Recent Trends in Nutrients Within the Galveston Bay System

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Most Recent Job 4 months - Senior Oceanographer - Water Quality Specialist
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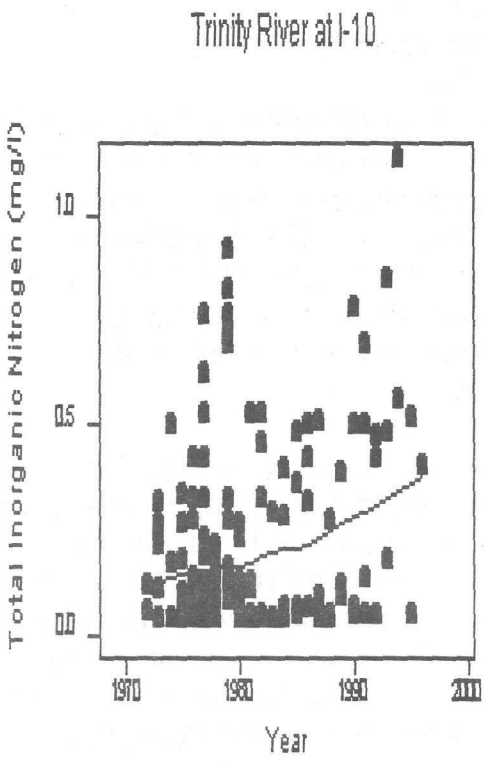
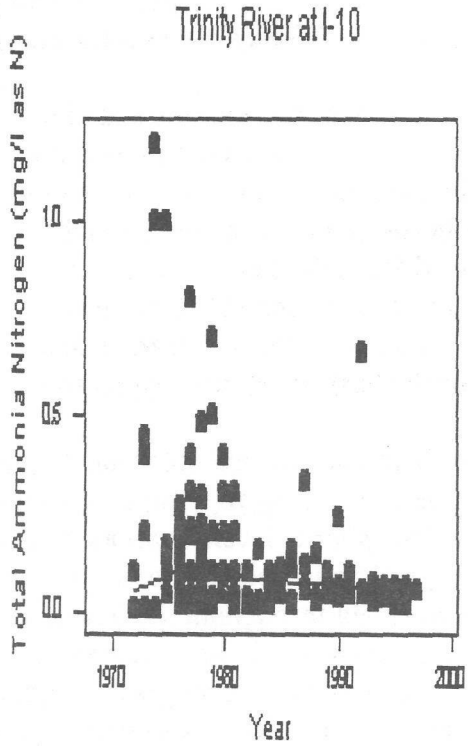
Texas Natural Resource Conservation Commission

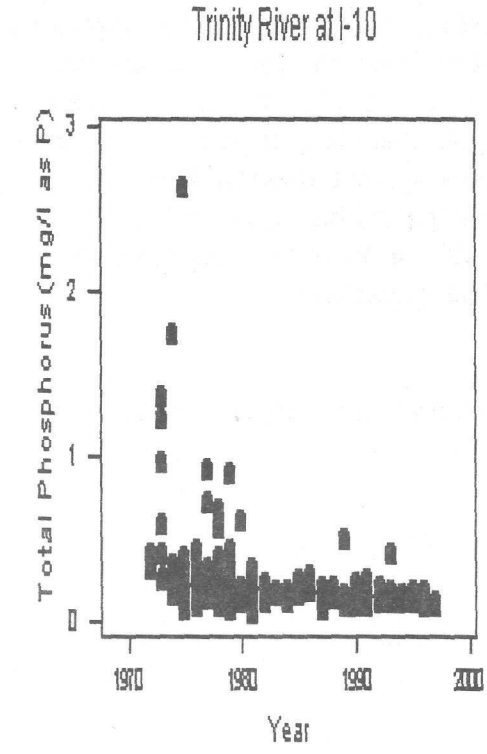
A survey of nitrogen, phosphorus and chlorophyll-a levels at representative open bay and tidal tributary stations was conducted to determine overall trends in indicators of eutrophication within Galveston Bay. Data on total ammonia, total inorganic nitrogen (nitrites + nitrates), total phosphorus and chlorophyll-a levels for approximately 25 years (1973 through 1997) were obtained from the Texas Natural Resource Conservation Commission (TNRCC) Surface Water Quality Monitoring (SWQM) system. Data were plotted using LOESS graphical techniques. Data was pooled on an annual basis. Values less than the detection limit were assumed for the basis of plotting equal to the detection limit.

Overall trends in nutrient and chlorophyll-a levels in Galveston Bay suggest that phosphorus levels have been declining over time. Differences however exist between open bay and larger tributaries. Phosphorus levels continue to decline in urbanized and major tributaries (Figs 1-4). Rates of decline in open bay areas are lower and/or have leveled off (Fig 5). Ammonia levels have declined throughout the bay system. However, total inorganic nitrogen (TIN = nitrates + nitrites) levels have increased as dissolved oxygen levels have increased in many tributaries. Chlorophyll-a levels have declined in many locations of the Galveston Bay system. There appears to be a positive correlation between declining phosphorus and chlorophyll-a levels. However, in certain portions of the bay system, such as West Bay, phosphorus and chlorophyll-a levels have remained fairly constant (approximately 0.1 mg/l as P and 5.0 ug/l respectively) over the last 10 years (Fig 6). These patterns suggest that most portions of the Galveston Bay system do not appear to be nitrogen limited and that phytoplankton populations are more regulated by fluctuations in phosphorus levels. Declining phosphorus levels may have contributed to decreased phytoplankton biomass. The ecological significance of these declines are debatable. Extrapolation of these trends suggest that many tributaries and open bay areas may continue to experience declines in phosphorus without affecting baseline productivity as defined by typical conditions in minimally impacted bay systems (e.g. West Bay). In most cases, nutrient and chlorophyll-a levels would still be above conditions that would be characterized as being oligotrophic (0.01 mg/l total phosphorus) .

*Current Address: Minerals Management Service, 1201 Elmwood Park Blvd., MS 5410, New Orleans, LA 70123.







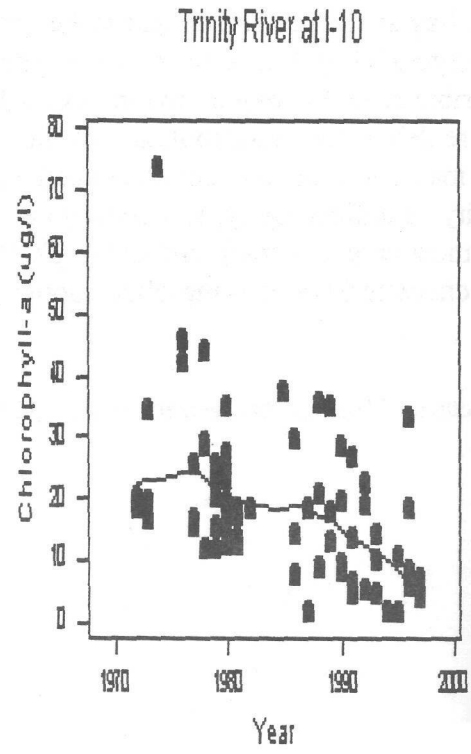
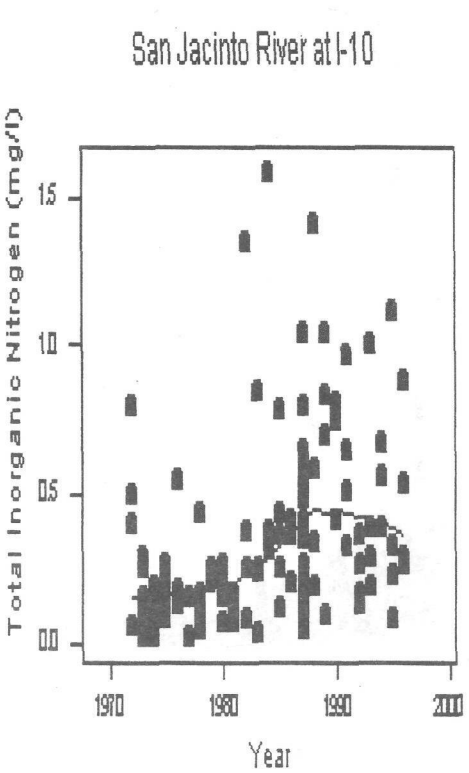
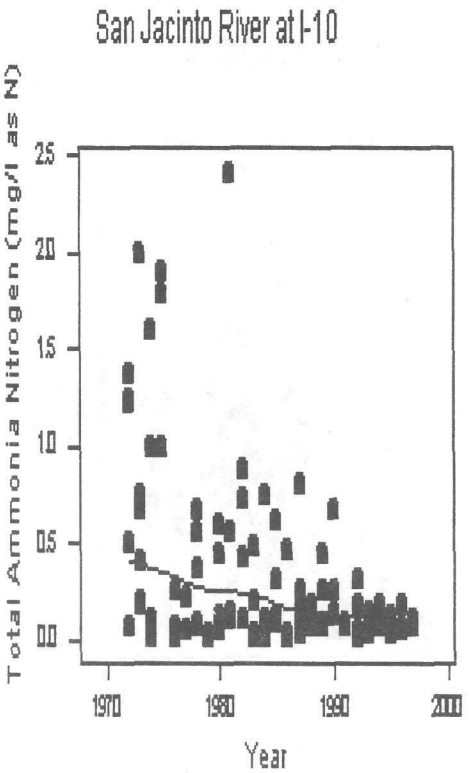
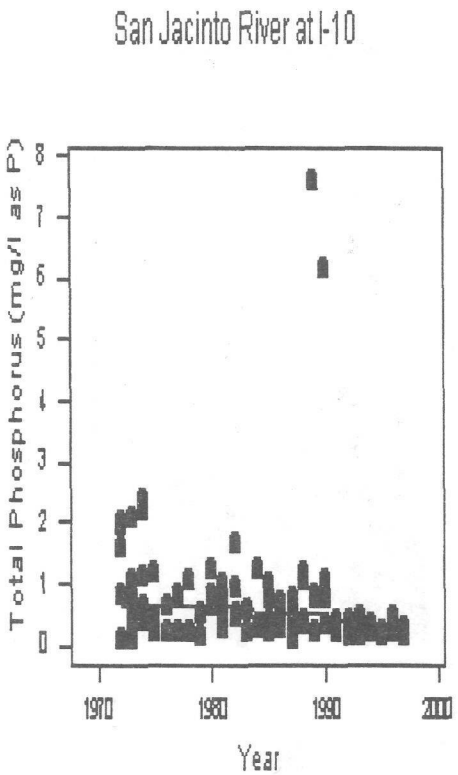


Figure 1. Trends in nutrients and chlorophyll-a at Trinity River and I-10 (segment 0801).







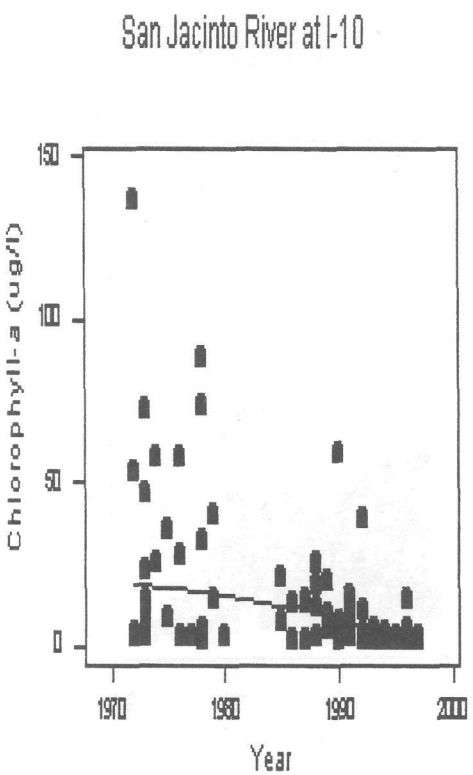
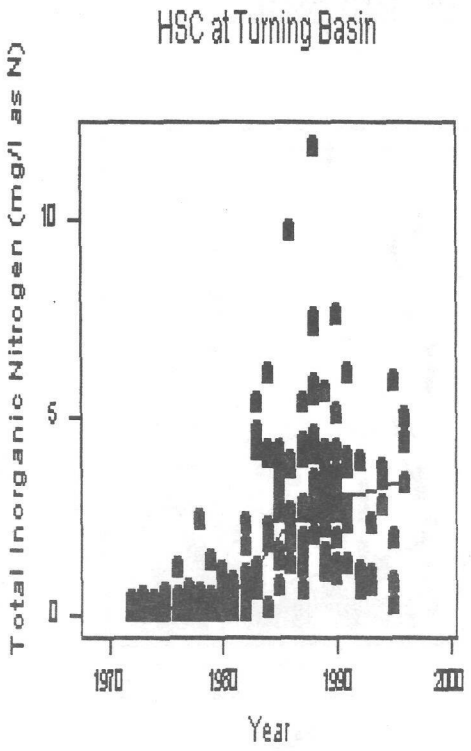
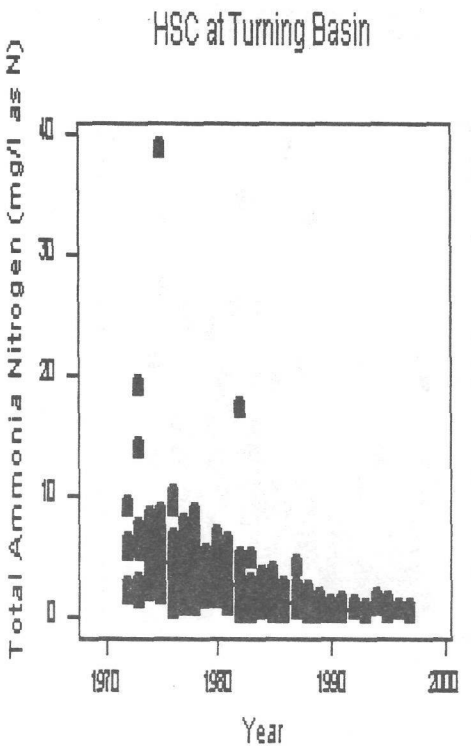
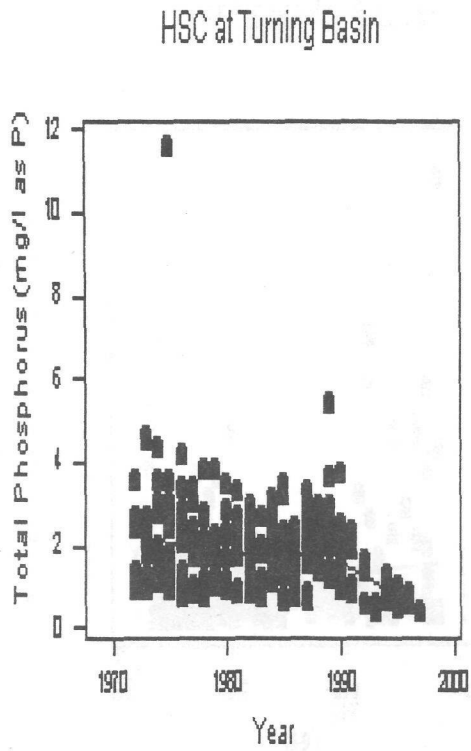


Figure 2. Trends in nutrients and chlorophyll-a at the San Jacinto River and I-10 (segment 1001).







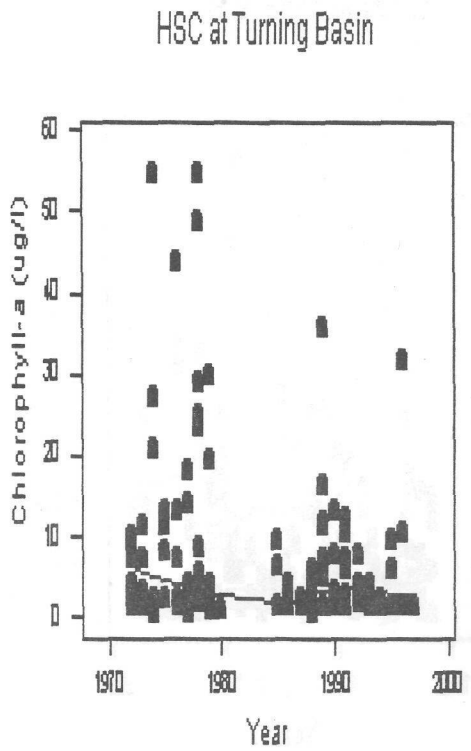
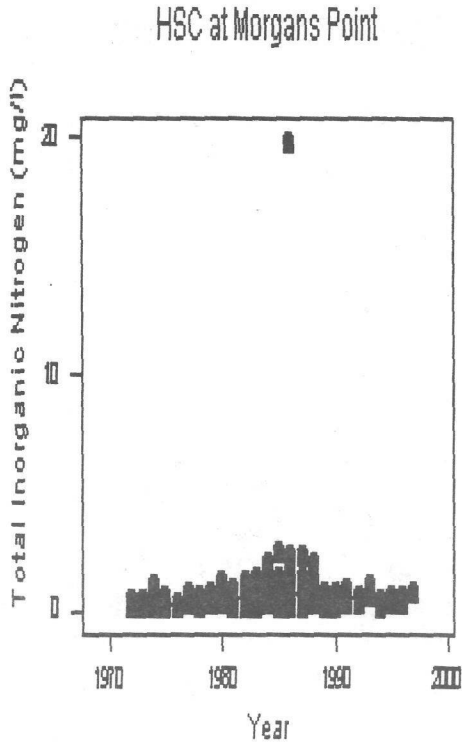
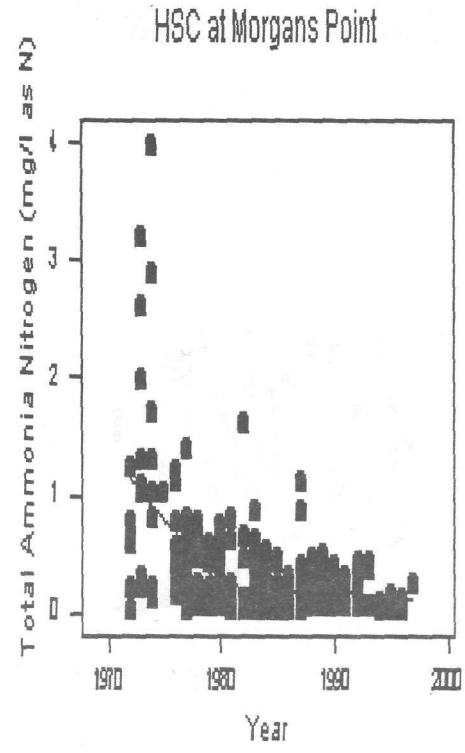
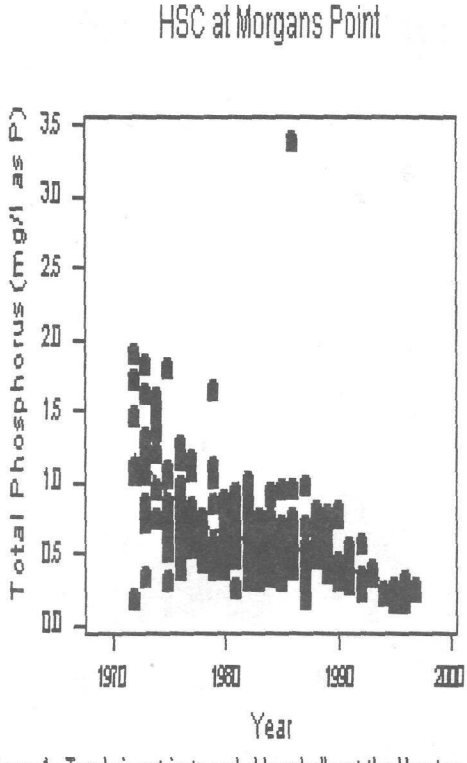


Figure 3. Trends in nutrients and chlorophyll-a at the Turning Basin in the Houston Ship Channel (segment 1007).







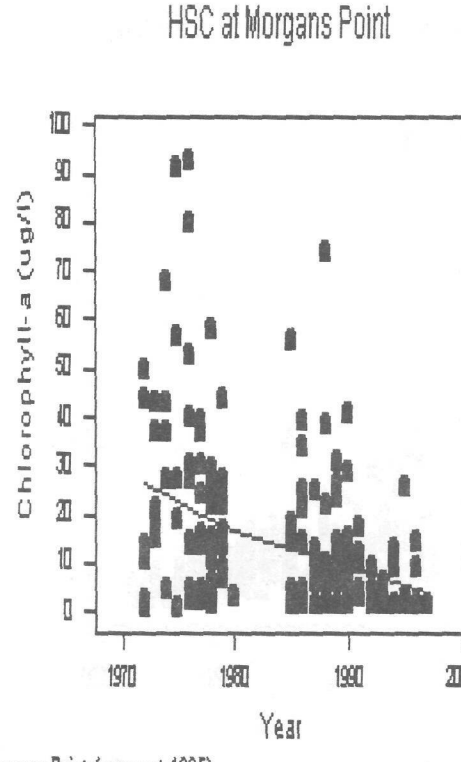
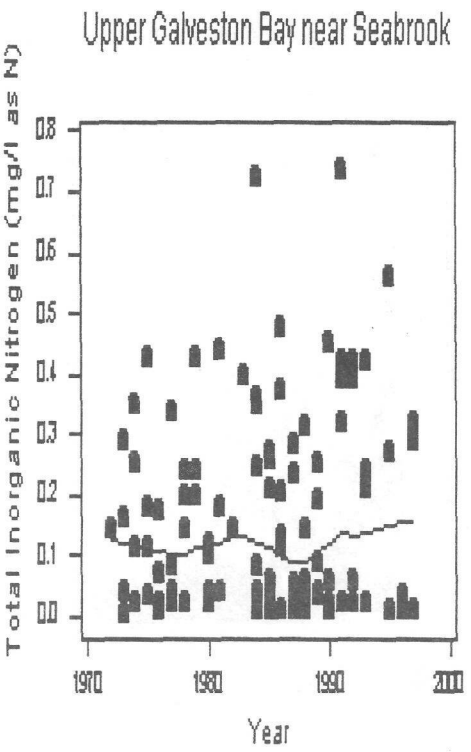
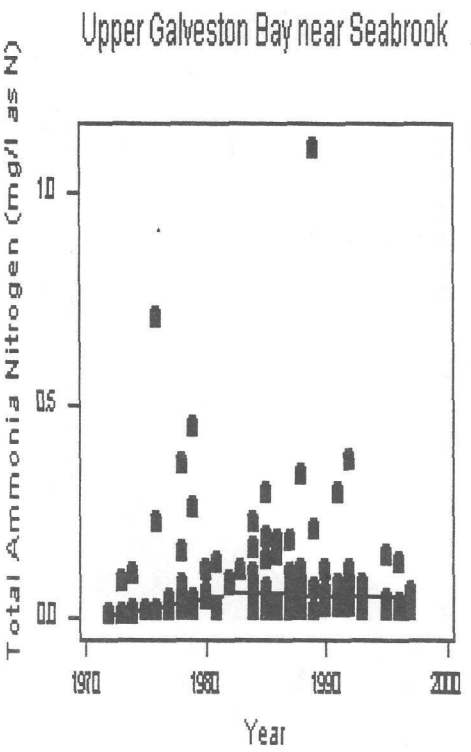
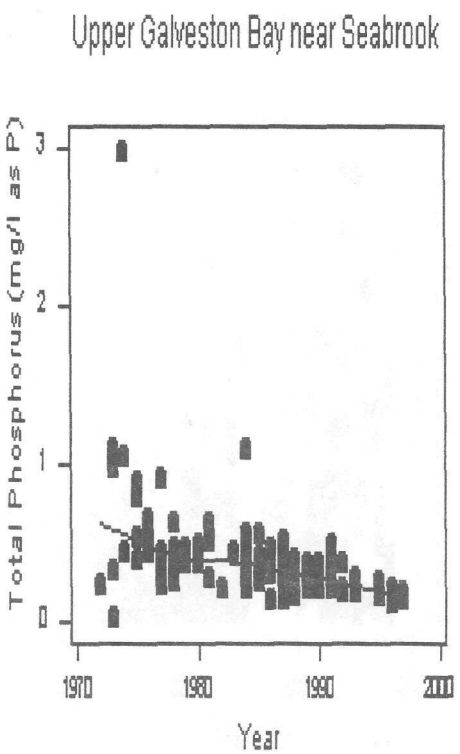


Figure 4. Trends in nutrients and chlorophyll-a at the Houston Ship Channel at Morgans Point (segment 1005).







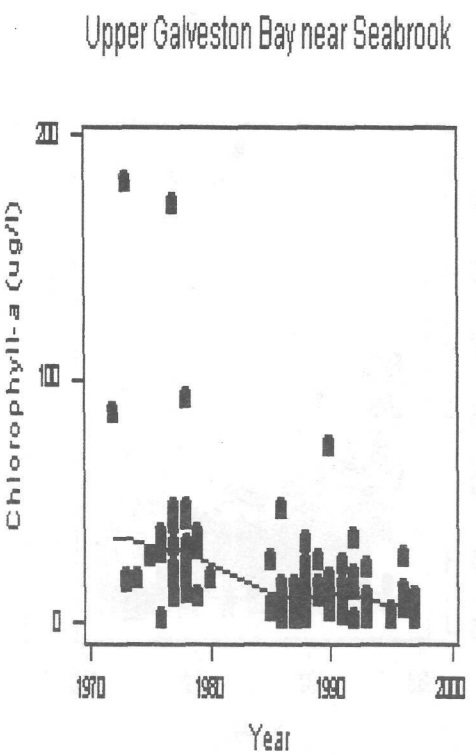
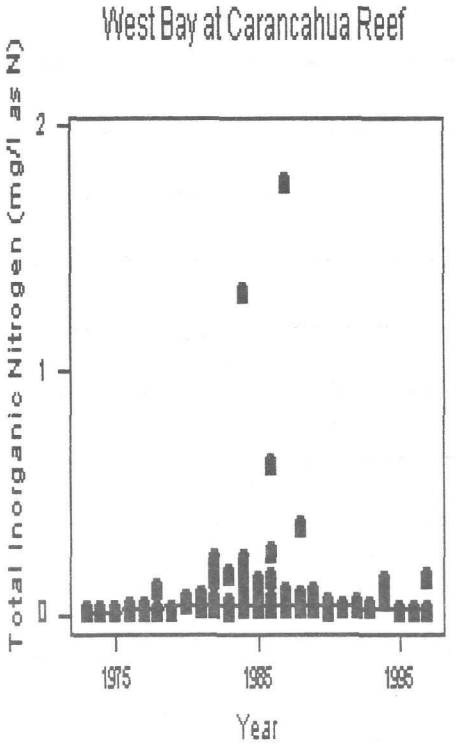
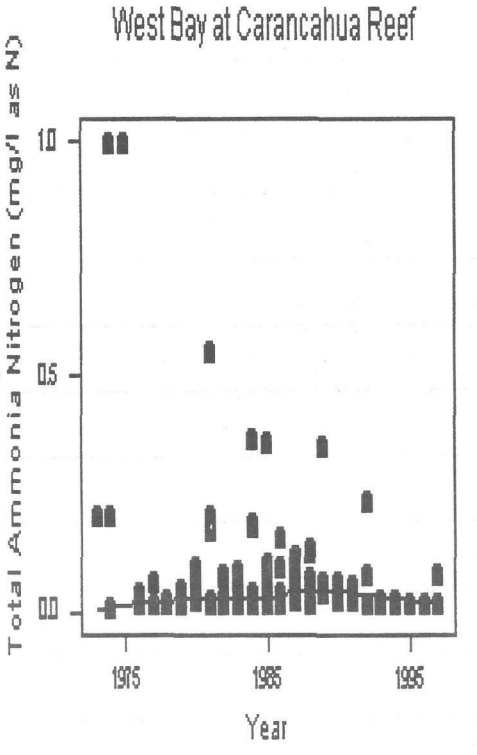
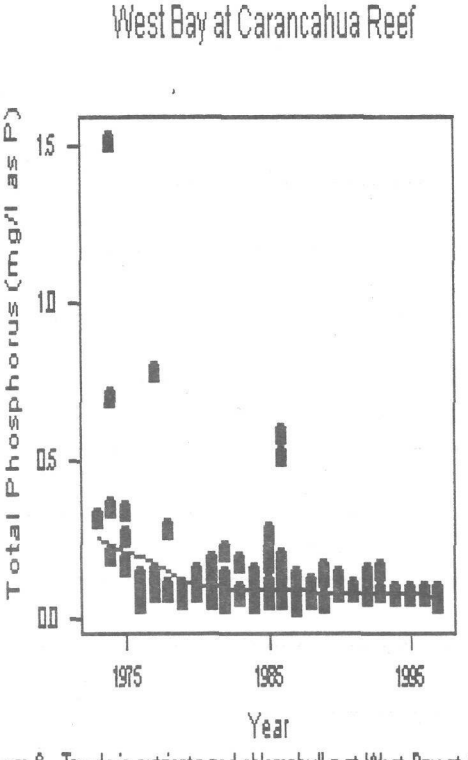


Figure 5. Trends in nutrients and chlorophyll-a at upper Galveston Bay near Seabrook (segment 2421).







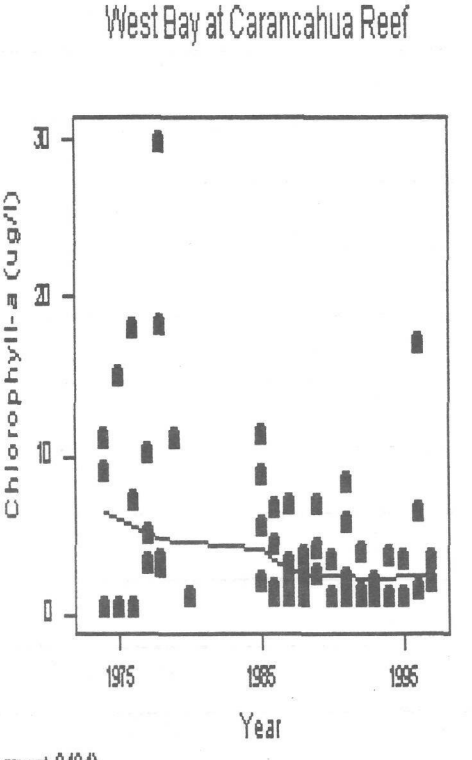


Figure 6. Trends in nutrients and chlorophyll-a at West Bay at Carancahua Reef (segment 2424).