An Evaluation of Sediment and Nutrient Loading to Galveston Bay from The Trinity River

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- **Physical Water Properties** – Water Temperature, pH, Specific Conductance, Dissolved Oxygen Concentration, Turbidity

- **Nutrients** – Total and Filtered Components, Ammonia, Nitrite, Nitrite+Nitrate, Orthophosphate

- **Sediment** – Suspended Sediment Concentration and Sand/Fine Break
- Discharge
- Bed Load / Bed Material
- Backscatter and Sediment Attenuation - ADVM
Event 2

Graphs showing discharge and reservoir water level for different locations:
- Trinity River near Goodrich
- Trinity River at Romayer
- Trinity River at Liberty
- Trinity River at Wallisville
- Livingston Reservoir near Goodrich
- Reservoir Conservation Level
Event 3

![Graphs showing discharge and reservoir level over time for different locations.](image)
No Flow
Not Measurable

16,600 cfs
Regression Methods

• Regression of Water-Quality Constituents, Why?
• To create predictive statistical relations between readily acquired continuous field data and selected water-quality constituents acquired through periodic sampling and laboratory analysis.
SUSPENDED-SEDIMENT CONCENTRATION, IN MILLIGRAMS PER LITER

TURBIDITY IN FNU

$r^2 = 0.87$

- Event 1
- Event 2
- Event 3
- Event 4
- Regression (All Events)
TURBIDITY IN FNU

CONSTITUENT CONCENTRATION, IN MILLIGRAMS PER LITER

Total Nitrogen

Total Phosphorous.

$r^2 = 0.8602$

$r^2 = 0.8635$
Phosphorous

$R^2 = 0.89$
Under low turbidity conditions the total nitrogen becomes more influenced by the effect of temperature as preserved by the regression coefficient on temperature. $R^2 = 0.80$
Acoustic Backscatter
Acoustic Advantage

- Fouling
- Index velocity for discharge
- Temperature and Acoustic Signal
- Better response in highly turbid environments
  - (i.e. Turbidity sensors can “peg”)
Trinity River

\[ R^2 = 0.88 \]
$R^2 = 0.90$
Lessons Learned

- Sediment and nutrient loading along the Trinity River can be highly variable and may be influenced by differences in flood-discharge magnitude, duration, origin of floodwater runoff into the Trinity River system, and timing of sample collection.
- Wetlands and bayhead delta may play a vital role in dampening discharge and sequestering sediment and nutrients.
- Monitoring with surrogate development may provide the best understanding of loads entering Galveston Bay from the Trinity River.
What’s Next?

- Bed Load / Bed Material
  - Total Loading?
- Continue exploring the ADVM
  - Index Velocity
- GBEP
  - San Jacinto River
  - Trinity River
- TWDB
  - Colorado River
  - Guadalupe River
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