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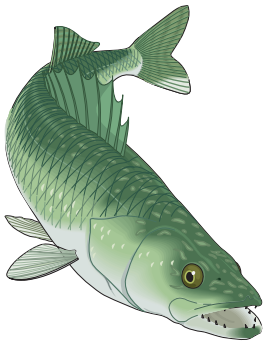

American Fisheries Society

Wisconsin Chapter

February 1-3, 2010
Hotel Sierra
Green Bay, Wisconsin

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Recent events on the Chicago Sanitary and Ship Canal

The last twelve months have seen an exponential rise in activity and interest in the Dispersal Barrier project and the Asian carp issue. Cross-basin flooding, use of a new genetic technique for monitoring and complicated maintenance operations have challenged and expanded the scope of the barrier project. We are moving into a new realm of activity on the Chicago Canal as Illinois and the rest of the Great Lakes states and provinces wrestle with how to accomplish ecological separation of the Great Lakes and Mississippi River drainage basins to prevent the spread of aquatic invasive species. I will discuss the current status and future of the barrier project, the potential for Asian carp to become established in the Great Lakes and issues related to ecological separation of the Great Lakes and Mississippi River.

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Using environmental DNA for aquatic surveillance and monitoring: lessons learned in the pursuit of the Asian carp invasion front

Detection of rare species is exceptionally difficult in aquatic environments, especially in deep (>2m) or fast flowing water. Typically, aquatic populations are estimated from measures of relative abundance, using mark-recapture or depletion electro-shocking methods where the target organism is at moderate to high densities. However, these approaches often perform poorly when the species is in low abundance or difficult to capture/recapture. To aid surveillance efforts for hard to detect or rare species, we have developed protocols that utilize cellular material shed by target organisms into the water column. Fishes, including Asian carp, slough DNA into the environment in the form of mucoidal secretions, feces, and urine. These biological materials can be held in suspension and transported, as DNA degradation is not instantaneous. Shed DNA in effect produces a plume that can be used to delineate site occupancy by the target organism. Our workgroup has developed techniques to analyze water samples for bighead and silver carp DNA, to detect the low densities of fish likely present at the invasion front in the Chicago Sanitary and Ship Canal and associated waterways. Through a series of steps, which includes water filtration, species-specific molecular amplification, and gel electrophoresis, we have been able to repeatedly detect DNA from bighead and silver Asian carp where other monitoring methods have failed to do so. In addition, we have developed various controls and quality assurance mechanisms to help eliminate false positives in detection through the process (water collection to data reporting). Future directions for this work include quantification of eDNA degradation to help determine DNA duration in the water column, methods to determine source populations of eDNA, and detection of other rare organisms in aquatic environments.

P - 6

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Poster

Using Dorsal Spines to Estimate Walleye Age: Is Sectioning Necessary?

Dorsal spines are frequently used to estimate the age of walleyes (Sander vitreus), but previous studies have reported mixed results with regards to the accuracy and precision of ages derived from spines. Furthermore, many previous studies have used various sectioning techniques to prepare spines for age estimation, which can add substantially to overall processing time associated with obtaining ages for a sample of fish. Conversely, a recent study demonstrated that unsectioned spines could be used to estimate the age of walleyes, but that spine ages tended to underestimate age for older walleyes (otolith ages > 6). Potentially, all annuli may not be easily identified when dorsal spines are not sectioned in some manner (as is often the case with otoliths). Using walleyes collected from several Wisconsin water bodies we compared ages estimated from sectioned and unsectioned dorsal spines to determine whether the number of visible annuli were similar between the two techniques. Our results suggest that unsectioned and sectioned spines yield similar age estimates, but that sectioned spines are easier to use for measuring annular increments needed to back-calculate walleye length at age.

P- 5

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Poster

Use of Remote Vehicle Counters to Estimate Angler Effort on Two Wisconsin Lakes

Angler effort can affect both the quality and long-term sustainability of exploited fish populations. Angler effort dynamics may be especially important to the management of fisheries in the lake-rich regions of the upper Midwest, where the relative proximity of many lakes results in no measurable change in cost to anglers when deciding where to fish. Angler effort is typically estimated from angler count data collected during creel surveys. Creel surveys are time-consuming and expensive and are rarely conducted on most waters, preventing fishery managers from monitoring temporal trends in angler effort or harvest. Assuming that boat ramp activity represents a useful index of angler use, deploying vehicle counters at boat ramps may provide a useful, low-cost means of monitoring angler effort on individual waters. To validate this assumption we deployed remote vehicle counters at the boat ramps of two northern Wisconsin lakes (i.e., Escanaba and Nebish lakes) for approximately 70 days during the summer of 2009. All anglers fishing the two lakes are required to report to the Wisconsin DNR field station on site. Consequently, the amount of daily fishing effort expended on each lake is known. Vehicle counters explained between 69 and 89% of the variation in the number of boats using each lake and between 53 and 73% of the variation in daily angler effort on each lake. Vehicle counters can be used to remotely monitor trends in angler effort on some water bodies and may provide a means for monitoring angler effort in situations where creel surveys are not routinely conducted.

PR - 1

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Presentation

Linking walleye recruitment with future adult abundance in northern Wisconsin with implications for stocking

Walleyes Sander vitreus are a tremendously popular sport fish in northern Wisconsin and throughout North America. Accordingly, a wealth of literature exists on walleye population dynamics. Often these studies have focused on how adult spawners and environmental variables influence recruitment, frequently on a relatively small spatial scale (i.e. one lake). Understanding how year classes affect later adult populations across a region has not been thoroughly examined yet has immediate implications for stocking rates and may provide insight into walleye carrying capacity. We attempted to elucidate this relationship and apply it to all of northern Wisconsin by using a spatially and temporally broad dataset developed from a unique state and tribal management program in northern Wisconsin. We examined over 100 lakes sampled over a 19 year time period and fit stock-recruitment curves to relationships between the densities of age-0 fish in the fall to the subsequent densities of age-4 fish in the spring. A Gamma model suggests that an intermediate density of age-0 fish (163/ha) produces the maximum number of age-4 fish (2.7/ha). Further analysis shows that when considering the cost of stocking relative to the benefit, the optimal stocking rate is 68 fall fingerlings/ha, which is considerably higher than current rates. Additional work will provide insight into describing the carrying capacity of walleye at various life stages and how this is affected by harvest.

PR - 2

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Presentation

Age Validation of Walleye, Sander vitreus, in the Winnebago System

Sport fishing on the Lake Winnebago System contributes $234 million dollars to the local economy, and walleye are one of the most important sport fishes in the system. It is essential to obtain and use accurate aging data to estimate rates of somatic growth, mortality, and exploitation, which are required to effectively manage the walleye fishery. We removed otoliths and dorsal spines from 75 known-age walleye, recaptured fish which were initially tagged at small enough lengths (<368mm) for age assignment to ±1 year. We compared the age estimates derived from spines and otoliths to the true age of the fish to determine the accuracy of both aging structures. Otoliths and spines were also collected from tournament mortalities and weekly samples to better determine the relationship between age estimates from the two structures. Age estimates from both dorsal spines and otoliths were in agreement for fish 4-8 years old, although spines underestimated age of fish 9 years of age and older (otolith age estimates were 0.67 to 5.00 years greater for females and 0 to 5.21 years greater for males). Total mortality rates based on spine age estimates were higher (40%) than those based on otoliths (20%). Age distributions within the mortality curve correlated directly with year class strength, suggesting that otoliths, unlike spines, are accurate for all ages of walleye.

P - 4

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Poster

Annual Growth Ring Formation on Smallmouth Bass Dorsal Spines

In fish management we commonly use dorsal spine sections for age estimation in smallmouth bass. However, a review of literature indicates that the formation of annuli on smallmouth bass dorsal spines has not been validated against known age fish, nor against a validated structure. This project was developed to verify the formation of annuli on smallmouth bass dorsal spines against otoliths, a verified structure. We also identifid common errors in spine interpretation.

P - 3

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Poster

Retention Ponds: Fertile Opportunity for Threatened Fishes?

The concept of an Ecological Reconciliation Project applies to establishing organisms in human created habitat where there is neither remnant habitat nor remnant populations. Such a project was undertaken in 1998 at Prairie Crossing, a housing development that emphasizes environmental quality. As part of the development two retention ponds were dug to collect rainwater and provide recreation. The community agreed to the stocking of several threatened/endangered small fishes (three minnows, a killifish, and a darter). These have prospered for eleven years and provide forage for the sport fishes, largemouth bass and tiger musky. It is likely that there is untapped potential for similar projects as the human landscape has been modified to include numerous retention ponds.

PR - 3

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Presentation

Using a Biochronology to Detect the Effects of Zebra Mussel Establishment and Food Resource Abundance

If the environmental factors that influence fitness and survival can be sorted out, we can better understand the processes that shape population and community dynamics. A biochronology is a sequence of punctuated growth responses that are preserved as an incremental pattern within a stable anatomical structure. Similar to classical dendrochronology (the study of tree rings) the increment widths can be analyzed in relationship to environmental factors. Fish biochronologies measured in the natural environment have been found to correlate to changes in temperature, flooding regime, and competition, but not as of yet to food resource abundance.

A dendrochronology model and a linear mixed effects model was applied to the increment widths obtained from cross-sectioned sagittal otoliths of freshwater drum (Aplodinotus grunniens) to separate extrinsic environmental effects from intrinsic age effects. No significant difference was found between the biochronologies derived from the two models. A significant increase in the growth rates of large drum (>409mm) was detected from 2001 to present. This growth increase corresponds to the timing of the establishment of the exotic zebra mussel (Dreissena polymorpha) and drum diet analyses from 2006-2009, which found that only large freshwater drum were utilizing this new food resource. Separate biochronologies were then developed for subgroups of small and large drum. The biochronology of small drum corresponded to fluctuations of their predominant food item, which are lake fly (Chironomidae) larvae. The biochronologies also corresponded to fluctuations in local temperatures and length of growing season.

PR - 4

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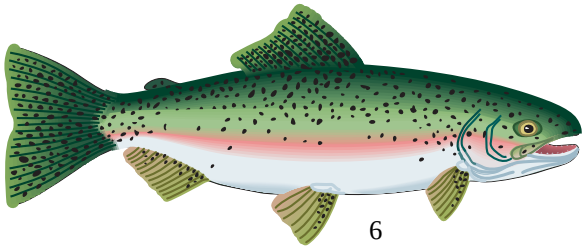
Presentation

Prairie River Special Trout Regulations - Did They Work?

This abstract is preliminary and is being written before most of the analyses have been completed. It is being done now to meet the December 4th deadline. If this presentation is accepted, please let me know when a final abstract needs to be submitted by to be included in the program.

The Prairie River contains naturally reproducing brook (Salvelinus fontinalis) and brown trout (Salmo trutta) populations. Special regulations (high size limits, reduced daily bag limits, and artificial lure only restrictions) meant to improve numbers of larger trout and overall size quality were in effect on a section of the Prairie River for 5 years from 2003-07. Double-run, population estimating electrofishing surveys were done for eighteen consecutive years (1992-2009) on a survey station within this section of the Prairie River. Eleven of the survey years were prior to the special regulations being in place, five were during the special regulation years, and 2 were after the special regulations had been removed. Data from these surveys were analyzed to determine if the special regulations improved the size structure and numbers of larger trout. Data from the last 2 years of special regulations (2006-07), presumably when a population effect should be more pronounced, were compared to 2 years of less restrictive regulations (2008-09). There were no significant differences (Two-Sample T Tests; $P < 0.05$) in numbers of trout caught during our electrofishing surveys during these two time periods. Further analyses from other time periods will be discussed. Studying the effects of special trout regulations helps fish managers tailor regulations that may better mesh resource potential with angler's desires and



P - 2

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Poster

Optimization of larval yellow perch aquaculture through food-web enhancement

The growth of the yellow perch, Perca flavescens, aquaculture industry is constrained by the high cost of feed-trained fingerlings. This high cost is due in part to the historically poor survival of larval yellow perch in culture ponds. Yellow perch fry will not eat commercially prepared diets, and must feed upon food that naturally occurs in culture ponds such as zooplankton. Zooplankton populations are enhanced by fertilizing ponds with plant fertilizers. These fertilizers enhance algal populations, which are fodder for the zooplankton populations. Fertilization procedures in yellow perch fingerling production ponds have been poorly studied. The objective of this project is to improve the survival, growth, and production of larval yellow perch by better understanding and manipulating pond food chain dynamics. We fertilized 14 replicate ponds in South Central Wisconsin with 4 different fertilizer regimes and stocked those ponds with 250,000 fry per acre. At the end of the 7 week culture period, we harvested the fingerlings, measuring their average weights, lengths, as well as total fingerlings harvested in each pond. Throughout the experiment, we also identified phytoplankton species as well as chlorophyll A production in each pond each week. Although there was no significant difference in the amount of fingerlings produced per hectare in each treatment ($p < 0.05$), ponds fertilized with fixed inorganic fertilizer had the greatest harvest values, followed by organic fixed fertilizer, variable inorganic fertilizer, and finally organic fixed + variable inorganic fertilized ponds. There were also some interesting differences in zooplankton populations between each treatment.

P - 1

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Poster

Using Archaeological Otoliths to Detect Life History Changes in Freshwater Drum

Like many natural environments around the world, Lake Winnebago, Wisconsin is constantly facing new anthropogenic pressures. Some of the major events that have occurred in the recorded history of this lake include the manipulation of natural water levels, eutrophication from agricultural practices, an intensive rough fish removal program, and the establishment of several aquatic invasive species including the common carp and the zebra mussel.

Freshwater drum (Aplodinotus grunniens) sagittal otoliths can be used not only to determine age, but also predict total body length with remarkable accuracy and precision (r2=0.97). Priegel (1963) used Winnebago otoliths and Witt (1960) used Mississippi River otoliths to evaluate the length frequency distributions of pre European settlement freshwater drum populations. Both authors concluded that archaeological freshwater drum had a greater mean average length than modern freshwater drum. However, until now, no one combined the estimated length data with age data of the archaeological freshwater drum. I examined 690 archeological freshwater drum otoliths dated to the 1830's and older from around the Winnebago system. The sizes of the drum captured near the shores and in the river were not significantly different from the sizes of archaeological drum; however, the ages of the archaeological drum were significantly greater than modern drum. Von Bertalanffy growth curves indicated that the archaeological drum grew slower and had greater longevity than modern drum. Catch curves also revealed lower mortality rates for archaeological freshwater drum. These results suggest that there have been post European settlement impacts to the Winnebago freshwater drum population.

PR - 5

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Presentation

Use of Sodium Hypochlorite solution to eradicate a population of Red Swamp Crayfish (Procambarus clarkii) in a stormwater runoff pond in Germantown, Wisconsin.

Sodium hypochlorite 12.5 percent solution was used to treat a 4.9 acre pond in Germantown, Wisconsin at a rate of 50 parts per million active ingredient in November, 2009. 3,740 gallons of 12.5 percent sodium hypochlorite was delivered at full strength to the pond using boat bailers which applied the chemical below the water surface. Approximately 250 crayfish burrows located along the shoreline at or just above the water line were treated using a boat-mounted tank sprayer by injecting 1gallon of 200 ppm active ingredient solution into each burrow. Initial chlorine levels ranged from 20 ppm at the surface to 70 ppm at the bottom of the pond right after application and declined to 0 ppm, both surface and bottom, by day 5 post-treatment. By day 7, live fathead minnows in test cages were found to survive 24 hours exposure with no apparent ill effects. Additional efforts toward eradication include trap and removal prior to chemical treatment, and a 1.5 foot drawdown over winter to freeze and desiccate crayfish in the burrows. Follow up monitoring using baited traps will be undertaken in spring, 2010.

PR - 6

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Presentation

Can a migratory brook trout population be established in Whittlesey Creek?

In 2005, the Wisconsin DNR and U.S. Fish and Wildlife Service completed the Wisconsin Lake Superior Basin Brook Trout Plan. Five priority streams were identified for brook trout rehabilitation initiatives. In Whittlesey Creek, the goal is to establish a self-sustaining brook trout population in the watershed that exhibits a migrating life history. We'll examine the stocking strategy and efforts to evaluate progress and ultimately, our approach to determine whether or not the project was successful.

PR - 7

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Presentation

Fish community variability and response to brook trout stocking in Whittlesey Creek

The current coldwater fish community of Whittlesey Creek consists of brook trout and sculpin and numerous introduced salmonines including migratory coho salmon, rainbow (steelhead) and brown trout. These introduced salmonines are considered 'naturalized' as their populations are sustained by natural reproduction and regular stocking in Lake Superior. In addition, splake are stocked in Chequamegon Bay and are occasionally found in Whittlesey Creek. Brook trout numbers in Whittlesey Creek are low and declined by about 70% from 1977 to 2001. In 2004, brook trout stocking began in an effort to establish a migratory population. We'll review the stocking strategy and changes in abundance of brook trout and population estimate variability of naturalized salmon from 2001-2009.

PR-20

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Presentation

Blending Angler Expectations with Reality: Lake Fishery Planning in the Upper Chippewa Basin

Fishery biologists in the Upper Chippewa Basin have piloted a project to develop stakeholder-supported objectives for fish populations of greatest interest in the lakes we manage. From 2004 through 2008, 20 stakeholder “visioning sessions” were conducted for 42 lakes comprising 65% of total manageable lake acreage in our basin. During these four-hour sessions, we received interactive input from a total of 592 local stakeholders (~30 per session).

Consistent with statewide angler preference polls, Upper Chippewa Basin stakeholders strongly favored walleye and centrarchid panfish over other species. A Relative Importance Index (100% maximum) ranked stakeholder interest as follows: walleye 79%; black crappie 74%; bluegill 62%; muskellunge 56%; yellow perch 49%; smallmouth bass 42%; largemouth bass 36%; northern pike 35%; and other species 4-6%.

Upper Chippewa Basin stakeholders preferred a balance between numbers and sizes for walleye and panfish; but size was increasingly more important than number for muskellunge, smallmouth bass, largemouth bass, and northern pike, respectively. No participants desired high numbers of small largemouth bass or northern pike. Our stakeholders preferred that we strike a balance between harvesting and releasing walleye, panfish, and northern pike; but they were inclined to voluntarily release most largemouth bass (63%), smallmouth bass (68%), and particularly muskellunge (86%).

Visioning sessions generated stakeholder trust and commitment to help implement strategies needed to achieve realistic objectives. Ten plans have been completed to date as part of this pilot process, viewable at www.dnr.state.wi.us/org/gmu/upchip/index.htm

PR - 19

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Presentation

Aquatic Invasive Species Transport via Trailered Boats: What Is Being Moved, Who Is Moving It, and What Can Be Done

Trailered boats have been implicated in the spread of aquatic invasive species. There has been, however, little empirical research on the type and quantity of aquatic invasive species being transported, nor on the efficacy of management interventions (e.g., inspection crews, boat washing). In a study of small-craft boats and trailers, we collected numerous aquatic and terrestrial organisms, including some species that are morphologically similar to known aquatic invasive species. Additionally, a mail survey of registered boaters (n=944, 11% response rate) and an in-person survey of boaters in the field (n=459, 90% response rate) both indicated that more than two-thirds of boaters do not always take steps to clean their boats. Furthermore, we used a controlled experiment to learn that visual inspection and hand removal can reduce the amount of macrophytes on boats by 88%±5% (mean±SE), with high-pressure washing equally as effective (83%±4%) and low-pressure washing less so (62%±3% removal rate). For removing small-bodied organisms, high-pressure washing was most effective with a 91%±2% removal rate; low-pressure washing and hand removal were less effective (74%±6% and 65%±4% removal rates, respectively). This research supports the widespread belief that trailered boats are an important vector in the spread of aquatic invasive species, and suggests that many boaters have not yet adopted consistent and effective boat cleaning habits. Therefore, additional management efforts may be appropriate. In this regard, the Ottawa National Forest, with funding from the Great Lakes Restoration Initiative, is conducting a demonstration project this summer to enhance boat inspection and cleaning activities.

PR - 8

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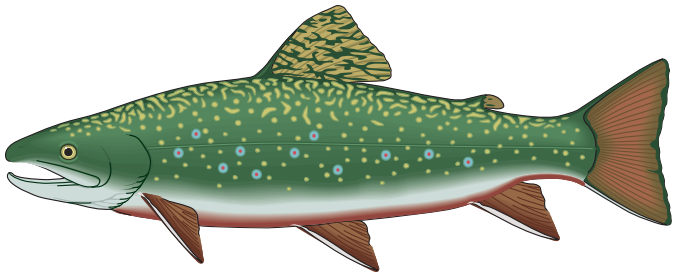
Presentation

Tracking movement and migratory behavior of brook trout in Whittlesey Creek

Our ability to detect and assess movement and migratory behavior of brook trout in Whittlesey Creek is critical to project evaluation. We'll describe and evaluate multiple approaches to track movement of brook trout in and out of Whittlesey Creek including underwater video, tagging, and angler assistance. Brook trout have been detected moving out of Whittlesey Creek and some fish have been detected returning to the stream.



PR - 9

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Presentation

Age, growth and maturity of siscowet lake trout in Wisconsin waters of Lake Superior, 1994-2007

The rehabilitation of lean lake trout (Salvelinus namaycush) in Lake Superior has been extensively described and much is known about this morphotype. Another form of lake trout, the fat lake trout or siscowet has increased dramatically since the early 1990s becoming the dominant predator in most of Lake Superior. Much less is known about the life history of siscowets because they generally inhabit waters greater than 75 m in depth. Our objective was to describe potential trends in age distribution, growth/condition, and maturity of siscowets in Wisconsin waters. Similar to lean lake trout, siscowets can be very long lived (>40 years old). The von Bertalanffy parameter estimates indicated that siscowet growth may be stable or gradually declining. Siscowet condition in the Apostle Islands region declined from 1997-2000, and then remained relatively stable through 2006; conversely condition increased in the western waters. Potential declines in growth and condition were likely related to increased siscowet abundance. We found that siscowets grow slower and mature at an even later age than lean lake trout, suggesting even more conservative management will be necessary to maintain sustainable populations. Furthermore, these findings may be important when considering potential siscowet reintroduction programs in the lower Great Lakes.

PR - 18

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Presentation

Trees and Trout- Using the past to guide future restoration: Cold-water fish habitat history of the Namekagon River, Wisconsin.

Authors discuss the history of riparian timber and woody habitat in the Namekagon River, from early logging to present. A density of big wood on the order of 300/mile is advanced as an objective standard for "baseline natural". Intra-agency planning, thermal habitat, channel morphology, brook trout vs. brown trout, construction details, objectives, and evaluation are discussed. A 50 structure, pilot, restoration project will be implemented in 2010 in the Cap Creek reach, Bayfield County.

PR - 17

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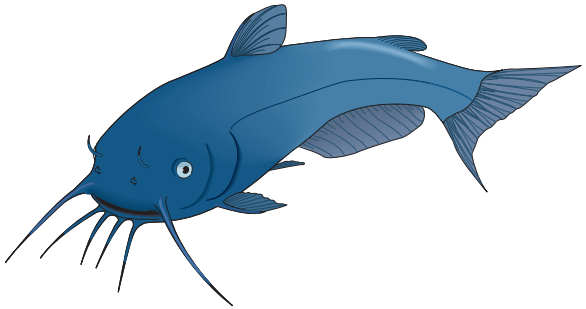
Presentation

Channel Catfish Study of the Grand Rapids section of the Menominee River

The Wisconsin Department of Natural Resources (WDNR) maintains an extensive fishery database for the Grand Rapids section of the Menominee River. This 21 mile section of the lower river is known for it's lake sturgeon and smallmouth bass fisheries but also supports a very good channel catfish population. In 1998, WDNR initiated extensive surveys targeting the channel catfish fishery in this section of the river. Baited, hoop nets were set upstream of several deeper holes. These efforts were replicated in 1999, 2000, 2008 and 2009. 944 channel catfish were observed over the 5 survey years. CPUE were within the range of values for several rivers at 2.49 fish/ net night. These annual surveys revealed a similar size structure supported by large fish, average size of 25.8 inches. Only 16% of the catfish caught were less than 20 inches in length. PSD and RSDp values were higher than the Wisconsin and Wolf rivers in Wisconsin. Population estimates yielded about 100 channel catfish per river mile. These values suggest this channel catfish population has a low mortality rate and light exploitation. Despite a liberal sport fishing regulation, this population has persisted and should continue to support an excellent fishery. Future directions for studies of this population should include electrofishing surveys to locate evasive small, less than 20 inches, channel catfish and continued monitoring of the adult population.



PR - 10

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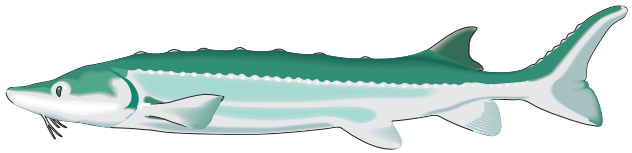
Presentation

Will Bottoming Out of the Lake Michigan Food Web Result in a Fisheries Deja-Vu?

Invasions often generate unanticipated consequences. An apparent consequence of the zebra/quagga mussel invasion of Lake Michigan is that the zooplankton community now closely resembles that of Lake Superior. The food web that once supported a burgeoning alewife population is now nearly devoid of the cladocerans that were their prey. Increased clarification of the water allows light to penetrate into the metalimnion is apparently increasing primary production their, to the apparent benefit of the large cold-water calanoid copepod, Limnocalanus. The species and size distribution for Lake Michigan now resembles Lake Superior. This change may mean that the energetic infrastructure that supported alewife and its introduced salmonine predators is effectively non-existent. If so, the fishery management strategies for Lake Michigan will need to be rethought and the model may be similar to Lake Superior or even a pre-European settlement system.



PR - 11

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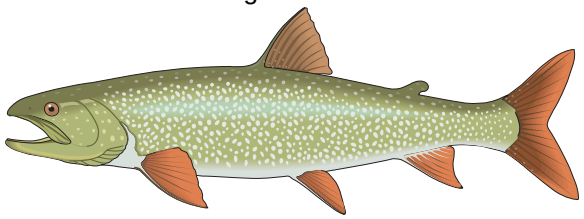
Presentation

Vital Statistics for Lake Whitefish in Wisconsin Waters of Lake Michigan

Lake whitefish (Coregonus clupeaformis) stocks in Lake Michigan have generally displayed a remarkable ability to adapt to a highly dynamic ecosystem brought on by the extensive exotic species invasions. Spawning stock size has increased considerably lake-wide since the 1990s. The Wisconsin Department of Natural Resources (WDNR) manages Wisconsin's lake whitefish commercial harvest as originating from one stock spawning in the areas around North and Moonlight Bays (NMB) off the eastern shore of Door County. However, there is reason to believe a refounding stock of whitefish is building in the Menominee River and possibly other Green Bay tributaries in Wisconsin waters. Model estimates for the NMB stock indicate the lake whitefish population level is in good condition and over the past several years recruitment has been strong. Field assessments appear to corroborate these estimates as larval trawl catches in this area are some of the highest on Lake Michigan. While numerically whitefish in Wisconsin waters don't appear to have suffered from the exotic species infestations, growth has decreased dramatically. Whereas in the mid 1990s a fish typically recruited to the commercial fishery (432 mm) at around 4 years of age, whitefish now on average do not enter the fishery until age 7. Commercial harvest remains viable and in some Wisconsin commercial zones the catch has increased considerably. Within the past several years, a sport fishery has developed for whitefish in Wisconsin waters of Green Bay. Sport anglers harvested in excess of 50,000 whitefish during each of the last two winters according to WDNR winter creel estimates.



PR - 16

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Presentation

Intra-Guild Predation between Walleye and Bass: A Review of Literature and Implications for Wisconsin Fishery Managers

I examined 25 peer-reviewed journal articles and technical reports in order to begin testing the hypothesis that walleye (Sander vitreus) interact with black bass (Micropterus salmoides and M. dolomieu) as intra-guild predators - competitors that eat each other. Only nine sources were AFS publications readily available to Wisconsin fishery managers.

There was little evidence of intra-guild predation between walleye and smallmouth bass, which co-occurred in high numbers, rarely ate each other during the open-water season, and did not exhibit significant dietary overlap. In early to mid summer, age-0 walleyes inhabited littoral zone macrophytes where smallmouth bass are inefficient predators. There was no credible documentation of smallmouth bass adversely affecting the reproduction, growth, or survival of walleyes.

Walleye and largemouth bass met all the criteria for classification as intra-guild predators. Estimates or indexes of their relative abundance were inversely related. Largemouth bass ate age-0 walleyes significantly, probably because they co-occur in littoral zone macrophytes where largemouth bass are efficient predators on walleye. Walleye and largemouth bass often ate the same food, especially yellow perch when available. Several experiments have shown that predation by largemouth bass reduces the survival and recruitment of stocked walleyes.

Walleye populations are declining in association with increases in largemouth bass populations in many northwestern Wisconsin lakes, including the Chippewa Flowage. The habitat-mediated effects of intra-guild predation will require managers to liberalize and encourage harvest of largemouth bass in appropriately chosen walleye-priority waters, while concurrently increasing protection of smallmouth bass to maintain or improve bass fishing in such waters.

PR - 15

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Understanding (or not.) recruitment of smallmouth bass in southwestern Wisconsin streams

Streams in southwestern Wisconsin support excellent smallmouth bass fisheries, although many populations have been reduced by agricultural runoff. Since 1989, we have monitored smallmouth populations annually on seven streams with a goal of better understanding patterns and processes of recruitment. Relative year-class strength appears to be largely set by the end of the first summer, although fish kills from manure can eliminate a year class at any age. Abundance of late-summer young-of-year (YOY) bass is highly variable, with our standardized electroshocking catch per mile ranging from 0 to 786. Number of YOY is not related to spawning stock (> age 3) nor abundance of juveniles (age 1 and 2). Weak and strong year classes tend to be synchronized over most of the streams, suggesting a climate effect. Weak year classes occur when there is high water during the May/June spawning and nest guarding period, and strong year classes are most likely in warm dry summers, but we have been unable to develop an accurate predictive model of YOY abundance based on climate and stream flow data from regional gaging and weather stations. It may be that in some years recruitment is driven by localized climate events (e.g., thunderstorms during bass nesting) that are missed by the existing weather and stream monitoring network. Even with 20 years of data, we still do not fully understand the conditions necessary to produce a strong year class.

PR - 12

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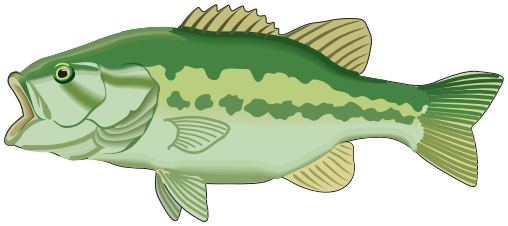
Centrarchid late fall movements observed through electrofishing surveys in Mississippi River pools 8, 10, and 11

Backwater fisheries habitat has been an objective of many habitat restoration projects on the Upper Mississippi River (UMR). One seasonal habitat need commonly identified as degraded, or lacking, has been centrarchid overwintering (OW) habitat. Quantifying wintertime fisheries utilization of aquatic habitats by active sampling is difficult to impossible due to ice coverage. Past radio telemetry studies have indicated bluegills Lepomis macrochirus and largemouth bass Micropterus salmoides may utilize large sections of the pools before "migrating" to OW sites. Therefore, summertime and early fall surveys most likely provide a poor representation of utilization of OW habitats. The objective of our study was to determine if fall catch per unit effort (CPUE) of centrarchids changes as fish move into OW habitat. Electrofishing surveys were repeated weekly between 10/11/2007 and 11/27/2007 at ten known centrarchid OW areas of varying quality; four each in Pools 8 and 10, and two in Pool 11. Surveys coincided with autumnal migration into OW areas occurring before ice formation. Four weekly surveys were conducted at 9 of the 10 sites, one was visited three times, varying in length from 8 min to 35 min (average = 24 min). The data shows an inverse relationship between weekly average bluegill CPUE in OW areas and October-November main channel water temperature (R2 = 0.97). The median CPUE of bluegills was significantly lower at warmer water temperatures (>10°C) than at colder water temperatures (<5.5°C) ($P<0.05$). However, the exact temperature threshold eliciting movement into OW areas is not discernable from our data.



PR - 13

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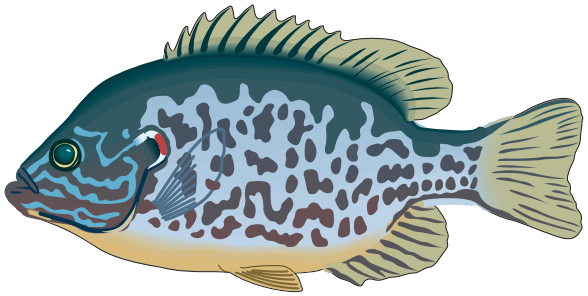
Sex Ratios of Angler-Harvested Black Crappies During Spring Fisheries: Are Males in the Majority?

Conventional wisdom suggests that harvest of black crappies during spring periods will be dominated by male fish due to differences in habitat use and spawning behavior between sexes. We examined the potential for male-dominated harvest within spring (late April to mid June) recreational fisheries for black crappies occurring on two Minnesota lakes. In the three spring fisheries we examined males represented between 45 to 57% of all black crappies harvested by anglers during spring, but sex ratios did not significantly deviate from 1:1. However, a temporal pattern in sex ratios was observed on Lake Hubert, where female black crappies dominated angler harvest before 19 May in both 2005 and 2006 (41-42% male), while harvest on or after 19 May was dominated by males (69-75% male); this shift appeared to coincide with peak black crappie nesting periods. Our evaluation indicates that sex ratios of black crappies harvested by anglers during spring fisheries can vary within and among lakes and will not always be skewed towards male fish. Some of the trends in sex ratios we observed likely resulted from temporal patterns in black crappie behavior (i.e., nesting) and patterns in angler behavior and fishing effort that occurred during spring (i.e., walleye opener).



PR - 14

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Largemouth Bass Population Response to Various Regulation Changes over a 20 year period. Balsam Lake, Polk County, WI.

Over the past two decades angling regulations have changed three times for largemouth bass on Balsam Lake. Prior to 1989, largemouth bass regulations consisted of a no minimum length limit with a daily bag of 5 fish. In 1989, a 14 inch minimum length limit with a daily bag of 5 was implemented for largemouth bass as part of a statewide bass regulation change. In 2002, largemouth bass regulations were liberalized to allow one bass less than 14 inches to be harvested as part of the 5 daily bag limit. Fish survey data and creel census surveys from 1988, 1998 and 2008 where available to monitor changes in the largemouth bass population from the various regulation changes.

In 2008, the largemouth bass spring electrofishing CPE was very high at 223 fish/hr. This was a 156% and 355% increase compared to similar surveys in 1998 (87 fish/hr) and 1989 (49 fish/hr), respectively. The largest change in largemouth bass abundance was for fish less than 13.0 inches which increased by 427% and 400% compared to 1998 and 1988, respectively. Size structure indices also show a downward trend. RSD-15 values were stable during 1988 and 1998 (10 and 11 respectively), however decreased to 4 in 2008.

High abundance of largemouth bass < 13 inches resulted in high angler catch rates but low harvest rates. In 2008, anglers catch rates were 33.6 largemouth bass/acre compared to 24.3 and 10.5 bass/acre in 1998 and 1988, respectively. Angler harvest rates decreased from 1.2 bass/acre in 2008 compared to 1.7 and 2.2 bass/acre in 1998 and 1988, respectively.

Largemouth bass growth declined during the study period. In 2008, largemouth bass reached 14 inches between their 7-8th year of growth. This is almost 2 years slower than southern zone bass growth standards for the state of Wisconsin. In comparison, in 1988 largemouth bass were exceeding southern bass zone growth standards and reaching 14 inches by their 5th year of growth.

The usefulness of the one less than 14 inches harvest regulation as a management tool to reduce small largemouth bass abundance and improve bass growth and size structure was poor. During a twenty year period largemouth bass densities for fish less than 13 inches continued to increase, growth and size structure decreased, and angler harvest rates decreased. Further liberalization of largemouth bass regulations are warranted in an effort to reduce largemouth bass abundance as well as improve growth and size structure of the largemouth bass fishery. Responses of other fish species during the study period are also discussed.