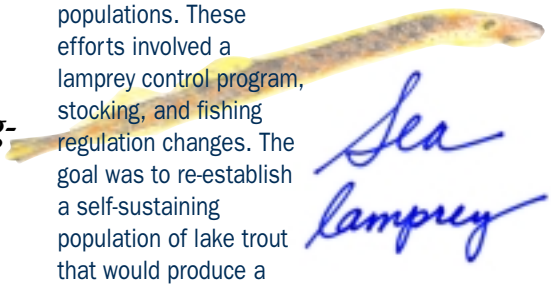
Enhancing Trout Fishing

Diver holding a lake trout caught on its spawning grounds. Photo by J. Ellen Marsden

Coastlines asked project assistant Lane Smith to focus on two NYSG fisheries research projects that have had long-term impact for nearly a decade.

The lake trout (*Salvelinus namaycush*) was once the top-level predator throughout most of the Great Lakes and was an important species for the sport and commercial fishery. By 1960, populations of lake trout had collapsed due to predation by the sea lamprey (*Petromyzon marinus*), overfishing, and habitat loss. Beginning in the early 1970s efforts were underway to restore lake trout populations. These efforts involved a lamprey control program, stocking, and fishing regulation changes. The goal was to re-establish a self-sustaining population of lake trout that would produce a surplus for harvest.



Although stocking has maintained adult populations in Lake Ontario since 1973, no natural recruitment of lake trout was detected until 1994. The first evidence of natural reproduction by stocked fish was found in 1986, when wild fry were captured, but no yearling fish were detected until 1994. Since 1994 naturally produced lake trout older than fry (one year and up) have been detected in assessment programs by the state (i.e., natural recruitment was occurring). This was due to a change in stocking practice that focused on a particular strain of lake trout. Prior to 1991 the Lake Ontario stocking program released several genetic lake trout strains into Lake Ontario (the original Lake Ontario native strain is extinct). The idea was that one or more of the strains might be best suited to conditions in the lake. Through natural selection, the best suited strain or strains would survive and recruit into the fishery. The question was which strain or strains survived the best and reproduced the most? By answering that question, the stocking program could use the best strain or strains for rehabilitating the lake trout population.

In a NYSG-funded study, researchers **Dr. Charles C. Krueger, Dr. Bernie May** and **J. Ellen Marsden** of Cornell University examined the parental strain of lake trout eggs and fry collected in Lake Ontario in 1990. To see if different strains spawn at different times, they compared differences in strain composition of early and late spawned lake trout eggs. The team also compared the strain composition of naturally spawned eggs collected in the fall and wild caught fry collected in the spring to see if certain strains survive winter better (spawning occurs in the fall and fry hatch out in the spring). Lastly, the scientists compared the strain composition of wild caught eggs and fry with Lake Ontario hatchery strains of lake trout. This would reveal which of the hatchery strains are most successful in the wild.

Genetic comparisons showed that the Seneca strain was the most successful overall. Both eggs and fry collected in Lake Ontario were dominated by the Seneca strain. The scientists also found that while the hatchery fish released into the lake were comprised of several strains, wild caught fry were dominated by the Seneca strain. The team concluded that the Seneca strain produced the most eggs and fry in Lake Ontario.

These results had clear management implications for the rehabilitation of lake trout in Lake Ontario. After learning that wild caught fry were dominated by the Seneca strain, New York State DEC weighted their stocking towards the Seneca strain. Out of 0.5 million lake trout stocked annually, 67% are Seneca strain, up from 20% before the project. Assessment programs by the state now detect small numbers of yearling trout in the lake. It appears that natural recruitment of lake trout into the next generation is now occurring at a small scale in Lake Ontario. The goal of achieving a self-reproducing population of lake trout in Lake Ontario is closer due to this research. The future looks hopeful for this once dominant native of the Lake Ontario ecosystem.

Diver collecting lake trout eggs. Photo by J. Ellen Marsden

Perkins, D.L., Fitzsimons, J.D., Marsden, J.E., Krueger, C.C., and May, B. 1995. Differences in reproduction among hatchery strains of lake trout at eight spawning areas in Lake Ontario: genetic evidence from mixed-stock analysis. Journal of Great Lakes Research 21: 364-374.

Marsden, J.E., Krueger, C.C., and Grewe, P.M. 1993. Genetic comparison of naturally spawned and artificially propagated Lake Ontario lake trout fry: evaluation of a stocking strategy for species rehabilitation. North American Journal of Fisheries Management 13: 304-317.