National Estuarine Research Reserves System (NERRS)
NSRS Connections Strategy

What is NERRS

The National Estuarine Research Reserves System is a network of 27 areas representing different biogeographic regions of the United States that are protected for long-term research, water-quality monitoring, education and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the reserve system is a partnership program between the National Oceanic and Atmospheric Administration and the coastal states. NOAA provides funding, national guidance and technical assistance. Each reserve is managed on a daily basis by a lead state agency or university, with input from local partners.

Rational for Expanding NGS Efforts beyond the original agreement to assist NERRS

- Observations taken at NERRS may hold potential for answering global sea level change questions.
- For this to happen, all NERRS observations need to be tied to their local water level devices and should be at the highest level of precision.
- All NERRS measurements should be traceable back to the NSRS.
- Connecting NERRS observational information to the NSRS will allow for relating that information on a national, rather than local, level throughout the NERRS system.

Current Status of NERRS measurement connections to the NSRS

- Historically NERRS SET observations were relative only to the "bench mark" which accommodated the SET arm.
- NGS has written guidelines for connecting SET benchmarks to the NSRS.
- To determine water level information, each reserve has either a NWLON station or a SWMP station. Water level information determined from these sensors is not directly tied to the SETs, or any other measurements conducted at the reserves.
Establishing a Local Geodetic Network at Each Reserve

Tool: Static GPS

Result: Sub-decimeter accuracy to the National CORS network.

- Minimum of three geodetic control markers at each reserve.
- Simultaneous observations of all 3 markers, during two separate GPS constellations.
- Observe for as long as practicable, 5 – 48 hour sessions recommended.
- Use OPUS to reduce GPS data and select option to “submit to database”.
- Final positions are the average of the two independent solutions.

Connecting NERRS sensors to the Local Geodetic Network

Tool: Geodetic Leveling

Result: Sub-Centimeter relative accuracy to the local network.

- Double run level loop (per NGS guidelines) through all Control Monuments, SWMP Station, or NWSLN station if available, and as many SETs as can be leveled to.
- Data are reduced using LOCUS tool.
- Averaged OPUS GPS Derived Heights held at all Control Monuments.

Connecting NERRS sensors to the Local Geodetic Network

Tool: Kinematic GPS

Result: Centimeter level relative accuracy to the local network.

- Following NGS RTK Guidelines, use RTK to determine position information for all sensors and other measurements not accessible by geodetic leveling.
- All RTK observations are conducted with the base station set up at one of the 3 local control marks.

Control Monument

SET

SWMP Station
Determining Height for the "Swamp Meter" Vertical Reference Point

An invar strip is attached to a 1m range pole section. Sufficient lengths of 1m range pole sections are coupled together to allow the combined pole to rest on the bottom bolt and allow for a level shot to the invar strip.

The Chesapeake NERRS use this configuration for deploying their SWMP meters. This deployment configuration is not consistent throughout the NERRS. NGS will need to recommend that a standardized approach be taken by NERRS.