*Science, Service, Stewardship*

Northeast Salmon Team (NEST) Factsheet Collection

# ROTARY SCREW TRAPS

"Rotary screw traps serve as a sampling platform whereby biologists can take a snapshot of smolt health, estimate the number of migrants and determine their origin."

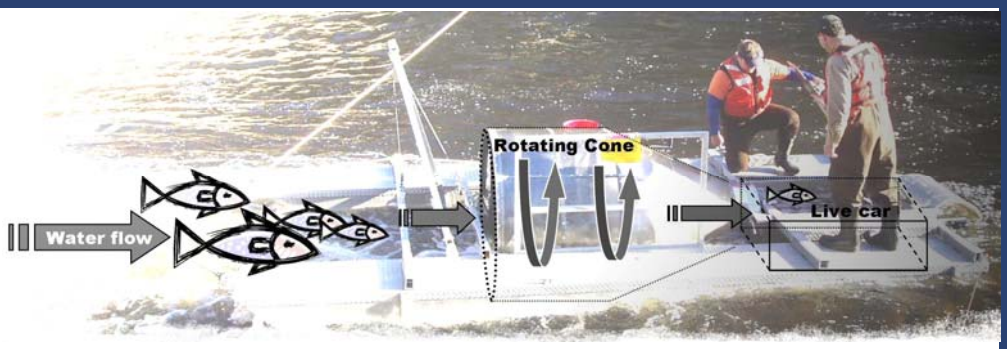
## NEST began using rotary screw traps in 1996...

NOAA telemetry data suggests that less than half of out-migrating Atlantic salmon smolts reach the Gulf of Maine. Migrants must adapt quickly to new environmental conditions (e.g. tides and saltwater), avoid unfamiliar predators (e.g. double-crested cormorants, seals and striped bass), contend with anthropogenic challenges like dams and acidification, and adapt to new marine foods.

In 1996, NEST began using rotary screw traps (RSTs) as part of a larger effort to study salmon as they migrate to sea. RSTs 1) enable biologists to obtain biological samples for a snapshot of smolt health, 2) act as a sampling platform whereby biologists can live-capture smolts for use in telemetry and other studies, and 3) help biologists estimate the number and size of smolts and other species, as well as determine smolt origin (i.e. hatchery or naturally-reared).

**...to study certain pieces of the salmon puzzle.**

## ANATOMY OF A ROTARY SCREW TRAP




Biologists count, take samples and release fish held in the live car of a Sheepscot River RST.

*Fish enter the RST through the large end of a revolving and half-submerged screen cone suspended between two floating pontoons. As the cone is turned by the river's current, it guides fish downstream into the live car, where they are held in river water until retrieved for sampling. As smolts typically move downstream at night, traps are tended early in the morning to minimize the length of time they spend in the live car. Sometimes traps are tended more than once a day or cones raised to reduce the threat of mortality and overcrowding with non-target migratory fishes like sea-run alewives.*

*While RSTs can be used and often excel during high flows, woody debris (e.g. from beaver dams or log jams) can become dislodged during high flows and wedged in the cone. As such, river conditions are monitored closely and precautionary measures (i.e. raising cones) are taken in advance of high flow/flood events to make sampling safe for staff and fish.*

**Right:** a captured hatchery smolt, identifiable by its blue Visual Implant Elastomer (VIE) tag and fin condition.

## RSTs AS SAMPLING PLATFORMS

*In spring, smolts are live-captured in various rivers as they make their way to sea. Captured smolts are counted and the following information recorded:*

- *length and weight*
- *fin condition*
- *seawater readiness (physical appearance)*
- *presence of hatchery/researcher tags or fin clips*

*Additional biological samples are sometimes taken:*

- *Scales (for age and origin analysis)*
- *Fin tissue sample (for genetic/parentage analysis)*

*All non-target species (e.g. trout, bass, lampreys, alewives, and eels) are identified, counted, and returned to the river. Species that occupy the same habitat as out-migrating smolts provide a unique ecological dataset that improves our understanding of species communities and potential for interactions (e.g. predation, disease-transfer, prey buffering).*

**Above:** a Penobscot River RST, cone raised, is prepped for fishing below Veazie Dam.

NOAA has operated RSTs on the Narraguagus River since 1996 and Sheepscot River since 2001. In addition to serving as a platform to monitor the migration of out-migrating smolts and obtain routine biological samples, NOAA has used RSTs on these and other rivers to:

- Estimate populations. NOAA has used mark-release-recapture techniques to estimate the Narraguagus River's out-migrating smolt population annually since 1997.
- Gain insight into over-winter survival. Coupled with Department of Marine Resources' parr population estimates (generated from fall electrofishing surveys), NOAA uses spring RST catches to assess over-winter survival.
- Provide a platform for telemetry and physiology studies. Telemetry is used to track smolts and understand migration bottlenecks. Physiology samples (gill biopsies and blood plasma) are taken and analyzed to assess seawater readiness.
- Collect naturally-reared smolts for hatchery broodstock. Acquiring broodstock (adults from which gametes are obtained for production) initially focused only on returning adults or electrofishing parr. Pleasant River RSTs were used to collect some of the last native cohorts.
- Evaluate smolt stocking strategies and impacts of dams. The conservation hatchery program varies its stocking program by life stage/age-class, location and timing of year. Capturing (or not capturing) these individuals as they migrate to sea can lend insight into which strategies are working and which are not. RSTs were also used from 2000-2005 to help evaluate downstream passage of smolts through hydroelectric facilities on the Penobscot River.

*The Northeast Salmon Team (NEST) is comprised of Northeast Regional Office (NER) managers and Northeast Fisheries Science Center (NEC) scientists. NER administers NOAA's Programs in the Northeastern United States to manage living marine resources for optimum use while NEC is the research arm of NOAA Fisheries in the region that plans, develops, and manages a multidisciplinary program of basic and applied research. Please visit the NEST website at: http://www.nefsc.noaa.gov/salmon/*