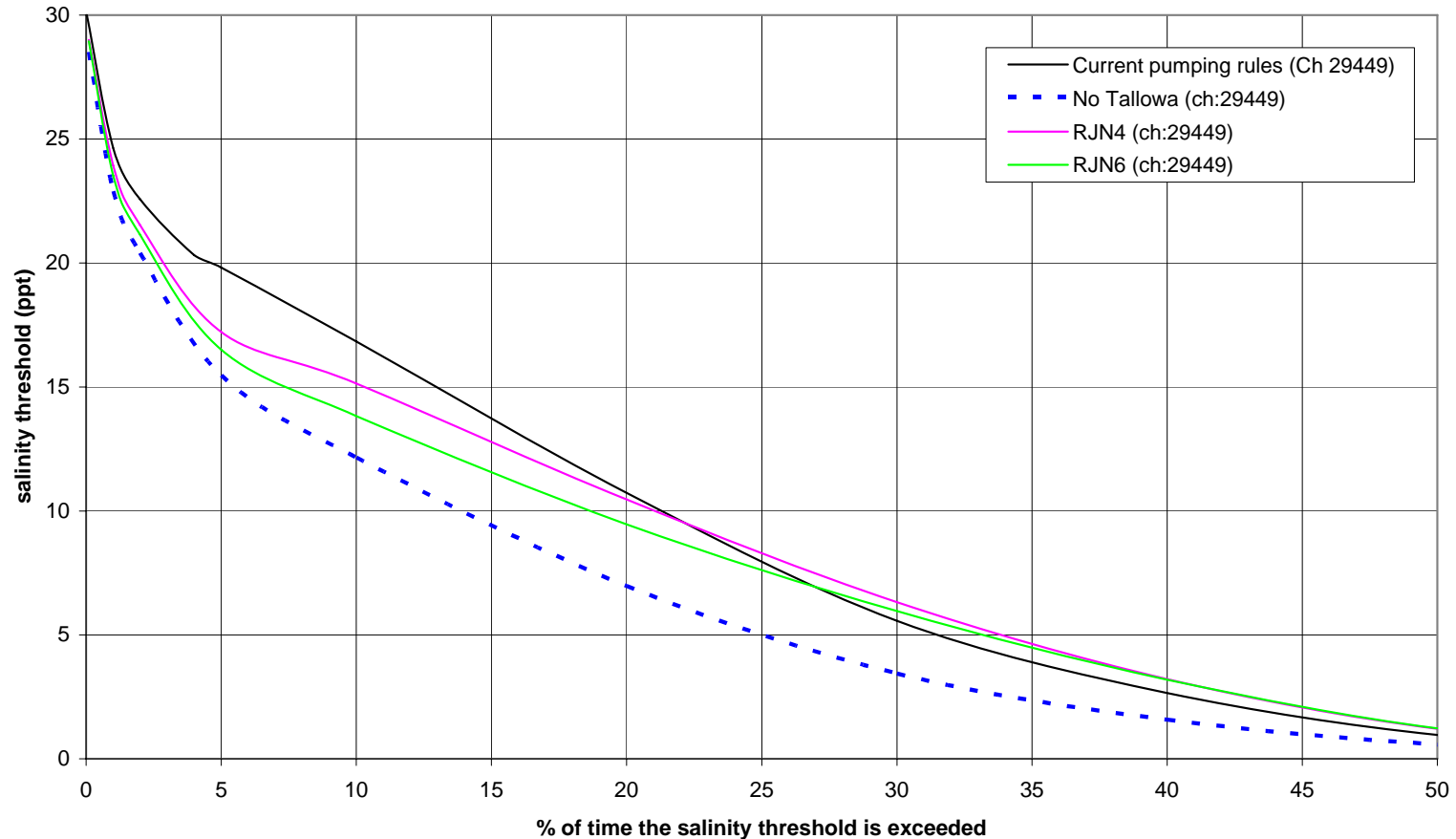
Salinity Distribution, 5km d/s Tidal Limit

5km downstream from Burrier



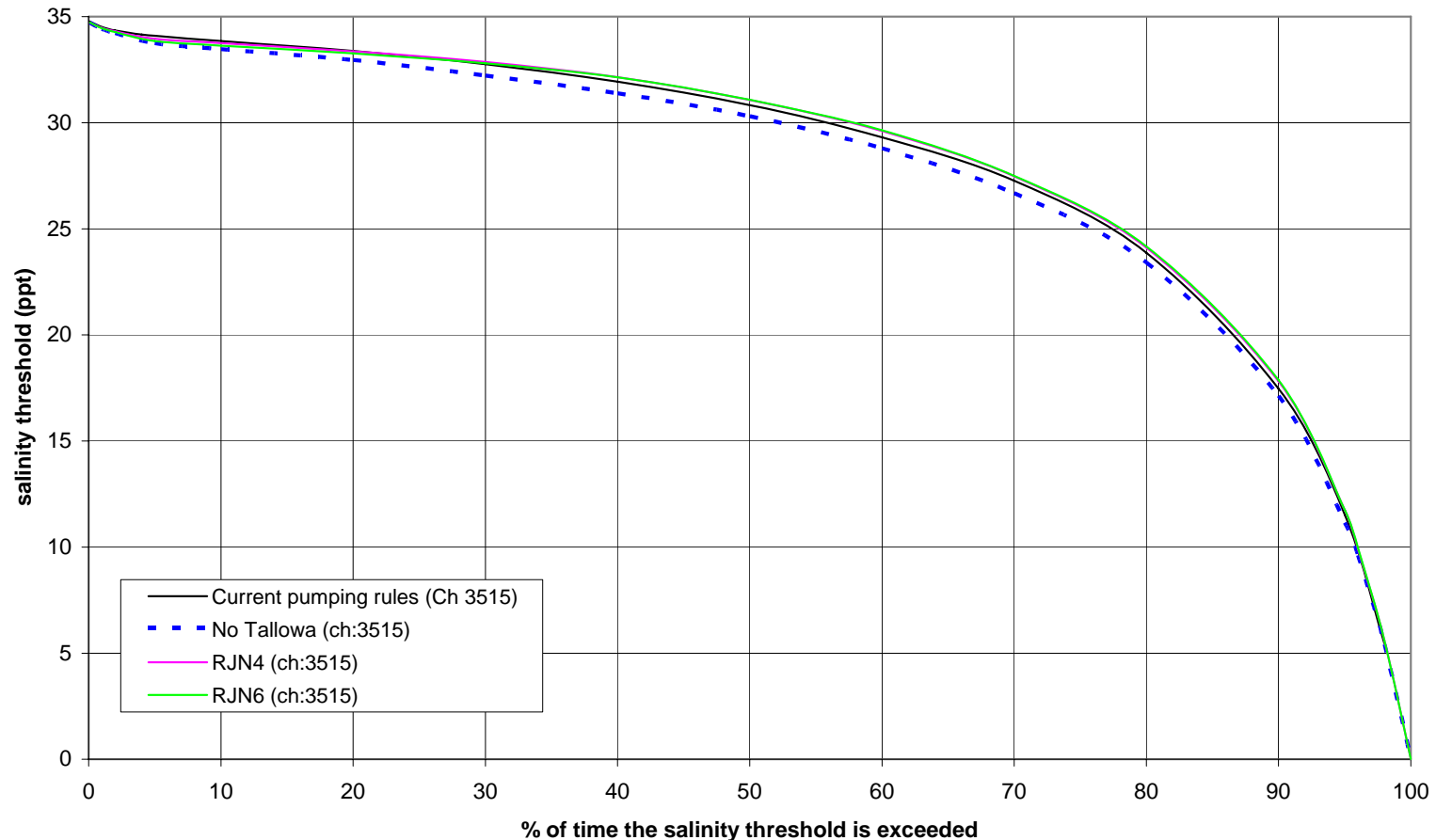
Salinity Distribution, 20km d/s Tidal Limit

Gypsy Point Longreach (20km downstream from Crookhaven Heads)

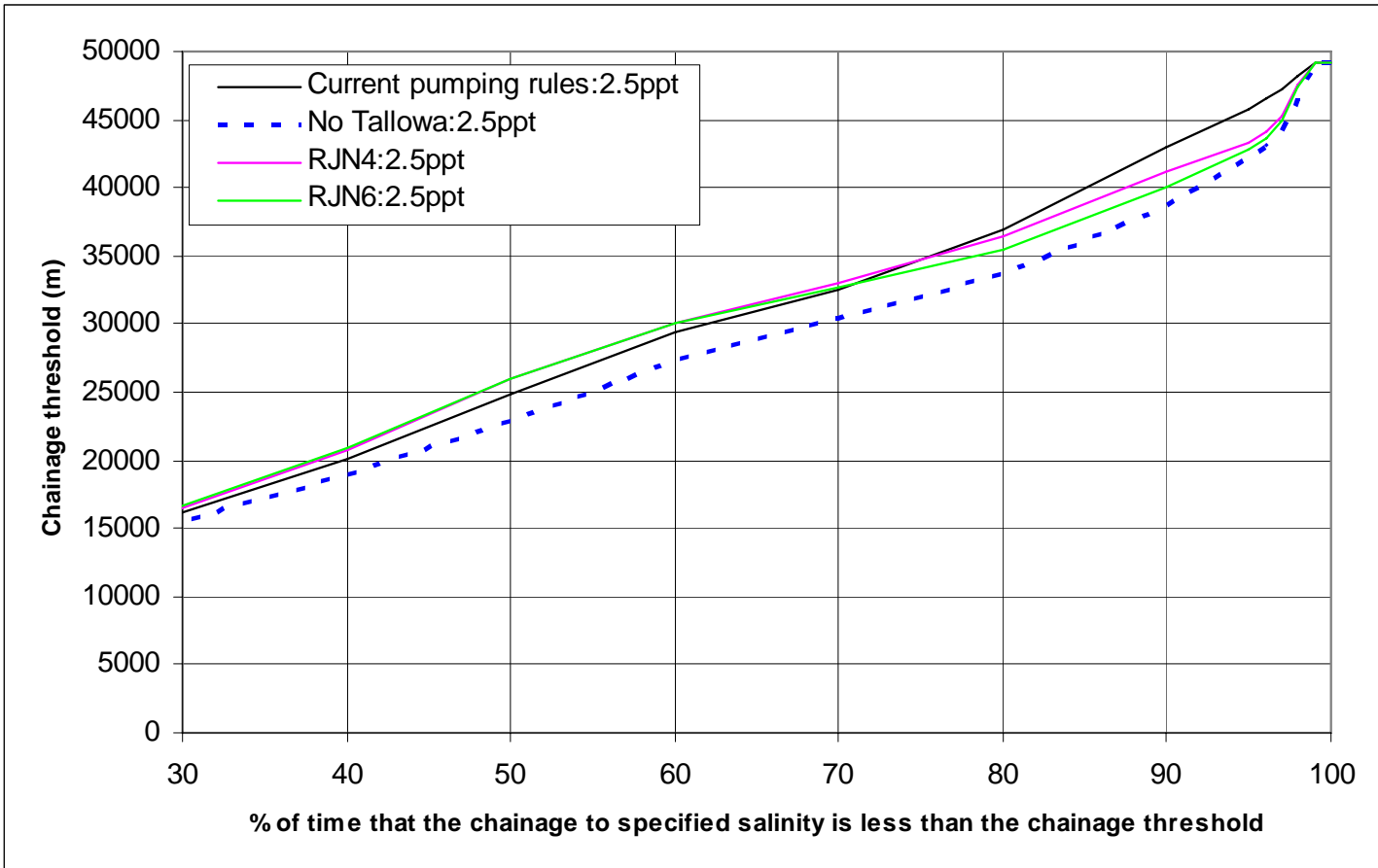


Salinity Distribution, Greenwell Pt

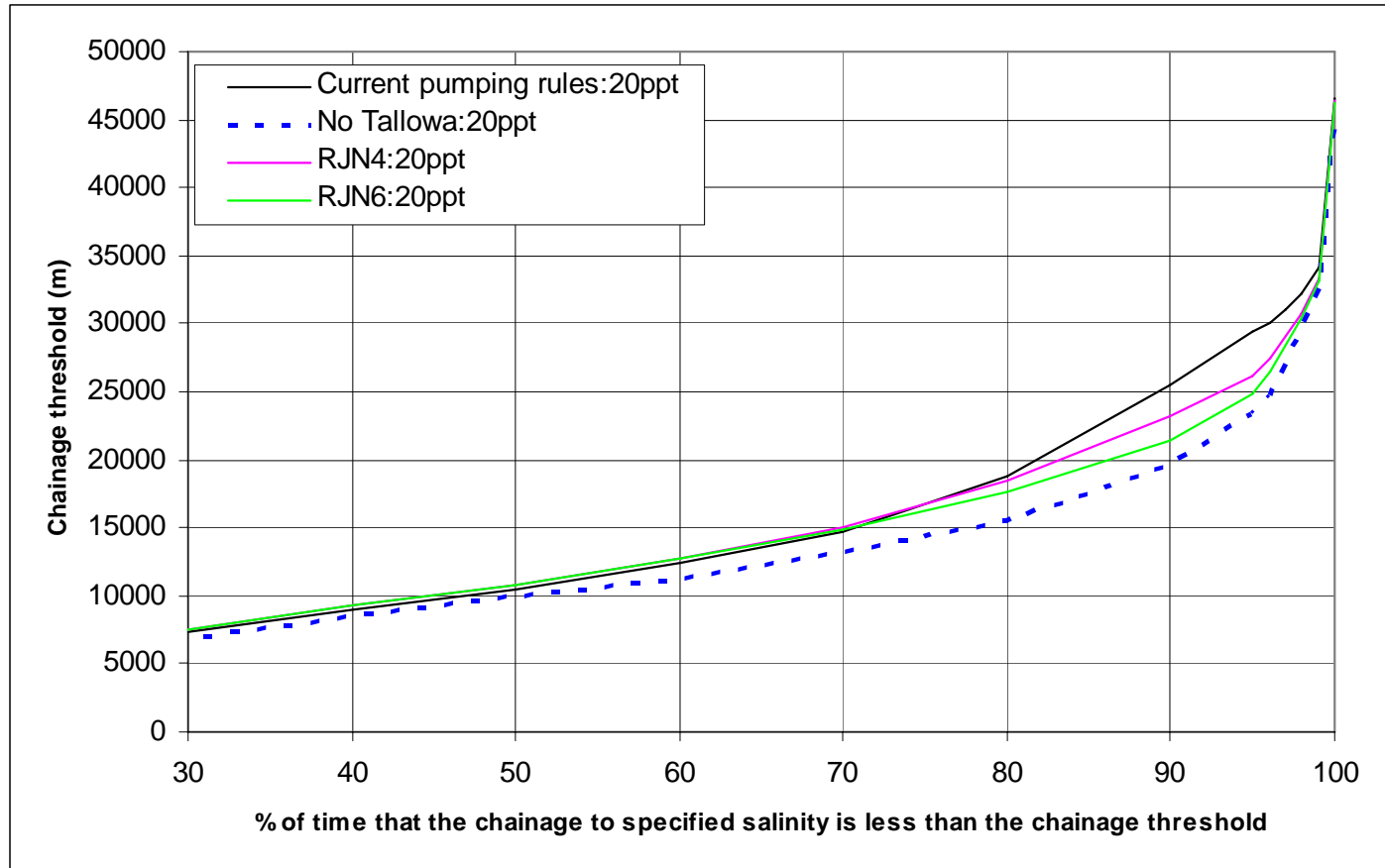
Near Greenwell Point (3.5km upstream from Crookhaven Heads)



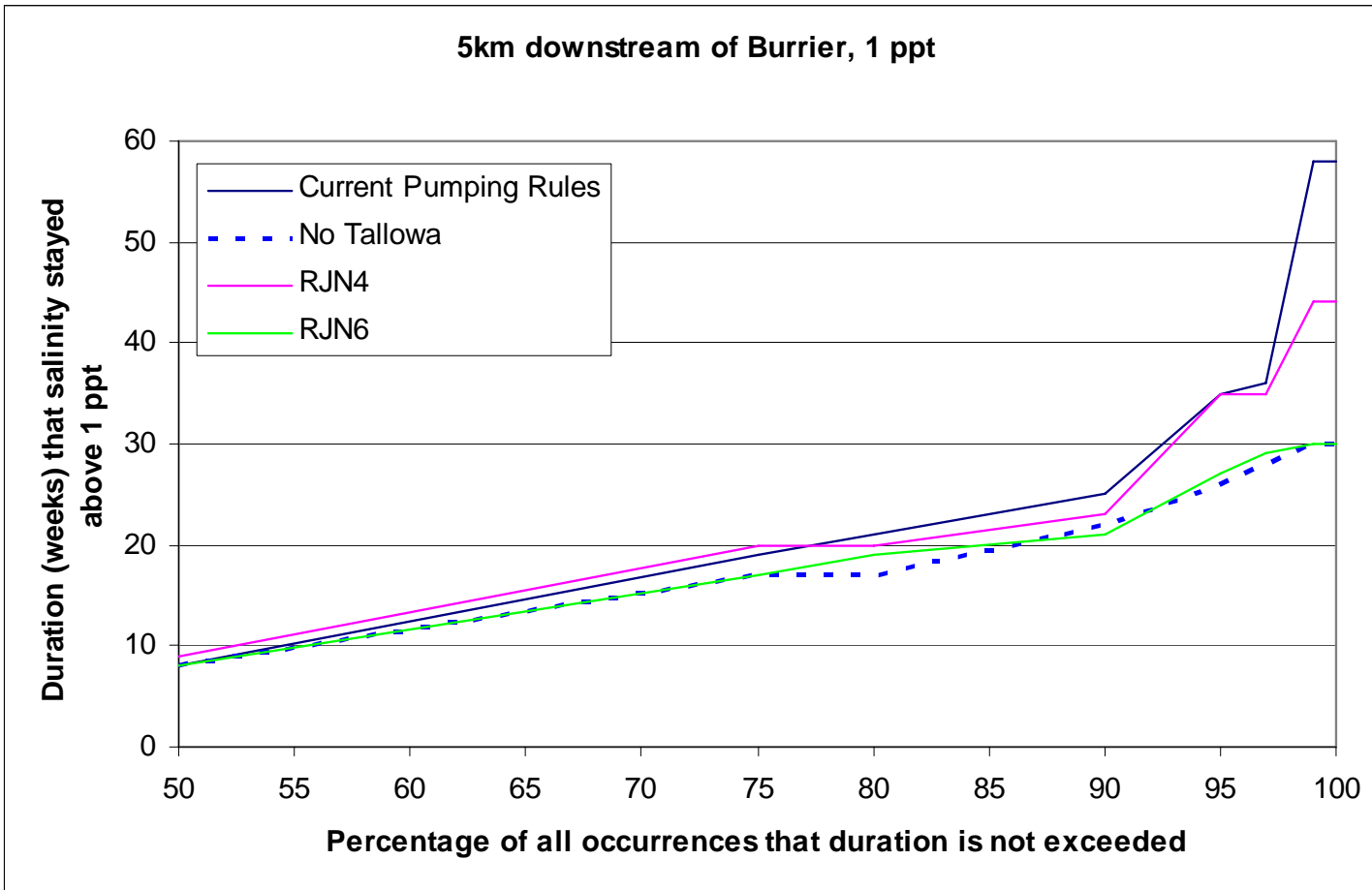
Chainage to 2.5ppt



Chainage to 20ppt



Duration exceeding 1 ppt



Thoughts for Other Investigations on Saline Dynamics

- Averages don't provide much information
- The variation in saline conditions between dry and wet years is often much bigger than the variation between scenarios
- Long period statistics are crucial for making forecasts of which scenario will be best
- The particular statistics to use will depend on the estuary, ecology and hydrology



The Full Report

WRL Technical Report 2006/23

“Environmental Flow Modelling of Salinity Structure in the Shoalhaven Estuary”

B M Miller, K M Hawker and A M Badenhop

