concerns over how this would effect the small bait fish such as smelt and alewives that salmon eat," says MacNeill. "This, in turn, prompted fisheries managers to enact stocking changes to maintain the sustainability of the fishery, a measure that was not universally accepted."

To make matters more difficult, Mother Nature continues to throw curve balls. For example, MacNeill says that despite the declines in lake productivity, salmon catch rates remain good and many trophy-sized fish continue to be caught. Lake Ontario remains the acknowledged leader in terms of sizes of trout and salmon in the Great Lakes. Also, Lake Ontario alewives have shown some signs of a population rebound in the last two years — possibly due to warmer than average water temperatures which may have led to more successful reproduction of the invasive species.

Another uncertainty in the stocking formula is the unknown contribution of naturally produced salmon in the system. For several years, biologists on both sides of Lake Ontario have observed some numbers of naturally produced chinook salmon in the lake's tributaries — no doubt the result of improving habitat conditions in these streams and rivers. Says MacNeill, "There are no hard and fast estimates, but most will agree that it is considerable. There is also no information on the relative survival of stocked versus wild chinook salmon. This is important information in the predator-prey dynamics of the lake."

He continues, "Obviously, without more accurate estimates of how many predators are in the lake, how they are surviving and how many are being added through natural production, the management of the predator-prey system is extremely difficult. Clearly, by quantifying these parameters, more precise management strategies can result."

To this end, one of the main objectives of Sullivan's research project is to compare long-term data sets with newly collected information to estimate relationships between survival, growth and prey production with changes in water quality indicators in the lake. The effort will also seek to determine the relative abundance of naturally produced and stocked salmon and ascertain the diet and distribution of the fish in relation to prey abundance and distribution with nets, trawl and acoustic assessment. In addition, Sullivan and his fellow researchers on the multi-faceted project intend to estimate the effects of the changing lake food web on young salmon survival and growth and ultimately develop a public outreach program to pass on the project results to the fishery stakeholders.

Sea Grant is also funding researchers interested in developing and improving aquaculture technologies — those involving the culture of marine and aquatic animals. These technologies will be geared towards further support of the commercial and recreational fisheries and fishing industries as well as to ensure high quality and safe seafood end products. In a newly funded separate study, Cornell University researchers **Paul Bowser** and **James Casey** are examining the little known swim bladder sarcoma virus — a disease recently identified in the United States as affecting populations of the commonly cultured Atlantic Salmon.

In addition to concerns over ecological impacts on New York's Great Lakes salmon populations, increasing attention has also been given to coastal habitat restoration opportunities in New York. In a new NYSG project overseen by SUNY College of Environmental Science and Forestry's **Karin Limburg**, the ecological constraints on establishing a freshwater resident population of blueback herring will be examined. The little known blueback, a crucial forage invasive species of the Hudson River, has expanded its population westward through the New York State lock and canal system into the Mohawk River and Lake Ontario. With a focus on the Mohawk/Hudson Drainage region, this research effort will look at critical population parameters to assess the blueback's pottential for successful establishment and spread.

Long-term evolutionary effects of harvesting on the dynamics of fish populations is the focus of ongoing studies being conducted by **David Conover** of SUNY Stony Brook's Marine Sciences Research Center. This new offshoot of Conover's research will examine a very fundamental aspect of the effect of fishing mortality on wild populations and its implications for future fish populations. Natural mortality typically has its largest impact on smaller fish, while fishing activity usually claims larger fish. According to Conover, "If size-selective fishing mortality can be shown to influence the evolution of growth rate and other life history traits, the potential long-term consequences of conventional fishery management strategies on fish populations, such as minimum size limits, will need to be re-evaluated in both marine and Great Lakes environments." Conover will continue experimental size-selective harvesting of captive Atlantic silverside populations to fully evaluate the magnitude of evolutionary change in growth rate and correlated traits.

– Paul C. Focazio

"The special focus project is expected to make a significant contribution to fisheries management.

— Jack Mattice"

Sea Grant on Sea Lamprey

In a new project tied to Great Lakes fisheries, Isaac Wirgin from the NYU School of Medicine will examine genetic diversity in sea lamprey. These upstream spawning, parasitic fish have had a detrimental effect on trout and salmon for decades. With some consideration being given to phasing out chemical applications for lamprey control, non-chemical approaches such as the release of sterile males and the construction of low-head barrier dams are being practiced. These dams prevent the upward migration of lamprey without disrupting the movement of other fish. Information on their reproductive strategy and the degree of genetic differences among Great Lakes tributaries and between Great Lakes and Atlantic coast populations should serve to enhance eradication efforts and their cost-effectiveness.