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***The Historical Decline Of The Rainbow Smelt
“Osmerus mordax”
In Connecticut’s Coastal Waters***

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University of Connecticut Cooperative Extension Service
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Preface
Timothy C. Visel – December 2005
Concern for Connecticut's Smelt

The United States Fish Commission recorded as part of the 10th census significant U.S. fisheries in a series of reports to Congress. Connecticut's inshore fisheries were included as a town by town description of employment, capital and production. It provides a look at several fisheries – ones that had both important local or regional production. The history of many fisheries includes colonial descriptions dating back to the 1700's. They describe the fishing effort before large scale mechanization of commercial fisheries commenced at the start of the 20th century. Passive methods such as traps, weirs and hooks include most of the gear types described. Inshore or near coastal fisheries are frequently described in terms of local consumption and those mostly transported to cities. The report also differentiates those fisheries as "capital" producing such as Menhaden reduction (oil) or "food" in the case of the oyster fisheries. One of the fisheries described in the reports was anadromous fish such as shad, the alewife and smelts.

This proposal was submitted primarily out of concern for the smelt *Osmerus mordax*, smelt fisheries were important to local fishermen. They were seasonal commercially in demand as fresh food but they also could be salted and pickled and smoked. They were caught in small mesh gillnets such as under ice in the Pawcatuck River, in fish traps and river long haul seines. Hook and line fisheries also existed but commercial catches depended on what was termed "commercial" gear. Smelt being anadromous returned in early spring to lay eggs just after ice broke usually at the end of February, early March. Entering large tidal rivers such as the Housatonic, Connecticut and Pawcatuck Rivers significant smelt catches are recorded nearby. It is possible to both estimate the biological extent and commercial value from catch statistics. It is one of the four inshore species that was sold commercially out of State. Later, Connecticut's smelt recreational catches was for the most part consumed in State. Smelt runs occurred in almost every tidal stream containing fresh headwaters.

A review of the literature confirms that smelt caught in Connecticut was very localized. Old Saybrook does appear as a major shipping point to New York City. One of the largest smelt runs was in Greenwich such as the one at Horseneck Brook. Here a stop seine was used to seine smelts from pools and adjacent to the turnpike (Route 95) and also at Byram Park. The last good years for this run was 1965, 1966 (Frank Rupp, personal communication July 1989). In the Pawcatuck River below the Route 1 Bridge opposite the factories holes would be cut in the ice to free bouys. The bouys held a traveler rope to which a gill net (very small fine mesh) would be drawn under the ice. After a given time the gill net would be hauled out by the travelers (Alfred Wilcox, personal communication Sept. 1988). A fyke net fishery in Hamburg Cove run by Mr. Daniel of that community also relates

to early frequent catches of smelt in the Connecticut River. Here a market existed for people of European decent in Hartford who fried them fresh. Frequently Mr. Daniels would also ship them to New York City where he obtained according to a former employee good price for fresh smelts. Smelts by the 1980's were largely gone from Connecticut's waters.

This proposal "Historical Declines of Seasonal and Anadromous Fisheries of Coastal Embayments in Eastern Connecticut" was submitted to Ellen A. More, Program Associate for the University of Connecticut Center for Environmental Health on August 30, 1989. Much of the proposal focused upon rainbow smelt, the species which had the greatest decline in abundance here in Connecticut.

It was submitted as joint proposal between The University of Connecticut Sea Grant Marine Advisory Program and the State of Connecticut Department of Environmental Protection, Bureau of Fisheries, Marine Fisheries.

The proposal was not funded but described work products that could prove relevant today,

- 1) An historical review – based upon specific habitats in coastal towns.
- 2) Compile a complete bibliography of references.
- 3) The study results would be disseminated by way of the University of Sea Grant/Connecticut Cooperative Extension Service.

The Rainbow Smelt fishery in Connecticut was officially closed as of December 2005. Any smelt caught by any means must be returned immediately from the waters of which taken. Sightings of smelt are now considered very rare.

Concerns about rainbow smelt were first raised by DEP Marine Fisheries in the early 1980's (Tom Savoy) additional concerns were also raised in Maine as a long standing policy regarding chlorination of sewage effluents had linked to declining smelts runs (Estabrook 1987). Commercial and recreational fishermen described healthy runs of smelts into the 1960's in waters which received sewage effluents – especially those runs in Western Connecticut. Several fishermen described how the late 1960's sewage treatment plants started chlorinating effluent year round and not just the summer months as has been the previous practice. According to several reports immediately after the change (year round chlorination) it was the last year significant smelt runs occurred. The link between the sudden disappearance of smelts and chlorination of effluent was never established. This proposal was to look carefully at these reports and determine if possible was there a sudden decline in smelt after waste waters were chlorinated? Wherever possible historic smelt runs were to be located and interviews conducted with local groups, land trusts, conservation commissions, etc. Changes in discharge permits for

existing waste water treatment plants were to be checked. One of the questions was did changes in effluent policy proceed just prior to historic smelt runs ending?

A literature review on the impacts of toxicology studies were also to be included in a final report.

A report was to be made available to resource users and resource managers.

References

- 1) Connecticut Geological and Natural History Survey
Natural History Notes Vol2 #2 Spring Issue 1987
"The Search for Rainbow Smelt" Tom Savoy DEP Marine Fisheries
- 2) Economic Impact of the Rainbow Smelt Fishery
Ed Novak The Fishermen December 1, 1988 Pgs 30-31
- 3) E. Penn Estabrook Deputy Commissioner Department of Marine Resources State of Maine – March 11, 1987

"The Rainbow Smelt population has declined in the last few years and there is local concern that the decline may in some way be connected to the sewage treatment plant."
- 4) Thomas S. Squiers Jr. Marine Resources Scientist Correspondence March 18, 1987
"Smelt are very sensitive to monochloramine and show strong avoidance at levels above .02 mg/liter TRC while re-exposure tests revealed strong avoidance as low as .004 mg/liter TRC."
- 5) Experimental Culture of Young Rainbow Smelt *Osmerus mordax*, Chapman et al
American Fisheries Society 1985 Pg. 596 to 603
- 6) George Brown Goode The Fisheries and Fishing Industries of the United States
GPO US Fish Commission 1887, Fyke Net Fisheries of Connecticut.

Abstract

The health and productivity of Long Island Sound and its coastal embayments recently has received increased interest and political attention. The decline of coastal fisheries, loss of tidal wetlands, pollution, and shellfish bed closings has improved conservation, regulation, and protection of coastal resources. In many cases, however, regulatory action came too late to maintain previous production levels of fish and shellfish. Since 1900, Connecticut's landings of smelt, blackback flounder, and shad have declined. This decline can be attributed to significant habitat loss and to the obstruction of spawning routes. As a result, public awareness has been raised regarding the historical productivity of coastal embayments, and the importance of these embayments to recreational and commercial fisheries, to tourism, and to the quality of life of shore residents. This increased awareness has created opportunities for conservation organizations, citizen groups, and fishermen's associations to undertake various fishery restoration activities. The identification of historical anadromous fish runs and seasonal fisheries will help state agencies and the public to commence fishery restoration programs.

Introduction

Coastal embayments are of unique ecological importance to recreational and commercial fisheries. These coastal embayments provide critical habitat for black back flounder, eels, blue crabs, and for bait forage species of predator fish such as bluefish, striped bass and weakfish. The United States Environmental Protection Agency states that these portions of our coastal waters and shore habitats in every coastal state have been found to be degraded to a moderate or severe degree. This degrading threatens the enjoyment of coastal areas, and public health through contaminated seafood. Much of this degradation can be attributed to both the negative effects of shoreline development and to the fact that coastal embayments directly receive pollutants from coastal population centers. Unfortunately, it is these same areas that the United States Fish and Wildlife Service estimates that over 60 percent of the major commercial and recreational fish species depend on estuarine environments for nursery growth, reproduction and spawning. Therefore, it is not surprising that inshore fisheries have declined in productivity to the dismay and alarm of numerous resource user groups. For instance, the diminished landings of flounder, eels and anadromous fish have impacted commercial fisheries and reduced recreational sports fishing opportunities. Another example is the smelt fishery in Connecticut which has fallen so dramatically that a once popular recreational fisheries is now almost unknown to sports fishermen. Coastal embayments also serve as spawning migration routes (runs) for anadromous fish species who return to a particular river or stream where they were themselves

spawned. Connecticut's coastline is heavily industrialized and shoreline alteration of tidal streams and creeks has had a direct negative effect upon anadromous fisheries. The most serious alteration has been the construction of dams that blocked adult fish from returning to spawn. A recent publication by the Department of Environmental Protection, Office of Marine Fisheries, states that "many of the runs in Connecticut have been exterminated or reduced to low levels due to the construction of dams which block the migratory path of adult fish and eliminate potential spawning habitat upstream." If fish ways are built, anadromous fish runs may re-establish themselves with restoration stocking of adults from nearby established runs.

In establishing a successful fisheries restoration program, accurate historical information on the existence of anadromous fish runs and important recreational fisheries in each coastal embayment is essential. For example, the effort to restore Atlantic salmon to the Connecticut River was due in part to the knowledge that salmon had once inhabited the river. Further investigations, based on this historical information, identified environmental constraints to salmon migration which were subsequently removed during the restoration program.

At present, information on fish runs in Connecticut coastal embayments are poor or nonexistent. The absence of historical catch statistics for individual embayments (catch data was usually combined into state reports) hinders restoration efforts. Other historical publications, such as local newspapers, often showed that a particular embayment had one or more locally important fisheries. /This information needs to be collected and compiled in a usable format. It could then be used in educational programs conducted by the University of Connecticut Sea Grant College Program and in assisting D. E. P. Marine Fisheries staff in identifying environmental constraints and possible restoration activities. This information also could enable allocation of limited resources to those areas found to have significant historical inshore fisheries or anadromous fish runs. At the present time, neither Sea Grant Marine Advisory staff nor D.E. P. Marine Fisheries staff has the time required to research information on each embayment. To undertake Extension outreach educational programs and review sites for possible restoration historical base line catch data, presence of historical anadromous runs and the existence of obstructions to fish migration must be identified.

This grant will support a graduate student who would research historically fishery information and compile it into a final progress report. Reference publications for this research are available at the libraries at the University of Connecticut at both Storrs and Avery Point, the Stevens Marine Library at the Connecticut River Museum in Essex, and the Blount Research Library at Mystic Seaport. The Department of Environmental Protection Marine Fisheries staff has offered access to old Board of Fisheries and Game files and records. Municipal records also would

be reviewed and Yale University indexes of microfilmed shoreline newspapers would be consulted.

Review of Literature – Relevance to Environmental Health

The negative effects of shoreline alteration, such as dredging, filling, pollution and the construction of coastal structures upon marine resources have been well documented in the scientific literature (Reid, 1961; NSA, 1969). However, it is often difficult to quantify these impacts upon specific fisheries and fish populations especially with respect to water quality. Fishery resource managers have acknowledged this difficulty and prefer fishery statistics from individual water bodies rather than grouped state landings "...such data may be a more useful indicator of the condition of that water body." (D.E.P. L.I.S.S., March 1989). The ability to quantify the link between the losses of habitat to declines in fish resources in a given region can be made by examining historical literature. This is especially the case with anadromous fisheries. A Connecticut State Board of Fisheries and Game publication found that dams have had a profound effect upon historical anadromous fisheries (C.S.B.F.G., June, 1962).

At present public policy has reflected the widely perceived concept of reduced fishery landings associated with estuarine degradation. A Department of Environmental Protection publication states that "...it is the policy of the Department of Environmental Protection Marine Fisheries Program to assist in efforts to prevent further pollution and degradation of Long Island Sound and to reduce present pollution so that populations of marine resource species can exist at the highest level of natural abundance and be fully utilized by Connecticut citizens" (D.E.P. Resources Management Plan for Connecticut, 1985). The report also concludes that ecologically and economically important fish and shellfish habitats have suffered because of man's influence.

The State of Maine Department of Marine Resources has found that smelt returning to spawn show strong avoidance of monochloramine, a substance in sewage treatment waste water discharges which may have eliminated or severely reduced historical runs (Jolly, 1976). Assumptions can be made when there is universal agreement that shoreline development activities in Connecticut have destroyed or altered the ecology of more than half the tidal salt marshes and that this has had a profound effect on all coastal resources (Niering and Bowers, 1966). It must also be acknowledged that large alterations in habitat caused by natural events such as storms and hurricanes have also been shown to effect fisheries production. Recent studies have been undertaken to review the correlation between habitat loss and changes in fish stocks (N.).A.A. Seminar Series #3, 1987) with respect to individual coastal embayments that have been altered or degraded by development activities. Opportunities do exist to identify environmental constraints that can diminish fish populations (an environmental status report of the Connecticut River Basin 1970-1983 C.R.W.C.).

A study of the contamination of Quincy Bay, Massachusetts (U.S. Environmental Protection Agency Report, June, 1988) found that cancer (neoplasm) in the livers of winter flounder were “clearly more prevalent in highly polluted urban embayments in comparison with non-polluted, near coastal and offshore environments.” Auster (1980) found that the occurrence of necrosis in winter flounder in New Haven Harbor suggests that environmental conditions may be a causative factor for high incidences in the inner harbor. Therefore, the assembling of a preliminary report on the historical presence of seasonal fisheries and migratory population of anadromous species may help identify significant declines in fish populations. This research could then be used in assisting with the research efforts to identify negative environmental impacts, commence possible restoration activities, and improve the health of Connecticut’s coastal embayments. This could coincide with Connecticut’s Environmental Plan 2000 goal with fisheries and fisheries habitats. The plan, which addresses 43 environmental issues, states that the objective in this area is to “foster natural propagation of fisheries and provide for sustained yield management of selected species and protect, maintain and restore fisheries habitats.” A constraint to this activity mentioned that “habitat information is absent, outdated or incomplete on certain streams, rivers, lakes and ponds, and on the Long Island Sound.”

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Methodology

Key tasks and work plan:

- A. to identify historical runs of anadromous fish in eastern Connecticut between the towns of Branford and Stonington.
- B. To document, where possible, the existence of locally important eel, flounder and blue crab fisheries in the above-mentioned towns.

- C. Prepare a joint SGMAP/DEP final progress report with appropriate bibliography of references.

Methodology A and B – Review available literature, historical documents; compile references; conduct and document interviews with appropriate travel to and around eastern Connecticut.

Methodology C – In cooperation with D. E. P. Marine Fisheries staff, write a final process report detailing any historical fish runs and fisheries in each selected embayment. The progress report will be published by the Sea Grant Marine Advisory Program.

Work Plan

- 1- 4 Weeks – Gather references, interview D. E. P. Marine Fisheries staff, professors at the University of Connecticut College of Agriculture and Natural Resources at Storrs, appropriate researchers.
- 4- 8 Weeks – Visit marine research libraries (Stevens Blount, Avery Point, Storrs), conduct interviews with local residents.
- 8- 12 Weeks – Investigate local records in Town Halls, conduct personal interviews with retired Connecticut Board of Fisheries and Game staff, unite progress report.

The graduate student will work closely with the principal investigator and will provide and be provided strong support services (telephone, photo copier, office space, clerical help) and guidance by the Sea grant Marine Advisory Program.

This project requires a senior or graduate student with an environment/natural resources background. Complementary skills in marine fisheries and or political/public policy would be advantageous.

Future Plans

Additional Research Funding Opportunities – Upon completion of this research, an effort will be made to obtain additional grant funds to document changes in fishery habitat, specifically to investigate biological/environmental conditions of selected embayments found to contain historically significant fishery resources.

The E.P.A Office of Marine and Estuarine Protection under the National Estuaries Program (Section 320-A) of the Clean Water Act (amended by the Water Quality Act of 1987) anticipates grant funding opportunities for fisheries management/restoration programs.

Study Results Dissemination – The Sea Grant Marine Advisory Program (SGMAP) is an outreach educational program of the University of Connecticut Cooperative Extension Service. The results of this cooperative SGMAP/DEP study would be incorporated into Sea Grant Program seminars, workshops, forums and slid-lecture presentations. The results of this research will be published in our newsletter, “Connecticut Currents”

which has a readership of 7,000. Additional information will be made available by various other Sea Grant/Extension publications. Sea Grant/Extension clientele audiences include conservation organizations, civic groups, commercial and recreational fishermen's associations, municipal commissions and boards, elected officials and members of the public. At present, the Sea Grant Marine Advisory Program is in the third year of a cooperative agreement with the Environmental Protection Agency (total funding to date: \$295,000) to develop and coordinate public involvement activities for the Long Island Sound Study, a federal/state partnership program.

**Update on Connecticut Smelt
December Public Hearings Conducted by the State Department of
Environmental Protection**

Comments on closing the smelt fishery- December 2006, Old Lyme, DEP office

“It is a shame it’s come to this point (Eastern CT Fishermen). I still see some –I use balls of soft cat food to catch them- Pawcatuck River Stonington. Some years I see them, some years nothing,”

Dave Simpson CT DEP – you try not to close the fishery like this because you loose the opportunity to collect information about the fishery (from the fishermen).

Notice of availability of Final Proposed Regulations October 23, 2006.

1. 26-142a-1. Remove RAINBOW SMELT from, and add bay anchovy, sheepshead minnow, mullet species and various shrimp families to, the list of species that may be taken commercially in the inland district; clarify the title of regulation section; make corrections o scientific names; and make technical corrections.
2. 26-142a-4. Make technical corrections to the citations of other regulation sections; and eliminate a reference to the closed season for RAINBOW SMELT so that commercial fishing is prohibited.
3. 26-142a-6. Make technical corrections; make title and textual clarifications; delete gear references related to RAINBOW SMELT; require that gill nets fished under authority of a personal use gill net license be personally attended by the licensee; and delete obsolete references to gear used to take glass eels.
4. 26-159a-1. Clarify the tile of the regulation; and prohibit the take or possession of RAINBOW SMELT in the marine district or in inland waters where commercial fishing is allowed.

A notice of intent to amend and adopt these regulations was published in the Connecticut Law Journal on November 8, 2005. Public hearings were held on December 8, 2005 and December 12, 2005 and the public comment period was kept open until December 2005.

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