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The Commonwealth of Massachusetts
DIVISION OF FISHERIES AND WILDLIFE

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Leverett Pond Aquatic Weed Control Project: Fisheries Assessment

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Leverett Pond is a fertile, 69-acre warm water pond located one mile east of Rte. 63 north of Depot Road. Access is off Long Hill Road via an unimproved car-top launch. The pond is characterized by clear water color, with a mean depth of 9.0 feet and a maximum depth of 20.0 feet and a shoreline of 1.9 miles. Water chemistry factors are within average range for ponds in the Connecticut Valley area, with the exception of a fairly high pH (6.5) reported in a 1981 report.

Surveys conducted in 1974, 1981 and 1994 identified a warm water fish community which consisted of the following species (ranging from abundant to occasional): Pumpkinseed (*Lepomis gibbosus*), Bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), chain pickerel (*Esox niger*), smallmouth bass (*Micropterus dolomieui*), black crappie (*Pomoxis nigromaculatus*), brook trout (*Salvelinus fontinalis*), golden shiner (*Notemigonus crysoleucas*), brown bullhead (*Ictalurus nebulosus*) and American eel (*Anguilla rostrata*).

The presence of brook trout as an apocryphal species (there is no survey evidence to support or deny the presence of trout in Leverett Pond) is contrary to the 1981 survey which reported no evidence of trout water. A 1950 survey had shown 5% trout water, water which combines temperature and dissolved oxygen requirements suitable for trout; it is possible that the almost complete coverage of the bottom by aquatic vegetation reported in 1981 would be responsible for this loss of cold, well-oxygenated water.

Fisheries Community and Management in Leverett Pond

In these surveys, where the information from the 1981 survey is the most comprehensive, fish condition factors were found to be above average for most species (bluegill, pumpkinseed, largemouth bass, chain pickerel and black crappie) when compared to state averages. Growth rates, however, were found to be average (pumpkinseed, chain pickerel) or below average (bluegill, largemouth bass and black crappie) when compared to state averages.

Condition factors are calculated comparing length and weight, and can be used to investigate the overall "well-being" of fish in a water body, and also allows comparison across a variety of water bodies. Above average condition factors at Leverett Pond in 1981 would seem to indicate that the fish were growing well compared with other water bodies across the state, based solely on the relationship of length to weight observed in the fish sampled.

Although the "well being" of the fish community appeared above average in most cases, the average and below average growth rates give an indication of unbalanced, or stunted, populations of bluegill, largemouth bass and black crappie. While the relationship between weight and length created above average condition factors, the fish were generally smaller and slower growing as shown by the slow growth rates.

Management objectives at the time were to improve access, control the stunted sunfish populations, and to raise the largemouth bass PSD to 50%. Recommendations to achieve these objectives were to purchase an access point, introduce a large esocid to control panfish (sunfish), and to control aquatic vegetation if good access was obtained.

The present methodology is to use more extensive comparison (age through scale analysis combined with length-weight information) rather than the more general PSD method. PSD, or

Proportional Stock Density, is the proportion of quality size fish in a stock. It is a comparison between quality fish of a minimum size or greater (in our state this would be the legal minimum size for possession) divided by the total number of fish in the sample. A low PSD would indicate few fish at or above the legal limit for possession, and is an indicator of a stunted population skewed to smaller fish.

In 1986, 200 nine-inch Northern Pike (*Esox lucius*) were introduced into Leverett Pond as a predator species for reducing stunted panfish (sunfish) populations. Although the 1994 survey results do not report any northern pike being sampled, the esocids are particularly adept at sensing and avoiding the field of electroshocking equipment. The current survey also observed a profusion of sunfish species, ranging from 2 cm to 20+ cm, and all size classes seemed represented. Further investigation needs to be performed to determine the exact size distribution of sunfish species and to conclude if the northern pike were successful in reducing the stunting of these species.

Further investigation is needed to determine the size and growth range of largemouth bass, a highly desired gamefish species. Due to the early sampling date (bass and other Centrarchids are best sampled when they are spawning, generally late May to early June), the sample size can not be considered comprehensive although it may be representative.

Future plans are to sample Leverett Pond before the end of the weed removal project, and complete analysis of bass and sunfish collected will be conducted.

Weed Control Implications in Fisheries

The management implications of vegetation removal / control were unadressable until the present project was proposed. Removal and control of rooted aquatic vegetation can be beneficial in many ways to the fish community, and this may occur in both direct and indirect fashion. The project currently underway at Leverett Pond seeks to control the spread of undesireable plants (Eurasian water milfoil and bladderwort) as well as the re-opening of channels currently overgrown with water lillies. It is generally felt by fisheries biologists that less than a 30% surface area coverage by aquatic vegetation will maximize fisheries potential in lakes and ponds.

The most directly beneficial aspect of the current project, as well as the strongest fisheries management tool, is increased access for anglers. Gamefish presence, and car-top accessibility in close proximity to a major urban area (Amherst/Northampton) will attract anglers to Leverett Pond. Increased fishing for both game- and panfish species will improve the balance of the fish community. Reestablishing channels and maintanining them will provide access to the deeper area of the pond and allow fishing throughout the pond, rather than isolated pockets.

Channelization will probably increase movement of fish through the pond. Areas previously unsuited for breeding may once again be free of aquatic plants. In species such as largemouth bass, which requires a solid substrate for nesting, the channels and adjacent bottom may encourage reproduction. Removal of the plants in the channels will also reduce the area available for small fish to hide in and reduce population pressure through predation. Small fish, while forming part of the food chain themselves, also utilize a large amount of the zooplankton and phytoplankton in a water body.

Increasing the amount of edge available through channelization allows increased escapement for fish species, as well as better hiding for some predators. This may seem paradoxical since a goal is reducing the small / stunted fish, but allowing edge increases the ability of predators, especially pike and pickerel, since they utilize the vegetation as a hiding area-- darting out when a prey species passes. Edge also allows escapement of small fish, so that the heightened efficiency of the predators

will not remove all of the prey fish.

Improvement of water circulation is also probable with channelization and removal of bladderwort and Eurasian water milfoil. Increased circulation should improve oxygen levels throughout the pond and minimize the effects of late summer uptake by aquatic vegetation on DO levels available to fish. The removal of Eurasian milfoil, which can grow in very dense profusion, will be especially beneficial to local DO levels. Although there is no apparent evidence of summer DO kills at Leverett Pond, sampling in 1994 revealed winter-kill fish which is the result of fish pooling-up in available water, then being isolated from circulation due to deep ice. At some point, vegetation might serve as a hindrance to fish movement in such situations.

A Disclaimer

There are many issues involved in a particular weed control project, and range far and wide from fisheries issues alone. In the case of Leverett Pond, it appears that extensive thought and follow through has gone into all areas of the development of this project. This analysis is based on current literature and discussion, and is for use only in discussing fisheries implications on this particular project.

Literature Consulted in the Preparation of this Assessment:

Bond, Carl E. 1979. Biology of Fishes. Saunders College Publishing, Philadelphia, PA.

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Maitland, PS. 1990. Biology of Fresh Waters, Second Edition. Chapman and Hall, New York, NY.

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MASS. DIV. OF FISHERIES & WILDLIFE DRAFT RESULTS
ELECTROSHOCK STUDY

4/26/94

MITCH- I Haven't had time to type this up, but here's a rough draft:

Leverett Pond 4/26/94

Method: CVWO Shock boat; shocking time 4355 seconds @ 120 VDC (output 6 amps) 6:35 - 9:00 PM

Sample Species Present: (length / weight)

Brown Bullhead: Total = 3 Total wgt = 430 grams
(252 mm / 220g ; 220/120 ; 202/310)
9.9" 8.7" 11.4"
9% 7.8%

Chain Pickerel: Total = 15 Total wgt = 1139 grams
(333/240; 310/95; 416/420; 196/49; 148/20; 136/15;
13.1" 12.2" 16.4" 7.7" 5.8" 5.4"
144/20; 168/30; 350/250) plus 5 unweighed
5.7" 6.6" 13.8"
45% 20.6%

Largemouth Bass: Total = 14 Total wgt = 3850 grams
(220/130; 417/1000; 469/1610; 250/190; 239/140; 97/10
8.7" 16.4" 18.5" 9.8" 9" 3.8"
165/50; 246/200; 170/30; 190/90; 199/80; 217/130;
6.5" 9.7" 6.7" 7.5" 7.8" 8.5"
176/10; 234/180)
6.9" 9.2"
42% 69.8

Black Crappie: Total = 1 Total wgt = 100 grams
(201/100)
7.9"
3% 33 559 gm

Centrarchids / Sunfish spp: the common species were found in such profusion that they were not collected. Size range appeared from 2cm to 20cm and all size classes were represented.

WHAT IS # ?

I will attempt to get this into the machine and formalized for Monday; I'll send it along to you then.

Thanks for getting me out on the Pond.

Dave Brewer.

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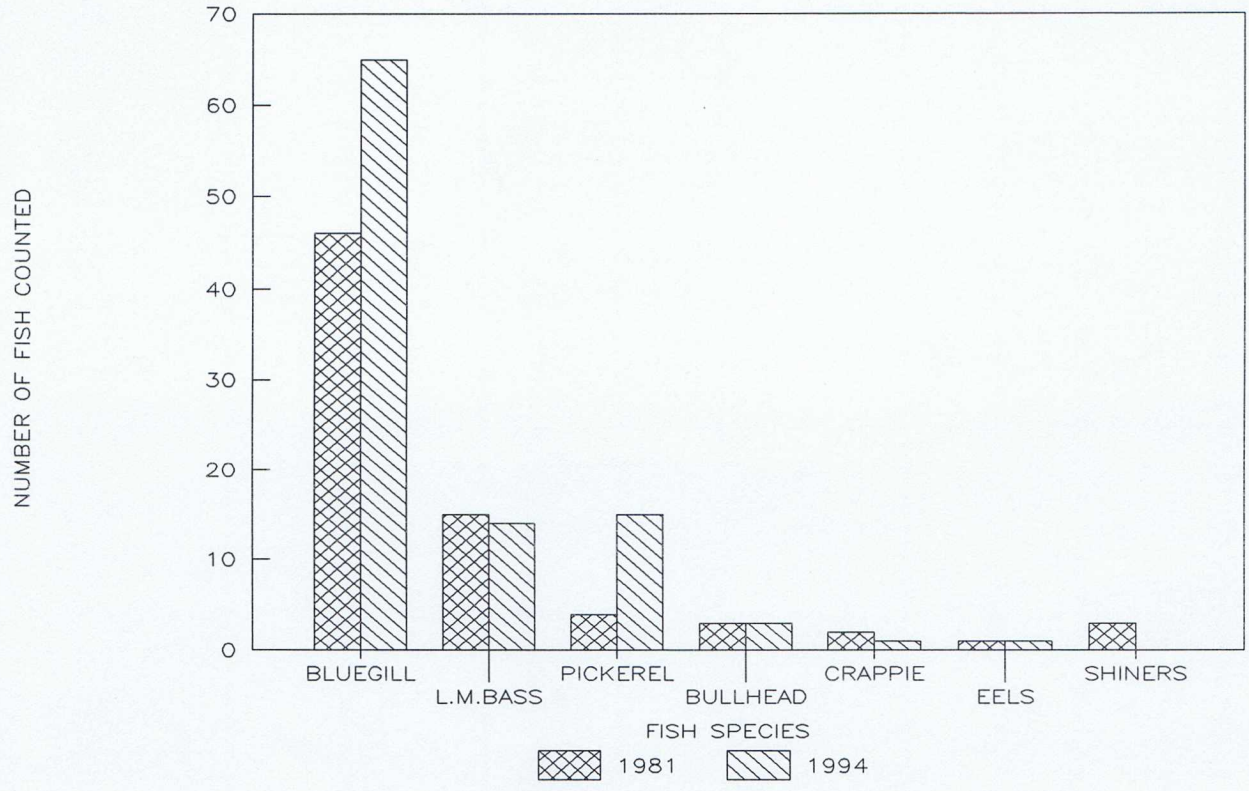
FISH SPECIES IN LEVERETT POND

RESULTS OF MDFW ELECTROSHOCK STUDIES



By Mitch Mulholland