

## Technology Center Annual Report - 1993

The Technology Center was involved in a variety of meaningful and interesting projects during fiscal year 1993. Personnel changes included biologist Jerre Mohler coming aboard as Assistant Director of Technology and Susan Baker, Director of Technology, taking a position in Region 6 at Denver as Deputy Assistant Regional Director. In addition, Pat Farrell, formerly of the National Fisheries Research Lab in Wellsboro, PA joined the staff as a Biotechnician. Projects involving the Technology Center in FY 1993 are described below:

**SPAWNING OF HUDSON RIVER ATLANTIC STURGEON:** In May of 1993, NEFC biologists Bill Fletcher, Jerre Mohler, Susan Baker and animal caretaker Tom Bryerton placed 10-foot long fiberglass holding tanks at two locations on the Hudson River. One location was a private dock on Catskill Creek in Catskill, New York and the other was at Dutchess Community College Environmental Center at Norrie Point State Park, Staatsburg, New York. These tanks were used as temporary holding units to accommodate mature Atlantic sturgeon captured by cooperating commercial fishermen. Tanks were equipped by NEFC maintenance manager Tony Carta with locking lids and electric pumps to provide security and fresh flow-through water for captured fish.

On June 3, 1993, NEFC biologists were notified of captured fish held at both sites. Staff personnel traveled to the sites which resulted in one male sturgeon being transported to NEFC and placed into a 20-foot diameter closed isolation tank to assure that non-indigenous species were not inadvertently introduced into the hatchery water receiving stream.

On June 6, 1993, three sturgeon were reported in the holding tanks at Norrie Point. Upon arrival, NEFC biologists determined that two fish were male and one was female. The female measured over eight feet in length and weighed 275 lbs but had already expelled its spawn in the holding tank. Therefore, the fish was released after a biopsy of the ovarian tissue was performed. The two captive male sturgeon were transported to NEFC and placed into quarantine as previously described.

The three recent-capture (1993) males plus four mature males captured in 1991 were injected with the hormone LHRHa to stimulate sperm production. The only fish which yielded milt samples were the three freshly captured males. Milt was stored on ice with oxygen.

Due to length of travel time, it was decided that NEFC personnel would stay at Norrie Point while fishermen were on the river in anticipation of a freshly captured female sturgeon to spawn on-site. Personnel from the Wellsboro National Fisheries Research and Development Lab (NFRDL) were present to assist NEFC staff on the project in addition to Joel VanEannaanem, a white sturgeon expert from the University of California, Davis.

During the first week on site, a female sturgeon weighing 140 pounds was captured. The attempt to spawn this fish on-site using techniques recommended in the Hatchery Manual for the White Sturgeon was unsuccessful. Upon surgical removal, a majority of eggs were suspected of being unsuitable for fertilization, but spawning protocol was followed nonetheless. The spawn was transported to Lamar and placed in hatching jars for incubation where it was discovered that fertilization had not taken place.

On a subsequent trip to Norrie Point during the last week of June, a ripe, 134 pound female sturgeon was captured along with a number of ripe males. It was decided that the female would be transported immediately to NEFC and spawned there. Milt was obtained from the fresh males and stored prior to departure from Norrie Point.

Once at NEFC, the female was injected with LHRHa and successfully spawned. The spawn was fertilized using milt from five different males and in addition, a portion was fertilized with cryo-preserved milt under the direction of NFRDL personnel. Incubation of the 420,000 eggs proceeded employing a variety of techniques, however, *Saprolegnia sp.* infection was high. The resultant hatch totaled approximately 14,000 fry. Eggs fertilized with cryo-preserved milt showed signs of early embryonic development but did not hatch due to fungus.

**ATLANTIC STURGEON FRY AND FINGERLING DIET TRIALS:** Approximately 5,500 yolk-sac fry were transported to NFRDL and the balance remained at NEFC for initiation of feeding trials to identify favorable culture techniques. Kofi Flynn-Aikins of the Tunnison Laboratory in Cortland, NY was a study cooperater providing valuable input and assistance with experimental design. In addition, the Fish Health Unit at Lamar contributed expertise in assessment of the health status of fry and fingerling sturgeon.

At the end of one month of feeding, several dry diets showed promising results for survival and growth but fish started on live brine shrimp far surpassed those given dry diets only. In addition, it was found that fish raised on brine shrimp were able to immediately convert to one of the more successful dry diets.

After fry trials were completed, trials using four different dry diets for 60 days were initiated on the fingerlings. During the 60 day trials, the approximately 600 surviving juveniles exhibited astounding growth. Biokyowa dry diet fed at 3% body weight/day resulting in weight gains as high as 87% over a two week period. A sturgeon starter diet formulated by the Bozeman Technology Center, Montana also showed good results with as high as 78% weight gain over the same time period.

**"PENNSYLVANIA OUTDOOR LIFE" TELEVISION PROGRAM ON ATLANTIC STURGEON:** While U.S. Fish and Wildlife personnel were involved with field work on the Hudson River, a television crew from WNEP studio in the Scranton/Wilkesbarre, Pennsylvania area filmed some of the sturgeon work and interviewed NEFC staff both on location at the Hudson River and at Lamar. This resulted in the production of a documentary of NEFC U.S. Fish and Wildlife involvement with Atlantic sturgeon which aired on the show "Pennsylvania Outdoor Life" in July, 1993. The acting careers of NEFC's Cathy Johnson, Bill Fletcher, Pat Farrell, and Jerre Mohler got a tremendous boost from this production.

**CAPTIVE ATLANTIC STURGEON:** Eight immature and five mature Atlantic sturgeon from the Hudson and Delaware Rivers were maintained at ambient temperature in fresh water circular tanks. All fish fed on Zeigler GR-7, 1/4 and 3/16" trout pellets. The fish were weighed and measured in January and again in September. Only one mature fish showed a weight gain over this time period but all immature fish showed gains of up to double their January weight. It is hoped that the new salt water recirculation system will enhance feeding response of the mature fish.

**PROFESSIONAL TRAINING ACTIVITIES:** For one week in March, biologist Jerre Mohler traveled to the University of California at Davis for hands-on experience in sturgeon spawning and culture. During the trip, which Jerre described as "invaluable", the latest techniques used for spawning white sturgeon were imparted by Joel VanEaannem who spawned white sturgeon both at U.C. Davis and various private sturgeon farms in the Sacramento area. Even though there are important differences in spawning between species, Jerre feels that this trip was instrumental in successfully spawning an Atlantic sturgeon at NEFC in June of FY93. Jerre Mohler attended Module 1 training at Leetown, West Virginia and participated in instruction for the statistical software (SAS) at Penn State University. Former Director of Technology, Susan Baker completed upper level management training.

**REMOTE MONITORING OF FISHERY PROJECTS USING COMPUTER INTERFACE EQUIPMENT:** An environmental monitoring system named MONITROL was implemented at NEFC. This system consists of the MONITROL supervisor, an IBM compatible computer, communications lines, and various sensing probes.

The system was programmed by head of maintenance, Tony Carta and biologist Jerre Mohler to supervise trout raceway dissolved oxygen, pH, and temperature. In addition, water pump operation and hazardous material storage building air temperature are monitored. An alarm was programmed to activate an automatic dialer to alert appropriate individuals of possible equipment failure, etc.

Jerre discovered how to download logged data into LOTUS 1-2-3 for graphing or other manipulation. It was also discovered that the system could be used to pinpoint times of trout activity (feeding, disturbance, etc.) due to visible dissolved oxygen drops as a response to increased respiration of trout during such periods.

The system is still in the experimental stage where "persistent bugs", "Murphy's Law", or "Gremlins" appear to take control at times. In spite of this, the system appears to have excellent potential.

### **START UP AND OPERATION OF CLOSED SALTWATER RECIRCULATION**

**SYSTEM:** A 7000 gallon saltwater recirculation system developed in cooperation with Baranaby Whatten of the National Fisheries Research Lab in Wellsboro, PA was placed into service this year. The system was constructed in the intensive culture building at NEFC by head of maintenance Tony Carta who did an excellent job which required extensive wiring and plumbing in cold working conditions and cramped quarters. Major components of the system include: 6.25 meter diameter rearing tank, rectangular clarifier, carbon dioxide strippers, heat exchanger, ultra violet disinfection lamps, fluidized bed biological filters, pure oxygen generation/adsorption system, and titanium heater. System start-up was facilitated by the addition of ammonium chloride on April 27th to encourage the establishment of nitrifying bacteria populations in the three biofilters.

Approximately four weeks later, ammonium levels were below detection limits hence two juvenile Atlantic sturgeon and three mature striped bass were introduced. All fish were observed feeding in their saltwater environment within a few weeks of introduction including one previously emaciated juvenile sturgeon which doubled its weight in four months. By November 8th, a mature male and female Atlantic sturgeon were introduced to the system in hopes of enhancing their potential to produce eggs and sperm in captivity. Ammonia levels remained low while nitrate levels climbed steadily showing that biofilters were performing as expected. The system requires weekly cleaning maintenance and occasional pH adjustment with sodium bicarbonate. A sand filter filled with charcoal was added to the system to assist in water clarification.

**ATLANTIC SALMON EGG TRANSPORTATION STUDY:** In recent years, percent eye-ups of Atlantic salmon eggs have fallen to below 60 percent in some cases. In response, Mike Hendrix, Bill Fletcher, and Jerre Mohler performed experiments in an attempt to identify transport methods for improving egg eye-ups. Eggs from domestic salmon broodstock spawned at Kensington State Hatchery (CT) and sea-run broodstock from Cronin NSS (MA) were transported for incubation to White River NFH (VT). Reaction of eggs to transportation in insulated jugs with ice, without ice, and in egg trays are being examined. In addition, transportation of unfertilized eggs and iodophor disinfection are being tested in this study. Preliminary examination of the eggs at White River suggests that eggs transported with ice and those shipped unfertilized will have relatively high percent eye-ups.

**1993 ATLANTIC SALMON WORKSHOP:** The Center hosted the workshop February 16-19 at the Samoset Resort, Rockport, Maine. Approximately 70 people attended the workshop many of which arrived during the initial stage of a wicked snowstorm which was followed by driving rain and below freezing temperatures. Attendees included people from State, Federal, and private enterprise having an interest in Atlantic salmon issues. Mike Hendrix, Center Director unanimously received the "jangled nerves award" for driving his two-wheel drive car the whole way from Pennsylvania during the storm to participate in and moderate the Culture segment of the workshop.

The Center was well represented during the proceedings of the workshop. Mike Hendrix made presentations concerning the toxicity of iodophor to eggs of Atlantic salmon and the use of LHRHa implants in male Atlantic salmon. In addition, Jerre Mohler, Assistant Director of Technology made a presentation on the design and application of a saltwater recirculation system for anadromous species management. Susan Baker, former Director of Technology has assembled the proceedings of the workshop which will be printed and distributed in the near future.

**HATCHERY PRODUCT EVALUATION QUESTIONNAIRE AND REPORT FOR REGION 5 FISHERIES PROJECTS:** The 1991 *Hatchery Subactivity Analysis Report* targeted the "universal" lack of "comprehensive" Hatchery Product Evaluation Programs. Hatchery Manager Bill Fletcher and Fishery Biologist Jerre Mohler were given the task of synthesizing a report on the state of Region 5 hatchery product evaluation programs (HPEP). Region 5 project leaders were canvassed and responded to survey requests on the topics of current hatchery product evaluations and future evaluations needed. Bill and Jerre then put together a report using this information on the current state of Region 5 hatchery product evaluations as viewed in line with the new Region 5 FFA ecosystem approach. The report was forwarded to the Regional Directorate of Region 5.

**FISH FEED INSPECTIONS:** As in previous years, the Center has taken responsibility for quality control of production fish diets for Region 5. Four inspections were performed by former Director of Technology, Susan Baker and Assistant Director of Technology, Jerre Mohler. No major quality control problems were encountered during the year. Additionally, the Center acts as the clearing house for contract changes the hatcheries need to make on a quarterly basis and collects the invoices for matching to the contract. Problems were encountered in keeping the contract moving along the set time schedule so production stations could receive feed on time.

**INFORMATION DISSEMINATION AND PUBLIC RELATIONS:** The Center received and responded to the following requests for information and other technical assistance during FY93:

1. The Kodenkandeth Foundation (PA) requested technical assistance and information on aquaculture and aquatic research possibilities applicable to the country of India.
2. Both the Penobscot Salmon Company (ME) and the Ed Weed Hatchery (VT) requested technical assistance in reducing hatchery effluent phosphorus levels. The Center obtained a literature search and sent other applicable information concerning methods of phosphorus reduction in effluents.
3. Green Lake NFH (ME) requested guidance on conversion of Fishery Information System (FIS) files to LOTUS 1-2-3 format.

Additionally, Jerre Mohler represented the Center at a meeting of the Fishing Creek Watershed Group. This group, which was formed by the Northcentral Pennsylvania Conservancy, met to troubleshoot degradation of Fishing Creek watershed and was represented by private, local, county, state, and federal concerns. NEFC is located in and uses Fishing Creek as a water supply, therefore the Center was pleased to participate in planning protection of this resource.

**WETLAND CONSTRUCTION PLANNING:** Phase one planning of a constructed wetland system for purposes of effluent treatment and public outreach were initiated by the Center. Gary Prime from Region 5 Engineering Services worked with Center staff on general design of the project. Phase one of the project involves flooding an abandoned earthen basin which is overgrown with trees to create a small forested wetland and planting/seeding hydrophytic vegetation on areas disturbed by project excavation. Center staff traveled to a nearby natural area and collected seed from eight species of hydrophytes for planting in FY94 when the project begins.

**N.P.D.E.S PERMIT COMPLIANCE:** The Center is responsible for monthly reporting of flows and various effluent parameters to state and federal agencies for purposes of compliance with the National Pollution Discharge Elimination System permit (N.P.D.E.S.). Water samples from designated discharge points on the facility are taken to a nearby laboratory each month to undergo analysis for: B.O.D., Suspended Solids, Phosphorus, and Ammonium. Monthly reporting forms were completed and sent to the appropriate agencies. Bill Fletcher and Jerre Mohler placed a new stream gauge in the settling channel to improve accuracy of flow calculations at that point.