



Over the last several decades, numerous non-native, exotic fishes have invaded the state's waterways. Some of these fishes have become established and are thriving in their new lake or river system home. The white perch in Green Bay is one example of a successful invader. White perch populations have increased to the point that anglers and commercial fishers have asked if they can expand their allowable catch to include the harvest of this particular exotic fish.

These user concerns prompted the Department of Natural Resources (DNR) to conduct contaminant testing



on white perch in Green Bay. Specifically, biologists wanted to examine whether PCB concentrations varied by location in Green Bay, by season, or by length of the harvested fish. This study would be a more extensive examination of PCB concentrations in an individual species of fish from a particular area than the DNR typically conducts when issuing sport fish consumption advice.

PCBs, White Perch, and Green Bay

The PCB concentrations in white perch in Green Bay were initially analyzed in the early 1990's. The results showed that the fillets of the tested fish contained more than 2 ppm (micrograms PCBs per gram of fish tissue). The upper limit for PCBs in fish for sale in commercial markets under the rules of the Food and Drug Administration (FDA) is 2 ppm.

The Wisconsin Department of Health and Family Services and the DNR issue fish consumption advice for sport anglers that ranges from "unlimited" to "do not eat" based on the concentration of PCBs and other contaminants. In 1997, the advisory recommended that individuals eat no more than six meals of white perch each year from Green Bay or the lower Fox River (below the DePere Dam).

Currently, sport fishing for white perch in Green Bay is open all year, with no daily bag or minimum length limit. Commercial fishers are allowed limited incidental harvest of white perch from Green Bay, but demand has been limited because of concerns over PCB concentrations.

Questions about the information presented here may be directed to Candy Schrank, 608/267-7614; candy.schrank@dnr.state.wi.us or Bill Horns, 608/266-8782; william.horns@dnr.state.wi.us

The Methods

In 2001 and 2002, white perch samples were collected for analysis to determine if PCB concentrations in white perch fillets varied by location in the Bay, by season, and by length of the fish. Collection location, season, age (length), and fat content were expected to affect PCB concentrations in the tested fish. Gender may also be important in PCB accumulation depending on the fat content of eggs relative to tissue fat. However, identifying male and female fish can be very difficult at times, so the effect of gender was not examined.

Monitoring was designed to collect white perch from 5 locations (within grids - see map to the right) in the bay in 3 seasons (spring, summer, and fall) over the size range of white perch.

Other contaminants are also known to occur in Green Bay fish but were not expected to be of major concern compared to PCB concentrations. However, eight fish were also tested for mercury.

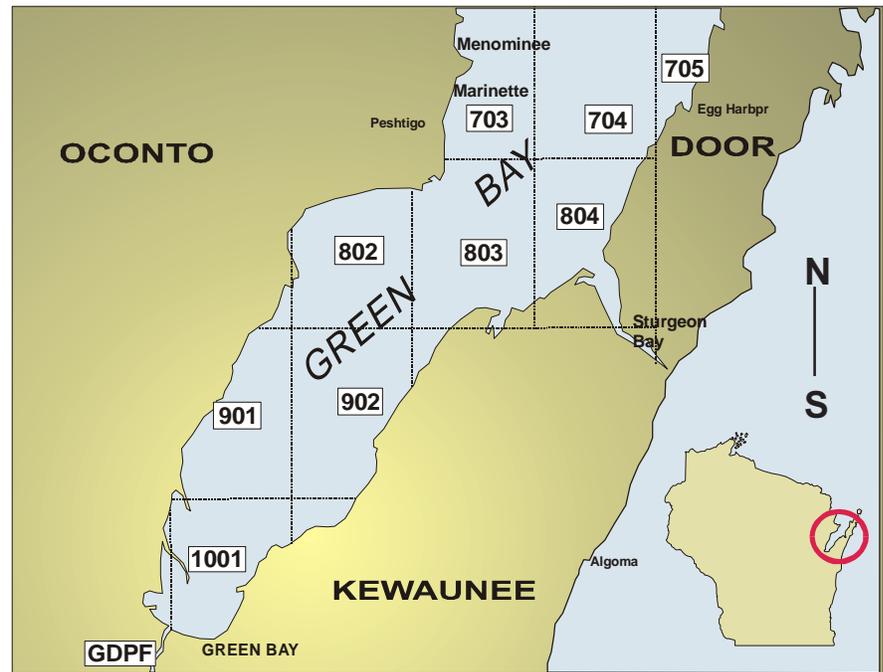
The Results

The fish analyzed in 2001-2002 ranged in size from 6-13 inches. PCB concentration in fillets ranged from 0.13 parts per million (ppm) to a high value of 2.2 ppm. Fat ranged from 0.6 to 10%. PCB concentrations for each season and grid are displayed on the following page. Based on the analyses, the following observations are noteworthy:

PCB Content of Fillets

- PCB concentration is moderately associated with fat and less so with length and weight. Fattier fish tend to have higher concentrations of PCBs. Length, weight, and fat content are good indicators of the condition of the fish.

- PCB concentrations in white perch fillets differed by location of the collections. PCB concentrations of fish



The Green Bay grid system used to sample white perch by season and location.

collected from the southern most grids (1001, 901, and GPDF) were higher than concentrations in fish collected from the northern grids (803 and 703). This is not unexpected since the Fox River, at the south end of the bay, is the major source of PCBs to the bay.

- PCB concentrations differed by season of collection. Fish collected in the spring had the highest PCB concentration, followed by fall, and then summer.
- Length did not explain the difference in PCB concentrations. PCB concentrations plotted against the length of white perch are shown in the graphic on the following page.

Fat Content of Fillet

- Fat was significantly higher in the fall fish compared to the summer fish. Whereas PCBs in fillets were associated with location of collection, fat content was not. In comparison, PCBs and fat were both associated with season of collection.

Mercury

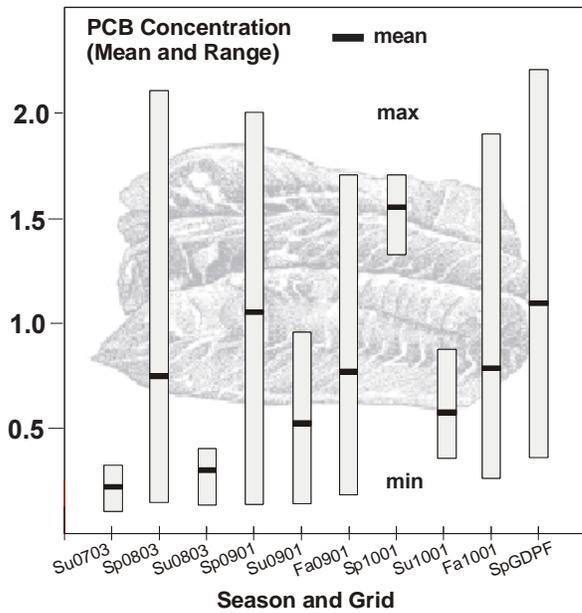
- Fillets from 8 individuals were analyzed for mercury. Mercury

concentrations averaged 0.20 ppm with a range of 0.07 to 0.28 ppm. Although this is a limited amount of data, it appears that mercury concentrations in white perch are comparable to the average concentrations found in panfish species (e.g. bluegill, perch).

The Conclusions

Sport Fish Consumption Advisory - Based on the 2 most recent years of data (1996 and 2001-2002), the consumption advice will remain at 6 meals/year.

Harvest - The 2001-2002 harvest information suggests that PCBs in white perch fillets reflected both the location of capture and the season in which they were collected. To minimize the chance of harvesting an individual fish that exceeds 2 ppm, fish should be taken from the northern grids (703 and 803). However, individual fish with PCB concentrations equal or greater than 2 ppm were found in 3 grids (803, 901, and below the DePere Dam) during this study.



PCB concentrations by seasons and grids, 2001-2002. Statistical analysis showed season and location were significant.

In addition, this study suggests that by fishing during the summer months, primarily August, one may minimize the chance of harvesting an individual that exceeds 2 ppm. However, the seasonal pattern demonstrated by the 2001-2002 sampling may not hold true in the future. The highest PCB concentrations documented occurred in the summer of 1994. Year to year variation was not tested in this study.

Although length was not statistically significant for the 2001-2002 data, harvesting of smaller individuals should minimize the chance of a fish exceeding 2 ppm PCB.

The levels of PCBs and fat in white perch may vary with abundance of white perch, growth rates, and food availability and type, in addition to short-term and long-term changes in PCB exposure. Any of these factors may change in future years so future concentrations cannot be predicted from the 2001-2002 information. Future monitoring will be considered to examine year to year variation in white perch pending availability of funds to collect fish, handle and process samples, and conduct chemical analyses.

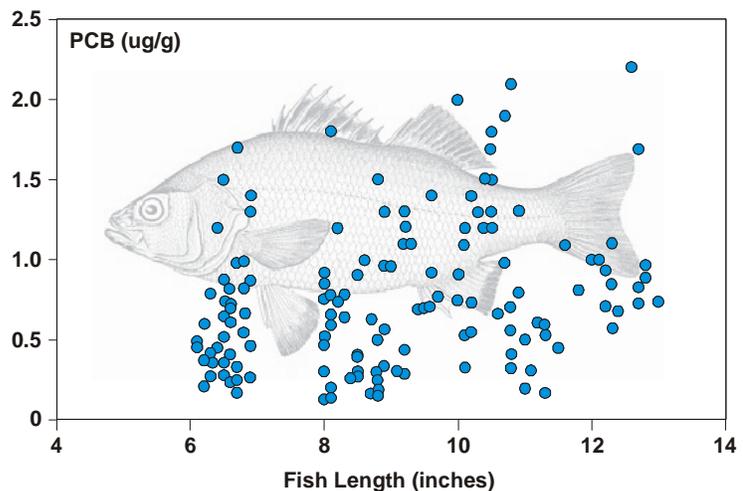
Commercial Sale - Three out of 145 individual fish contained PCBs equal or greater than FDA's 2 ppm standard for commercial sale of fish. There was no apparent pattern to these three fish other than they were all collected in the spring. Although these individual fish tended to be larger fish, they were not the largest. Also, these individual fish were collected from 3 different grids.

The Department of Natural Resources shares contaminant information with

other agencies including the WI Department of Agriculture, Trade and Consumer Protection (DATCP) and the FDA. The responsibilities of DATCP and FDA include establishing standards of quality for fish that are distributed for commercial sale. It is the responsibility of those who wish to market white perch to comply with FDA and other applicable regulations.

The DNR will share the results of this monitoring with FDA and DATCP representatives. Fishery biologists who work on Lake Michigan will use the results of the study to make management recommendations on the harvest of white perch. At this time, however, the DNR is not making any determinations on whether white perch from Green Bay are acceptable for commercial sale.

FYI: The white perch is native to Atlantic coastal regions from Maine to South Carolina. It invaded the Great Lakes through the Erie and Welland canals in 1950. It slowly moved westward until the first noted occurrence in Wisconsin in the Green Bay /Fox River area in 1988.



PCB concentrations by fish length for all seasons and grids, 2001-2002. Statistical analysis showed that length was not significant.