



MEETING SPONSORS

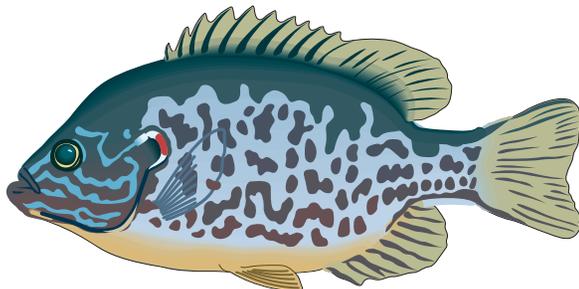
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Wisconsin  
American Fisheries Society  
Celebrating 40 Years!



January 31– February 2, 2011  
Ramada Hotel  
Stevens Point, Wisconsin



**PR-1**

**Reminiscences about the American Fisheries Society and the  
Wisconsin Chapter pre-1983**

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Abstract: I plan to reminisce about my early thoughts of the American Fisheries Society and the Wisconsin Chapter.  
But here I document a short timeline of our beginnings from the chapter's archives:

**1965 June.** Ed Schneberger sends a memo to Bill Threinen, Lyle Christenson and John Brasch about the possibility of forming a local chapter.

Reasons: to give (Wisconsin) fishery workers an opportunity to assemble and exchange information and to bring (AFS) societal activities closer to those members who are unable to attend either the meeting of the parent society or that of the division. AFS local chapters were first formed during Ed's term as president of AFS in 1962-3.

**1968 August.** Bill Threinen, Lyle Christenson, and Tom Wirth canvassed Wisconsin members of AFS to see if they were interested. Almost all responded favorably. October. Bill Threinen petitioned AFS through Bob Hutton, executive secretary at AFS, to start the process to establish a Wisconsin Chapter.

**1969 January.** A planned February organizational meeting for a state chapter was cancelled owing to limited funds. March. AFS Executive Committee approved the Wisconsin petition.

**1971 July.** The Wisconsin Chapter had an acting President (Bill Threinen), an acting Vice-President (John Magnuson), and an acting Secretary-Treasurer (Lyle Christenson). They prepared a set of purposes and bylaws for a Chapter that were sent to the Parent Society.

**1972 July.** Bill Threinen contacted Dan Coble and asked him to be President of the chapter. Dan was our first formal president and the four of us formed an ad hoc working group to activate the chapter. Saturday February 26. Our first meeting was held at the University of Wisconsin-Stevens Point. In the

invitation Dan Coble stated the purposes:

--in the first meeting it might be best to have as many people as is practical from various university campuses and Department of Natural Resources and federal biologists take 15 minutes or less to tell the gathering what kinds of studies in aquatic biology are being conducted at their institutions.

Ninety persons attended; sixteen spoke from various state and federal agencies and universities. The meeting ended with a social and we were on our way home by late afternoon. Registration was \$2. We elected our first set of officers: Dan Coble - President, Bob Hunt - Vice President, and Roy Stein - Secretary-Treasurer. Bill Threinen was warmly elected Past President

**1974 January 11 & 12.** Our second meeting was held in Stevens Point. Bob Hunt, then chapter President, presided. Again a broad range of institutions and diverse topics were apparent. Some sessions were tutorials on impact statements and on biological production; others were original research in fish and fisheries biology.

We were well underway!



## P-11

### Response of a diminutive coldwater fish to warming in the world's largest lake

Mark. R. Vinson

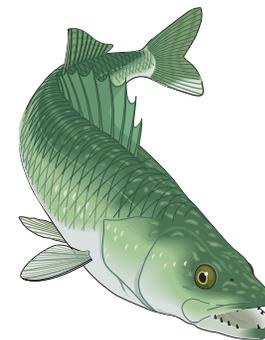
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Abstract: Lake Superior's 2.5 °C increase in mean summer surface water temperatures over the past 30 years is one of the greatest documented temperature increases of any habitat worldwide. We took advantage of a long-term record (1978-2010) of water temperature profiles and fish collections in Lake Superior to evaluate bottom temperatures and the depth distribution of pygmy whitefish (*Prosopium coulterii*), a small demersal prey fish in Lake Superior. Preliminary analyses suggest that spring bottom temperatures increased about 0.8 C over this period. Pygmy whitefish abundance-weighted mean depth of collection increased from about 72 m in 1978 to about 96 m in recent years; a ~7 m per decade rate of deepening. In warm years, fish were generally collected in deeper waters than in years when spring water temperatures were colder. In 2010, summer surface water temperatures were the warmest on record in Lake Superior and the mean abundance-weighted depth of collection of pygmy whitefish was 105 m, the deepest on record. This rate of deepening is similar to that observed in many North Sea demersal fishes that have deepened up to 14 m per decade (1980-2004) in response to a winter bottom temperature increase of 1.6° C.



## P-10

### Building the infrastructure for large-scale connectivity restoration in the Great Lakes Basin

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**Abstract:** Poorly designed or maintained road crossings can block fish migration and deposit excessive sediment in stream channels. Alternative crossing designs have been developed that minimize negative effects on streams and fish passage. However, there are often too many problem crossings in an area to address in the short term and some crossings have a disproportionate effect on stream connectivity. Our model for prioritization showed that the cost to benefit ratio could be greatly lowered for a watershed. For example, in the Pine-Popple watershed in northeastern Wisconsin, a target connectivity index value of 0.8 could be achieved for \$2 million through prioritization, but would cost approximately \$6 million with random project selection. Together, these factors (i.e., lowered cost and greater connectivity) mean that prioritizing restoration projects is a useful approach to maximize the restoration of stream connectivity.

This report describes a field protocol for estimating a passability ranking that represents the proportion of individual fish that are able to pass through a crossing. It also describes the development and implementation of a series of connectivity metrics oriented toward stream-resident fishes. The objective of this project was to develop methods that could be used to quantify connectivity patterns and prioritize restoration efforts across the Great Lakes Basin.

## PR-2

### Teaching Lessons in Stewardship and Exploitation Through Fisheries Biology

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**Abstract:** High angler exploitation limits the quality of many bluegill fisheries in Wisconsin. Through fisheries research targeting the effect of exploitation, we empowered youth from the Rhineland Environmental Stewardship Academy and shoreline landowners with knowledge of how to enhance or conserve the quality of the bluegill fishery. We compared quality bluegill (> 8.0 inches) abundance and length/age distribution of three fisheries with different levels of harvest to demonstrate the effect of exploitation on the quality of the fishery. The bluegill relative abundance in Manson Lake was 65 bluegills/fyke net and less than 1.0% of the bluegills captured were > 8.0 inches. The bluegill population in Roy Fredrich Lake has 162 fish/acre (81 bluegills/fyke net) in which 19% of the bluegills captured were > 8.0 inches. The bluegill population of Blair Lake has 183 fish/acre (106 bluegills/fyke net) in which 56% of the bluegills captured were > 8.0 inches. In Manson Lake, only 3.0% (n=64) of the bluegills aged were > 7 years of age. In Roy Fredrich Lake, 61% (n=80) of the bluegills aged were > 7 years of age. In Blair Lake, preliminary results show 60% (n=24) of the bluegills aged were > 7 years of age. Length/age analysis suggests that the quality fisheries in Blair and Roy Fredrich Lakes are the result of below average growth over a long life-span. Over the next decade and beyond, providing hands-on, place-based research experiences may empower communities to achieve higher standards in conservation and stewardship.



Wolf River Spawning walleyes in holding pond 1945. WDNR photo

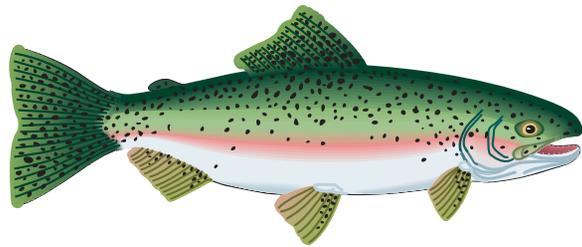
**PR-3**

**Historical Look at Fish Propagation in Wisconsin**

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Abstract: I will give a brief review of events in the development of aquaculture efforts within the Department of Natural Resources beginning in 1871 and extending to the 1990s. This is intended to lead in to presentations relating to current efforts in fish propagation in Wisconsin



**PR-4**

**Improved Culture Techniques for Larval Lake Herring**

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Abstract: Lake herring (*Coregonus artedii*) has historically been a valued species for commercial fisheries in the Great Lakes. Lake herring has not been cultured as an aquaculture species in the past because of its natural abundance and ease of netting commercially. With declining populations alternative sources of lake herring for reintroduction, fillets, and roe must be found.

The goal of this project was to build upon culture techniques that have been independently developed under research conditions and establish viable commercial culture practices for the propagation of lake herring using new aquaculture technologies.

**P-9**

**Upper Colorado River Endangered Fish Recovery**

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Abstract: The Colorado River is host to four endangered fish, Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*). The populations of these fish species have been greatly reduced by human impact to habitat, construction of dams, river flows cut by approximately 1/3 and the introduction of more than forty non-native species.

A coalition of agencies, tribes and organizations came together in 1988 to recover endangered Colorado River basin fish and provide for future water development for agricultural, hydroelectric and municipal uses, thus forming the Upper Colorado River Recovery Program (UCRRP), and shortly thereafter the San Juan River Recovery Implementation Program (SJRRIP). The geographic scope of the UCRRP and SJRRIP includes the Colorado, Gunnison and San Juan rivers of Colorado, Utah and New Mexico. Since 1988, this approach has allowed the Fish and Wildlife Service to issue favorable biological opinions on some 600 water projects in Colorado, Utah and Wyoming with a potential to use more than 618,000 acre-feet of water. Under this agreement, as long as sufficient progress is being made toward endangered fish recovery, the Service will issue favorable biological opinions for most water depletion projects.

This poster will cover efforts focused on the recovery of these four endangered species.

P-8

### The Great Lakes Mass Marking Program

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Abstract: State, provincial, federal, and tribal agencies in the Great Lakes annually stock over 30 million salmonines to diversify fisheries, restore native species, and control invasive fishes. Because few fish receive any mark before stocking, little is known about post-release survival, contribution to fisheries, and natural reproduction. To address these needs, the Council of Lake Committees, Great Lakes Fishery Commission, promoted the development of a basin-wide program to tag and mark all stocked salmonines. This effort would provide greater insight into relative survival, the efficacy of stocked fish to restore native species, the ability to limit harvest of wild fish (unmarked), and to improve hatchery operations. After evaluating several marking and tagging options, coded-wire tags combined with adipose clips (ADCWT) was the method selected, modeled after the program for marking Pacific salmon (*Oncorhynchus* sp.) in the northwest United States. The U.S. program will be operated by U.S. Fish and Wildlife Service (Green Bay, WI), and when fully developed, will tag about 25 million fish per year. This mass marking effort will use the AutoFishT automated marking and tagging trailers, and may require up to 8 trailers and 3 manual trailers (total equipment costs: \$12 million U.S. in 2007). Annual costs including tags, recovery efforts, and tag extraction services, will be about \$6 million. An operational plan has been completed to provide tagging services to 25 hatcheries, and to recover tagged fish during surveys, from anglers, commercial fishers, and charter boat operators, and cooperatively analyze the data. Implementation began in 2010, and 5.7 million lake trout and Chinook salmon received ADCWTs at state and federal hatcheries.

PR-5

### A Historical Look at Warmwater Fisheries Management in Wisconsin

Gordie Priegel

WDNR Retired

Abstract: I will give a brief review of events in the management of warmwater fisheries within the Department of Natural Resources. This is intended to lead in to presentations relating to current efforts in fisheries management in Wisconsin.

PR-6

### The role of climate in walleye recruitment and potential effects of climate change 1950-2006

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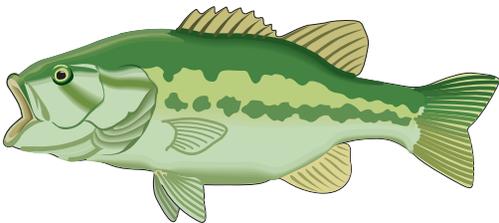
Abstract: Walleye (*Sander vitreus*) populations in Wisconsin support valuable recreational and tribal fisheries. We examined the role of seasonal temperature and precipitation in walleye recruitment and then estimated changes in walleye recruitment between 1950 and 2006 based on changes in climatological variables. We constructed a regression tree using climatological variables (winter precipitation, spring precipitation, spring maximum temperature, spring minimum temperature, summer precipitation, summer maximum temperature, summer minimum temperature, fall precipitation, fall maximum temperature, and fall minimum temperature) which were estimated at the 8 km<sup>2</sup> scale between 1997 and 2006 as predictive variables, and the associated walleye age-0 walleye density as estimated from 298 fall electrofishing surveys which occurred between 1997 and 2006. Spring precipitation and summer maximum temperature were included in the final model with higher spring precipitation and summer maximum temperature being associated with higher walleye recruitment. We then used estimated changes in climatological variables that occurred between 1950 and 2006 in each 8 km<sup>2</sup> cell to determine expected walleye recruitment in 1950 and 2006. Our model had modest explanatory power ( $R^2=0.103$ ) but predicted a small overall increase in walleye recruitment in Wisconsin between 1950 and 2006 although the results were spatially heterogeneous with predicted increases in recruitment in the south central part of Wisconsin with no predicted changes based on climate in the rest of the state.

**PR-7**

**Demographic variables, stocking, and genetic characteristics of walleye populations in northern Wisconsin.**

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Abstract: A key goal in the management of Wisconsin's walleye (*Sander vitreus*) is to maintain the genetic integrity of naturally recruiting populations. Previous studies have suggested threats to the genetic integrity of walleye including inbreeding and low effective population size. Management practices and population dynamics can impact the genetic characteristics of fish populations. The objective of this study was to determine if management and demographic variables were related to the genetic characteristics of walleye populations. Walleye populations were electrofished from the majority of the observed spawning habitat approximately one week after spawning had commenced. Genetic data (10 microsatellite loci), growth rate, condition, and population data were gathered for nine populations representing three recruitment categories: naturally reproduced (NR) (n=4), stock augmented (C-ST) (n=3), and primarily stocked (C-ST) (n=2). Genetic data was used to estimate inbreeding, effective population size, and genetic diversity for all populations. Relations between genetic characteristics, and stocking or demographic variables were assessed by stepwise regression. Relations between condition factor and early growth rate with population genetic characteristics were tested using stepwise regression. Significant positive relations were observed between stocking and genetic diversity measures. Negative relations were observed between stocking-related measures and condition factor. The results of this study provide insight into the impacts of demographic variables and management activities on the genetic integrity of walleye populations in northern Wisconsin.



**P-7**

**Precision of Scales and Pectoral Fin Rays for Estimating Age of Highfin Carpsucker, Quillback Carpsucker, and River Carpsucker.**

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Abstract: Previous attempts to age *Carpoides* spp. have focused on the use of scales or dorsal fin rays. Past studies indicate that obtaining age estimates from these structures in other species is difficult and inconsistent. We examined between-reader precision of age estimates of scales and pectoral fin rays for 123 highfin carpsuckers (*Carpoides velifer*), 174 quillback carpsuckers (*C. cyprius*), and 135 river carpsuckers (*C. carpio*). Precision of age estimates was assessed through measures of agreement, the coefficient of variation (CV), and a confidence rating. Exact agreement between readers was higher for fin rays (highfin carpsucker = 82.1%; quillback carpsucker = 75.9%; river carpsucker = 77.0%) than scales (highfin carpsucker = 69.5%, quillback carpsucker = 68.9%; river carpsucker = 71.1%). In addition, CV was lower for fin rays (highfin carpsucker = 2.28; quillback carpsucker = 2.43; river carpsucker = 2.90) than scales (highfin carpsucker = 2.95; quillback carpsucker = 3.00; river carpsucker = 3.46). Fin rays were also assigned a higher confidence rating (i.e., mean readability, 0-3 with 3 being high; highfin carpsucker = 2.22; quillback carpsucker = 1.95; river carpsucker = 1.92) than scales (highfin carpsucker = 1.53; quillback carpsucker = 1.51; river carpsucker = 1.68). Based on these results we recommend the use of fin rays for obtaining age estimates from *Carpoides* spp.



**P-6**

**Comparison of otolith and scale methods for ageing bluegill and black crappie**

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Title: Co-Author: Alan Niebur

**Abstract:** Abstract: Traditionally scales have been used to estimate the age of Centrarchids as they are easily collected, relatively easy to process, but the interpretation of annuli can be difficult and precision is usually low. The use of otoliths to estimate age is gaining popularity in many age estimation studies since they can be much easier to interpret with high precision, and for many fish species, are a validated age structure. The objectives of our study were to compare the precision of scale and otolith methods using coefficient of variation and age bias plots. Scales and otoliths were collected from a sample of 167 bluegill, (*Lepomis macrochirus*) and 117 black crappie (*Pomoxis nigromaculatus*) collected by a combination of fyke netting and electrofishing in five Northeast Wisconsin lakes during 2009 and 2010. Scales and otoliths from each fish were aged independently by two readers. Coefficient of variation of the scale method for bluegills and black crappie averaged 10.1 and 6.8% respectively. Coefficient of variation of the otolith method for bluegills and black crappie averaged 0.9 and 0.3% respectively. Bluegill age bias plots showed both underestimation and overestimation of scales compared to otoliths depending on the waterbody. Black crappie age bias plots showed overestimation with scales compared to otoliths. Our results show that otoliths are a more precise estimator of age of bluegill and black crappie. Future work should focus on validation of otoliths as an appropriate structure to accurately estimate age of bluegill and black crappie.

**PR-8**

**Management of a Walleye Population in the Face of Public Adversity:  
A Case Study of Fifty Years of Walleye Management on the Lake  
Winnebago System**

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**Abstract:** The Lake Winnebago System fishery contributes \$234 million to the local economy, primarily targeting the nationally recognized walleye, *Sander vitreus*, population. Through the last fifty years, the walleye population has received varying degrees of research and management attention. In the 1960s Gordon Priegel extensively studied the life history of the population, followed by a period of passive management (1970-1988). Declining adult abundances and extended periods of poor recruitment, spurred the development and implementation of a walleye management plan in 1991, which resulted in a significant increase and stabilization of the population by the late 1990s. A series of public meetings held in 2010 allowed for public input into a management plan update. Some of the concerns expressed at the 2010 meetings were similar to those expressed in the 1960s; most notably that fishing on the Upper Fox and Wolf Rivers should be closed during the spawn. In the 1960s, more than 77.8% of harvested female walleye were caught after spawning and currently 72.7% of harvested mature females are caught outside of the rivers, indicating that the spring fishery is not detrimental to the population. Changes in the ecosystem, fishing trends, and management activities have correlated with changing concerns of fishermen. Currently, fishermen have concerns about the number of tournaments held on the system, increases in aquatic vegetation, and potential effects of electro-fishing on spawning adults and eggs. A pro-active and data-rich walleye management program is critical to managing the Winnebago walleye fishery while effectively involving the public in the program.

**PR-9**

**Recovery of the Lake Sturgeon Population in the Winnebago System, 1970-2010**

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Abstract: The Winnebago System in east central Wisconsin is home to the largest lake sturgeon population in North America and a winter spear fishery that annually produces 1500 fish. My objectives were to describe the changes in abundance and exploitation of the adult lake sturgeon stock in the Winnebago System in the 20th Century, and relate these metrics to management actions, environmental conditions, and public activities during the same period. The current Winnebago lake sturgeon stock was slowly shaped over time by decisions beginning in 1874 with the creation of the WI Fisheries Commission. Harvest was closed during 1915-1931 following the collapse of the Great Lakes sturgeon stocks. The adult stock in Winnebago, spared from collapse in 1915, reached a critical low point in the 1960s due to legal and illegal overharvest in the 1930s-1950s. A series of restrictive harvest regulations in the 1950s helped reduce annual exploitation, but turbidity from non-point pollution was a major factor in maintaining low exploitation in the spear fishery through the 1960s, 1970s and 1980s. Low abundance and poor spearing success spurred the creation of Sturgeon for Tomorrow in 1977 which began funding the Sturgeon Guard program to eliminate poaching during the spawning run. Improvements in water clarity in the 1990s following wide-scale implementation of non-point controls resulted in explosive increases in annual exploitation leading to the formation of the Winnebago Citizens Sturgeon Advisory Committee and a second series of more restrictive regulations including a harvest cap, and shorter spearing seasons and days. From 1970-2010 the adult lake sturgeon stock increased fourfold potentially approaching carrying capacity while maintaining a robust and unique spear fishery with over 10,000 annual participants.

**P-4**

**Using Dorsal Spines to Estimate Percid Age: Are All Spines Created Equal**

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Abstract: Dorsal spines are often used to estimate the age of walleyes *Sander vitreus* and yellow perch *Perca flavescens*. Spine selection has varied among studies and in some cases multiple spines are removed from the same fish over time, but we found no study verifying that all dorsal spines from an individual walleye or yellow perch exhibit the same number of discernible annuli. Our objective was to determine if the first 5 dorsal spines from individual walleyes and yellow perch were similar in appearance and yielded similar age estimates. We found no difference in age estimations among spines for walleye and yellow perch. Walleye clarity ratings did not differ among spines, but the first dorsal spine for yellow perch had significantly lower clarity ratings than the 4th and 5th dorsal spine. Any dorsal spine provided the same age estimate for walleye and yellow perch, but we suggest that the first dorsal spine should not be used for yellow perch due to its relatively s

**P-5**

**The movement of Brown Trout (*Salmo trutta*) in SW Wisconsin Streams A look at how man made and natural barriers pose as obstacles for brown trout spawning**

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Abstract: Trout Unlimited along with the DNR destroy many beaver dams a year, in an attempt to better the trout population. But does it really help? In this research project I used brown trout on two different streams in south west Wisconsin. Tenny Spring Creek (Vernon Co. WI) and Ash Creek (Richland Co. WI). One with a man made barrier to keep brown trout out and the other with a series of beaver dams and found that some trout are able to maneuver over these obstacles, while some are stuck below waiting for the right chance.

P-3

**Predicting the Effects of Daily Bag Limit Reductions on Angler Harvest of Crappies in Wisconsin**

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**Abstract:** Crappies *Pomoxis* spp. along with other panfish like bluegills and yellow perch likely represent the most socially and economically important group of sportfish in the state of Wisconsin. Quality overfishing is perceived as a problem in many panfish populations and fishery managers frequently implement bag limits in an attempt to improve catch rates and size structure of fish available to anglers. The frequency distribution of harvest among anglers is typically skewed because most anglers harvest few or no fish and most bag limits for panfish are too liberal to effectively reduce harvest. Previous studies have suggested that relatively low daily bag limits (i.e., < 10 fish day) are required to effectively reduce panfish harvest. While we suspect that similar trends will be true for crappie harvest in Wisconsin, the predicted effects of various bag limits on harvest have not been analyzed on a statewide level. This information will be useful if the current aggregate daily bag limit for panfish is altered and an individual bag limit is implemented for crappies. Our objective was to determine if reductions in the current daily bag limit for panfish (i.e., 25 fish per day) would result in measur-

PR- 10

**Lake sturgeon population demographics in the Bad River, Wisconsin**

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**Abstract:** We sampled the 2010 lake sturgeon *Acipenser fulvescens* spawning run of the Bad and White Rivers to assess abundance of spawning adults, size structure, growth, age composition, and mortality rates to achieve the recommended goals outlined by the Lake Sturgeon Rehabilitation Plan for Lake Superior and further cooperative management of subsistence harvest. Sampling occurred during April 14 - 30 with a pair of 10 or 12 inch stretch gill nets. A total of 278 lake sturgeon were collected in gill nets; 196 had no previous marks. We used the POPAN model to estimate total spawning population size at 844; 666 (496-836) in the Bad and 178 (111-245) in the White River. Lake sturgeon lengths ranged from 883 to 1,684 mm total length, mean of 1436 mm and 1290 mm for females and males, respectively. A greater proportion of lake sturgeon were females when length exceeded 1,400 mm. Lake sturgeon grew approximately 22 mm per year around age 20, but slowed to only 12 mm per year around age 40. Total length at age 20 and 40 was predicted to be 1080 mm and 1417 mm, respectively. True ages for adult lake sturgeon ranged from 24 to 49 (mean of 34 years) after a correction factor for age estimation error was applied. Instantaneous mortality was 0.11647 and total annual mortality was 0.10994. The 2010 assessment of the Bad and White River furthers the formulation of a comprehensive management strategy and fulfills goals of the lake sturgeon rehabilitation plan for Lake Superior.

**PR-11**

**Lake Sturgeon Movement and Abundance in the Namekagon River and Saint Croix River in the 1960s and 2000s**

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Abstract: The lake sturgeon (*Acipenser fulvescens*) fishery on the Namekagon River and St. Croix River above St. Croix Falls has been closed since 1994 to protect the remaining stock. We conducted population assessment surveys on the Namekagon River and St. Croix River above the confluence with the Namekagon River to address goals in the Upper St. Croix Basin Sturgeon Plan. Lake sturgeon were captured with DC boat-mounted electrofishing and by hook and line. We marked 68 lake sturgeons with PIT tags and dangler tags during 2008-2009 and documented 19 recapture locations. Lake sturgeon showed upstream to downstream movement from early summer to fall within the Namekagon River; however, Minnesota DNR recaptured one lake sturgeon that moved between the Namekagon River and St. Croix River during 2008-2009. Angler tag returns from lake sturgeon marked in 1960 and 1961 and recaptured from 1960 to 1974 showed movement of 19 individual lake sturgeons from the Namekagon River to the St. Croix River. Direct travel distances ranged from 38 miles to 112 miles. Total electrofishing catches of lake sturgeon in one river segment provided the best method to compare abundance changes between time periods and showed the catches averaged 80.5 fish per year during 1960-1961 and 6.5 fish per year during 2008 - 2010. The decline in lake sturgeon catch between time periods suggests the lake sturgeon population is still depressed and should continue to be protected from exploitation.

**P-2**

**Prevalence and Potential Effects of Viral Hemorrhagic Septicemia Virus (VHSV) in Three Lake Winnebago Fish Populations**

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Abstract: A freshwater variant of VHSV type IVb was detected in 9 freshwater drum that were part of a fish kill that occurred on portions of the Lake Winnebago system in Wisconsin during May 2007. Fishery managers and the public are concerned that VHSV could have significant effects on fish populations in Lake Winnebago. During fall 2009 and spring 2010 we tested a total of 1,149 freshwater drum, walleyes, and yellow perch from Lake Winnebago to determine the prevalence and demographics of VHSV within these populations. None of the fish tested positive for active VHSV. Thermal conditions in Lake Winnebago may not be conducive to the persistence of VHSV, which may explain our failure to detect VHSV since 2007. Bottom trawl catch rates of freshwater drum in October 2007 and 2008 were higher than average and similar to or higher than trawl catch rates in 15 of 21 surveys conducted since 1986. In light of prevailing rates of natural mortality and exploitation in walleye and yellow perch populations, potential mortality related to VHSV infection would be inconsequential at infection rates of 5% or less, even if all fish died as a result of infection. Our findings suggest that VHSV infection rates within these three fish populations are currently too low to have significant effects on population demographics and dynamics. Continued testing of freshwater drum and PCR testing of archived samples will provide new information on VHSV prevalence in Lake Winnebago and may allow us to examine sub-lethal effects associated with infection.

# Poster Abstracts

P-1

## Precision of Age Estimation Techniques for Bluegills

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Abstract: Abstract.-Dorsal spines may offer a non lethal alternative to otoliths for estimating the age of bluegill *Lepomis macrochirus*; however, a previous study with black crappies suggested that ages estimated from dorsal spines were consistently lower than ages estimated from otoliths. No previous study has examined the relationship between bluegill ages estimated from otoliths and dorsal spines. Our objective is to determine if among-reader precision and age estimates associated with dorsal spines are similar to precision and age estimates associated with whole and sectioned otoliths for bluegills from Wis-



Seine Haul, Bruce Swanson (left) and Dennis Pratt. WDNR phot

PR-12

## Dealing with Quality Overfishing: Black Crappie Fisheries in Northern Lakes

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Abstract: Many water bodies across the upper Midwest are capable of producing reasonably high catch rates of crappies between 8 and 10 inches on a sporadic basis, but at least some anglers desire increased opportunity for larger fish and generally anglers would prefer more consistency in fishery quality. Reduced daily bag limits and minimum length limits have been implemented to achieve these goals, but evaluations have been poorly designed or nonexistent. Furthermore, little consideration has been given to angler behavior when developing crappie management strategies. Crappie anglers are harvest-oriented, size-selective, and highly mobile, allowing them to quickly exploit emerging opportunities to catch large numbers of relatively large fish until a better opportunity emerges (i.e., binge fishing). My objective was to determine if reductions in bag limits and minimum length limits can be used in some manner to improve black crappie fisheries in 2 northern lakes where crappie population dynamics suggested that improvements are possible (i.e., moderate to fast growth rates, low to moderate natural mortality, and moderate to high exploitation at sporadic intervals). Low bag limits (i.e., < 5 fish per day) and minimum length limits can reduce harvest and likely improve crappie fisheries in some northern lakes, but substantial improvements in the number of crappies attaining lengths of 10 inches or more may not be possible or will require more creative application of harvest regulations. Additionally, the effectiveness of these regulations could be undermined by angler behavior, especially if the regulations are effective and the improved fishing opportunities attract more effort.

**PR-13****Use of Scales, Otoliths, and Anal Fin Spines to Back-Calculate Lengths at Age for Yellow Perch**

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**Abstract:** Yellow perch (*Perca flavescens*) support economically important sport and commercial fisheries across much of their range, including the Great Lakes. The Wisconsin Department of Natural Resources (WDNR) manages both commercial and recreational harvest of yellow perch in Green Bay, Lake Michigan. In order to establish annual levels of allowable harvest, the WDNR evaluates yellow perch age and growth using sectioned anal fin spines and mean lengths at age of capture. Biologists are interested in whether back-calculated lengths at age derived from anal spine sections might offer additional insight regarding the effects of abiotic and biotic factors (e.g. water temperature and age-0 yellow perch abundance) on yellow perch growth in Green Bay. However, no previous study has utilized otoliths or anal fin spines for estimating back-calculated lengths at age for yellow perch. Our objective was to determine if back-calculated lengths at age vary among scales, whole otoliths, sectioned otoliths, and anal fin spines for yellow perch. Relationships between yellow perch length and structure radius appeared to be linear for all structures and several back-calculation models appeared useful for estimating back-calculated lengths at age. Mean back-calculated lengths at age were generally similar among scales, sectioned otoliths, and sectioned anal fin spines. Mean back-calculated lengths at age from whole otoliths tended to be larger than the other three structures. Sectioned otoliths and anal fin spines can be used to back-calculate lengths at age in yellow perch.

**PR-28****Implication of impoundments on flow dynamics of a small headwater stream at Fort McCoy, Wisconsin**

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**Abstract:** Stillwell Creek is a sandy, low gradient headwater stream (drainage area of 5.1mi<sup>2</sup>) that originates on the Fort McCoy Military Installation complex and is a tributary to the LaCrosse River. The drainage area for the cold-water stream is comprised of primarily forest and grassland; however it flows through a cranberry operation located within Fort McCoy boundaries. In 2002, Stillwell Creek was designated as impaired waters due to sediment management concerns.

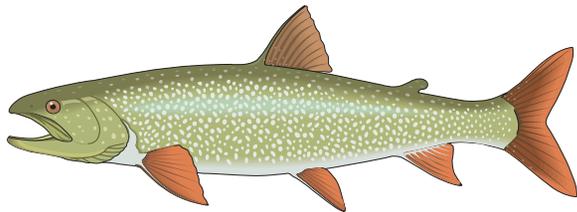
Stream gages were installed upstream and downstream of the cranberry operation where annual streamflow and suspended solids were monitored. A geomorphic assessment indicated that Stillwell Creek has abundant sources of sand-sediment within the stream channel available for movement with the increased frequency of high flows. Site observations and evaluations of both daily and unit value hydrographs indicate that there was an increased number storm-like flow events at the downstream site compared to the upstream given the same precipitation events. The increases in stage at the downstream site were not necessarily related to precipitation additions and were not reflected at the upstream site despite the sites being less than ½ mile apart. In addition, the discharge at the downstream site was determined to be less than the upstream during periods of prolonged baseflow. Constant sedimentation impairs habitat development and given the increased frequency of storm-like flow events, habitat formation may be limited. Fort McCoy has used brush bundling and sediment removal techniques to increase habitat development and protection. The use of adaptive management concepts and identifying beneficial methods including the use of the water resource for sustainable agricultural, may help resolve watershed and fisheries concerns.

**PR-27**

**Trout Angling on Timber Coulee Creek Then (1984) and Now (2008): Creel Survey Results and Management Implications**

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Abstract: We conducted a season-long (March-September) creel survey on Timber Coulee Creek to quantify trout fishing effort, catch, and harvest in 2008. Timber Coulee Creek is an 8.2 mile stream managed as a Class I wild trout fishery consisting almost entirely of brown trout. Angling in about a third of the stream is restricted to catch-and-release only using artificial lures; in the remainder of the stream anglers may keep up to 5 trout per day measuring less than 12 inches. We compared our creel survey results with those obtained by Robert Hunt (Wisconsin DNR) in a 1984 creel survey on a 1.6 mile section of Timber Coulee Creek. In 1984 there was a 6 inch minimum size limit with a bag limit of 2 trout per day (January 1-May 4) and 5 trout per day (remainder of season). We found that in 2008, as in 1984, Timber Coulee provided a high quality brown trout fishery in terms of average size and catch rates. However, we observed significant changes in angler characteristics and behavior. For example, Timber Coulee was primarily fished by local residents living within 25 miles of the stream in 1984 and by anglers living greater than 25 miles from the stream in 2008. Trout angling was heavily oriented towards harvest in 1984 versus catch-and-release in 2008. Only 51 trout were recorded as kept by our creel clerk in angler interviews conducted on 140 days in 2008. We will discuss these differences and their implications for trout management.



**PR-14**

**Muskellunge Management in Central Wisconsin**

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Abstract: The management of muskellunge in the Wisconsin River in central Wisconsin has changed over the years. As the popularity of muskellunge as a sport fish grew, fish managers have changed their management techniques and intensified the sampling effort. Instead of using fin clips to mark stocked muskellunge fingerlings, Visible Implant Elastomer is used to provide estimates of stocking success, growth rates and known age muskellunge. All muskellunge captured during surveys are now double tagged with PIT tags and Internal Anchor Tags which allow anglers to report individual fish. The estimated one year retention rate of Internal Anchor Tags in muskellunge is 94 %. Muskellunge aging, which was done on a limited basis using scales, is now performed using anal fin rays. Aging muskellunge using anal fin rays has not been validated, but fish managers will recapture some of the marked muskellunge to accomplish this. The ability to survey more muskellunge, tag more muskellunge and stock more muskellunge would not be possible without a network of volunteers.

**PR-15**

**Age and Growth of Muskellunge in Wisconsin's Ceded Territory**

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Abstract: Cleithra were used to estimate age and to back-calculate growth histories of muskellunge *Esox masquinongy* to determine the scope for growth among a range of populations producing small-, medium-, and large-bodied fish in Wisconsin's ceded territory. Wisconsin muskellunge had an average asymptotic length of 43.2 in. Female muskellunge grew larger ( $L_{\infty} = 44.5$  in) than males ( $L_{\infty} = 40.1$  in). Small-bodied populations had an average asymptotic length of 30 in, medium-bodied populations had an average asymptotic length of 43.6 in, and large-bodied populations had an average asymptotic length of 54.9 in. I conclude that muskellunge in Wisconsin's ceded territory attain lower asymptotic length than other North American populations.

**PR-16**

**Stream Habitat Conditions and Biological Assessment  
of the Menomonee River Watershed**

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Abstract: This presentation presents the results of an inventory and analysis of the surface waters and related features of the Menomonee and River watershed (Full report SEWRPC Memorandum Report No. 194, Stream Habitat Conditions and Biological Assessment of the Kinnickinnic River and Menomonee River Watersheds: 2000-2009, January 2010; see <http://www.sewrpc.org/SEWRPCFiles/Publications/mr/mr-194-kk-mnr-stream-habitat-biological-assessment.pdf>). Information pertaining to the historical trends and current status of habitat (physical, chemical, and biological) quality and ecological integrity, bank stability, and potential limitations to water quality and fishery resources is addressed. Specifically, it summarizes the biological and habitat quality within urban/urbanizing watershed; identifies factors potentially limiting the aquatic community and habitat quality; identifies information needs; provides recommended goals, objectives, and actions to address the impairments; recommends a prioritization strategy to maximize project cost effectiveness; and recommends post-project monitoring to assess project success. Data were provided by WDNR, USGS, MMSD, and Bob Anderson from the Wisconsin Lutheran College. This presentation/report is intended to provide a strategic framework for decision-making for the purpose of protecting and improving recreation, water quality, and fisheries.



**PR-26**

**Fisheries history of the Namekagon River, post-Pleistocene,  
to 2100  
(With special reference to the last forty years).**

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Abstract: The author details the fishery history of the upper Namekagon River in Bayfield and Sawyer County. The Namekagon was designated a Federal Wild River in 1968, and is one of the first four rivers so designated. Management during "Wild River" period, which overlaps the authors tenure at Hayward, will be highlighted. Topics which will include: logging, beaver, special regulations, stocking, wild trout, big woody cover, the Fishery Management Plan, brook trout-brown trout, and adaptive management to climate



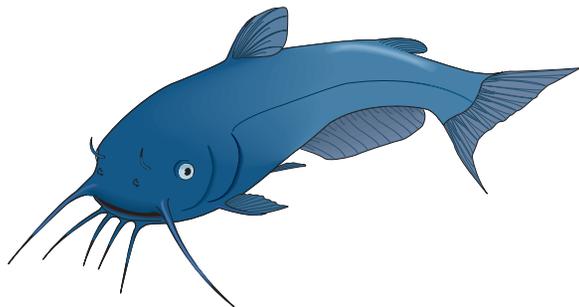
WDNR photo

PR-25

### Linking Large-scale Geomorphic Characteristics to Small-scale Fish Distribution Patterns

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**Abstract:** We conducted a study of shallow water fish assemblages in three reaches of the Lower Chippewa River in western Wisconsin. The reaches were distinguished by the stability and diversity of their channel form; features quantified from analyses of historic aerial photographs. For each reach, we mapped the distribution of backwater, island, sandbar and riffle habitats. Fish surveys then were conducted from each habitat type to characterize the link between fish diversity patterns and local habitat- and reach-scale conditions. With respect to habitat availability, we found the greatest diversity and abundance of habitats in the unstable, braided reach. All habitat types were more common in this reach, but the most distinctive feature was its many islands, which added greatly to the overall habitat abundance. By contrast, shallow water habitat was most scarce in the stable, simple reach. Fish assemblage structure varied among habitat types, but also among reaches and over the summer survey period (from early to late summer). We encountered nearly 50 fish species in surveys completed at 70 sites distributed across approximately 30 km of the river. The importance of this work lies principally in its effort to link large-scale geomorphic characteristics (channel dynamics) to small-scale fish distribution patterns; however, there were other notable findings from our work. Among them was the finding that imperiled fish were much less common in our survey than 10 years ago, when a similar study was completed.



PR-17

### Genetic Structure of Surrogate Species and its Use in Sportfish Management in Wisconsin

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and Dr. Martin Jennings, Department of Natural Resources.

**Abstract:** Fish propagation can disrupt the genetic integrity of populations and obscure historical stock boundaries. In Wisconsin, genetic structure of walleye (*Sander vitreus*) and muskellunge (*Esox masquinongy*) is mostly consistent with major watersheds; however, a major disjunction occurs in the headwaters of the Chippewa River. Populations of both species from this region are more similar to populations in the Upper Wisconsin River watershed. Whether this disjunct is because of natural zoogeographic processes or cross-watershed stocking/translocation is important for implementing stock-based management. Assuming that genetic structures of aquatic species are mostly consistent, surrogate species with no stocking/translocation history can provide insight into the cause of this disjunct. Our objective was to determine if the genetic structure of rock bass (*Ambloplites rupestris*) and johnny darters (*Etheostoma nigrum*) are consistent with previously identified walleye and muskellunge genetic structures. Ten rock bass and six johnny darter populations from target subwatersheds mostly surrounding the area of disjunct were sampled. Genetic structure was estimated using six microsatellite loci per species. Resolved structure was consistent with watershed boundaries and, thus, contradicted the walleye and muskellunge findings. These initial findings are consistent with stocking/translocation of sportfish being responsible for the previously observed disjunct. However, further sampling will be performed in 2011 (target 26 populations/species) and additional population genetic data (12 loci/species) will be collected to provide sufficient statistical and experimental power. This study will assist effective genetic stock-based management of coolwater fishes in Wisconsin including accurate broodsource selection and appropriate delineation of management units.

**PR-18****Backcalculations vs. Biochronology: Is there a Better Method for Interpreting Fish Growth Responses?**

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**Abstract:** The development of comprehensive and integrative metrics for understanding population level growth responses to environmental factors such as climate, exploitation, and trophic interactions is a major goal of fisheries ecology. It is well-established that the incremental growth patterns of the hard parts used for age determination in many fish species correspond to somatic growth. Back-calculation of fish lengths from hard part incremental growth is the traditional method used to study historical growth patterns in fish, but it is not the only method. Biochronology, similar to dendrochronology (the study of tree rings), is based on separating the intrinsic and extrinsic effects that both contribute to growth patterns.

The objective of this study was to compare back-calculations to biochronology while investigating whether fish growth corresponded to exploitation, establishment of an invasive species (a new forage base), and changes in climate. Annual increment widths were measured from thin-sectioned freshwater drum (*Aplodinotus grunniens*) sagittal otoliths, which were recently validated for age determination of this species. The fish length to otolith radius relationship was found to differ significantly between sexes; therefore, back-calculations were separated between males and females. Mixed effects von Bertalanffy growth models were constructed from back-calculations and the parameters were compared among subgroups from different time periods. The freshwater drum biochronology was derived using a linear mixed effects model. Both methods revealed information about the growth history of drum; however, there were fewer steps for constructing the biochronology, and the biochronology values were less autocorrelated and more sensitive for interpreting year-to-year fluctuations.

**PR-24****Utilizing Vacuum Tumblers to Remove Methyl Mercury Levels in Fish Fillets**

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 Co-Author: Dan Neumann and Ned Thornton/ Creative Culinary Solutions, Inc. and Jon Koshir, Elizabeth Lauer, and John W. Ejnik Ph.D. / University of Wisconsin-Whitewater

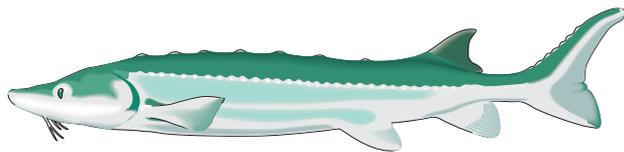
**Abstract:** Fish is an important source of nutrients for human consumption. However, mercury levels in larger predator fish has resulted in safety concerns related to fish consumption. Fish consumption is the main source of methyl-mercury exposure in humans. Consumption of fish contaminated with high levels of mercury is known to cause neurological damages to children and developing fetuses and aging adults. As a result, the U.S. Environmental Protection Agency (EPA) and 48 of the 50 states have issued advisories to limit or avoid the consumption of certain fish. A joint effort between UW-Whitewater and Creative Culinary Solutions, Inc. is underway to remove mercury from fish fillets. The technology proposed in this abstract is a food marinating processing technique which will lower methyl mercury concentrations in fish tissues (fillets) for human consumption. The removal of the methyl mercury from the fish tissues will occur as a pre-cooking/marinating process which utilizes vacuum tumblers (Marinade Express) from "Creative Culinary Solutions, Inc." Results of 30% to 70% mercury removal have been achieved by varying marinating solutions and fillet sizes. As a result this method will produce fish fillets healthier for human consumption by reducing methyl mercury along with fish fillets with longer shelf lives and better taste.

**PR-23**

**Balancing Dam Safety and Fisheries Resources Needs:  
A Story of Dam Removal on the Middle Bark River,  
Waukesha County, Wisconsin**

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Abstract: Due to an emergency drawdown order issued by WDNR dam safety engineers during the June 2008 flooding event, all the boards were removed from the high hazard Roller Mill Dam. Although the impoundment was drawn down slowly, this led to significant deposition of approximately 1.5 to 2 feet of sediments into the downstream reaches of the Bark River below the dam, which has been accumulating within the impoundment for more than 100-years. The inundation of the sand and gravel substrates represents a significant loss of habitat for fish and other aquatic organisms. Since the remaining super structure of the dam has yet to be removed, there is substantial risk of additional sediment loading and associated habitat degradation to the downstream reach and Upper Nemahbin Lake. Therefore, this study was initiated to monitor the response of fish and macroinvertebrate communities of the Middle Bark River upstream and downstream the dam. Six additional fish species below the dam and three species above the dam were observed in the summer of 2010 compared to previous collections made in 2000 and 2008. However, the slender madtom (*Noturus exilis*) endangered species, has not been observed below the dam since deposition of sediments of the post-drawdown condition. Macroinvertebrate sampling in the upstream and downstream riffle areas in 2010 pro-



**PR-19**

**A Historical Look at Great Lakes Management in Wisconsin**

Lee Kernen  
WDNR Retired

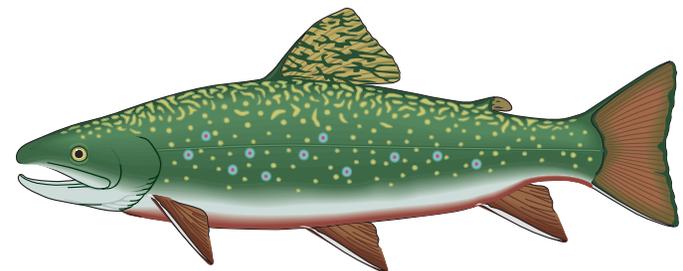
Abstract: I will give a brief review of events in the management of Great Lakes fisheries within the Department of Natural Resources. This is intended to lead in to presentations relating to current efforts in fisheries management in Wisconsin.

**PR-20**

**Great Lakes Fishery Commission Initiates a Massive  
Assault on Sea Lamprey Larvae**

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Abstract: The Great Lakes Fishery Commission has embarked on a strategy of large-scale control effort to suppress sea lampreys to target levels. The strategy was deployed in Lake Erie during 2008 - 2009, is being deployed during 2010 - 2011 in Lake Huron where it is projected to reduce sea lamprey spawners by an estimated 116,000 animals from the current average of 149,000 animals beginning in 2012. Preliminary results of the 2010 treatments are reported and plans for 2011 treatments are discussed. Future options to deploy the strategy in Lake Superior or Lake Michigan are being developed.



**PR-21**

**A comparison of spatial distributions of lake whitefish in the Apostle Islands, 2007-2009, to historical distributions**

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Abstract: Lake whitefish (*Coregonus clupeaformis*) were tagged between 2007 and 2009 as part of a Wisconsin Department of Natural Resources study to examine current spatial distribution of whitefish in the Apostle Islands region of Lake Superior. Whitefish were tagged in a total of 54 locations from commercial trap-nets set throughout the islands in the summer months for each year. A total of 317 fish were recaptured in a total of 27 locations, primarily from commercial trap-nets. Mark and recapture locations were entered into GIS to map and examine the overall distribution of mark and recapture locations. Distribution patterns summaries were generated from pivot tables and through an examination of fish moving to and from five specific locations. All recaptures occurred in the Apostle Islands region except for a single fish that was recaptured in Michigan Waters and one fish recaptured west of Bark Bay. Overall, despite a steadily increasing population, the general trends of movement appear to have not changed from historical trends. Specific homing and spawning sites can be examined based on data trends.



Wolf R. walleye fishing spring run Fremont bridge 1948 WDNR photo

**PR-22**

**Mixed-Stock Analysis of Lake Michigan's Lake Whitefish Commercial Fishery**

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Abstract: Stock-based management of the lake whitefish (*Coregonus clupeaformis*) commercial fishery in Lake Michigan requires more effective and accurate allocation of harvest between jurisdictions (e.g., Michigan and Wisconsin). Six stocks of lake whitefish have been identified in Lake Michigan, providing a framework for stock-based. The objective of this research was to determine if genetic stocks of Lake Michigan lake whitefish were differentially harvested in the commercial catch by total proportion, spatial differences, or seasonal differences. Genetic samples (n=150/sample) were collected during spring, summer and fall (pre-spawn) from two seasonal locations, Big Bay De Noc (MI) and North and Moonlight Bays (WI), and from six randomly chosen (season and location) landing sites throughout Lake Michigan (total samples = 18). Samples were genotyped at 11 microsatellite loci consistent with a reference dataset of 12 known spawning aggregates used to delineate the six primary genetic stocks. Mixed stock analysis of the commercial harvest was performed using a maximum likelihood estimate of genetic mixture. Chi-squared tests were used to determine differences between samples. The six stocks differentially contributed to the total harvest sample. The location of harvest failed to provide an accurate 'predictor' of stock contributions. At any given location and season, a minimum of four stocks contributed to sampled fishery; spatial differences and seasonal differences were found between all samples for both 2009 and 2010. By providing a more accurate means of estimating stock contribution to the fishery, these findings will aid in more efficient management of Lake Michigan's commercial harvest.