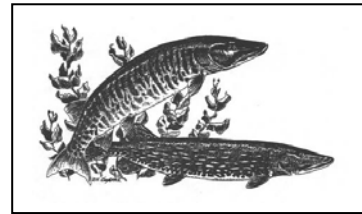
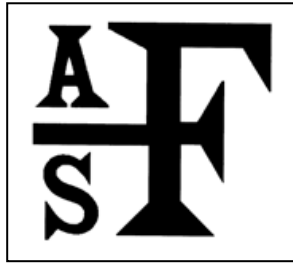


NORTH CENTRAL DIVISION OF THE AMERICAN FISHERIES SOCIETY
JOINT MEETING

Walleye Technical Committee - Esocid Technical Committee



AUGUST 5, 6, 7, 2008

KEMP STATION - LAKE TOMAHAWK, WISCONSIN

ABSTRACTS

Evaluation of a Slot Length Limit for Northern Pike in Pelican Lake, Minnesota

Tom Burri, Minnesota Department of Natural Resources

Abstract.---Pelican Lake is an important resource in northern Minnesota and one of the highest priority lakes in the International Falls Management Area. The lake has a diverse fishery and a history of excellent fishing for northern pike *Esox lucius*. However, a special regulation was implemented in 1998 in response to information from assessments and reports from anglers that indicated the quality of the northern pike fishery had declined. The primary goal of the regulation was to improve the size structure of northern pike during a 10-year trial period. The initial regulation was a protected slot from 24 to 38 inches, with one fish over 38 inches allowed in a bag limit of three. Due to immediate public opposition, the regulation was modified in 2000 to a protected slot from 24 to 32 inches, with one fish over 32 inches allowed in a bag limit of three. Most species increased in abundance during the 10-year trial and generally, size structure and growth for all species was maintained or improved. Abundance of northern pike in 2007 was 22.2 fish/gillnet, which was more than twice the mean of 10.0 fish/gillnet from 1959-2001 and well above the third quartile of 3.59 fish/gillnet for similar lakes. Size of northern pike also greatly increased after the experimental regulation was enacted. Total length of fish captured in gill nets in 2007 ranged from 10.2 to 32.2 inches and the mean was 21.7, compared to a mean of 18.3 in 1995. Although abundance and size have increased, growth did not suffer as a consequence. Mean total length at capture of age-4 fish was over 6.5 inches greater in 2007 than in 1995. Although anglers and fisheries staff agreed that the regulation was successful, some public opposition to a long-term length regulation still occurred after the trial period ended. However, with new approaches to the public input process, the progression to a long-term regulation change was less contentious.

Update on Contemporary Muskellunge Genetic Structure in Wisconsin

Brandon Spude, Graduate Research Assistant, University of Wisconsin at Stevens Point College of Natural Resources

Abstract: Wisconsin contains >700 muskellunge (*Esox masquinongy*) populations that provide an array of angling experiences ranging from high-density action waters to low-density trophy fisheries. The current Wisconsin Department of Natural Resources' (WDNR) muskellunge management goals include maximizing angling opportunities while preserving genetic integrity. Historically, the WDNR managed musky populations through stringent regulations, including daily bag limits and length limits, and a prolific stocking program. However, supplemental stocking across genetically divergent boundaries can break down historically adapted gene complexes unique to individual populations, thus threatening genetic integrity. Currently, the WDNR delineates muskellunge management units based on watershed boundaries and genetic data. A study was initiated in 2005 with a goal of identifying contemporary genetic structure among naturally recruiting muskellunge populations. We used microsatellite genotyping and non-lethal sampling to identify genetic structure among muskellunge populations. Fin clips from 38 naturally recruiting populations ($n \approx 50$ /population) across the native range of muskellunge in Wisconsin have been genotyped using 14 loci. Genetic stock identification showed an east-west split among populations not stocked since

1990. Two management units, the upper Chippewa River and Lake Superior, failed to resolve suggesting historical genetic boundaries and contemporary watershed boundaries are not congruent. Continued research aimed at further delineating and resolving muskellunge stock boundaries within the state will provide for more accurate and efficient management of Wisconsin's muskellunge resource.

Wisconsin's Critical Habitat Designation Program: Progress on Protecting Esocid Spawning Habitat

Paul Cunningham, WI Department of Natural Resources

Abstract: The Wisconsin DNR is concerned about the growing number of threats to sustainable healthy lakes in the state. Conversion of lakeshores to residential development has greatly accelerated over the past 30 years. The upper Great Lakes states of Michigan, Minnesota, and Wisconsin, each rich in natural inland lakes, have experienced extremely high increases in population. Patterns of growth tend to be away from agriculture and urban core areas and toward suburbs and lake rich areas such as central and northern Minnesota, northern Wisconsin, and the upper peninsula and lake regions of lower Michigan. While many positive measures have been initiated within Wisconsin over the past few decades, habitat and water quality continue to be impacted. The **Critical Habitat Designation Program** plays an important role in implementing legislative and judicial mandates entrusted to the Wisconsin DNR. Critical Habitat Designation is a program that includes formal designations of wetland and aquatic plant sensitive areas, public rights features including spawning habitat, and resource protection areas (areas within the shoreland zone). All of these elements combine to provide regulatory and management advice to the State of Wisconsin, counties, local units of governments, and others who hold authorities or are interested in protecting and preserving these unique habitats for future generations. Fisheries Management is leading an effort to re-tool the program and intensify our efforts to designate lakes. This presentation is an update on our progress and future challenges.

Evaluation of a 14 to 18 inch Protected Slot for Walleye in Twelve Northern Wisconsin Waters

Kubisiak, John. Wisconsin Department of Natural Resources

Abstract: A protected-slot walleye regulation has been in effect on selected northern Wisconsin waters since 1996 or 1997, depending on the lake. On these lakes there is no minimum length limit for walleye but fish from 14 through 18 inches may not be kept. The daily bag limit is three walleye with only one fish over 18 inches allowed. Twelve lakes or lake chains were surveyed before and at least four years after implementation of the regulation and adult walleye populations were estimated using mark-recapture methods. Angler creel surveys were also conducted both before and after implementation on six lakes or chains. Adult walleye abundance remained stable or increased and abundance of fish within the protected slot increased dramatically in the lakes with strong recruitment. Abundance of 18 inch and larger fish increased in lakes where strong recruitment was combined with average or better growth rates. In contrast, stocked and low-recruitment lakes had variable adult populations and little change in the number of fish 14 inches and larger. In lakes where walleye population metrics improved, creel surveys estimate similar angler catch rates after implementation, but harvest rates and harvest of 18 inch and larger fish increased. These results suggest that a 14-18 inch protected-slot regulation can be effective in improving walleye size structure and harvest rates in lakes with strong recruitment.

Bull Shoals Lake Walleye Reward Tag Project

A. J. Pratt, Missouri Department of Conservation

Abstract: In the past 14 years, the Missouri Department of Conservation (MDC) has put forth considerable effort (stocking, regulations, sampling, etc.) to enhance the walleye fishery of Bull Shoals. However, not much was known regarding angler harvest, exploitation, angler's attitudes and opinions, or walleye movements. In March of 2003 and 2004, a total of 1,963 walleye were tagged from the Forsyth area of Bull Shoals Lake. Walleye were tagged with Calin-Dangler tags which were randomly assigned values of \$10 - \$100 (N=1670). To estimate angler compliance, a total of 293 were tagged with \$50 tags. These tags specifically mentioned their respective value. Tagged walleye ranged from 9.3" – 30.5" and averaged 18.5". By the end of the study period (July 2006), 499 anglers, representing 14 states, returned a total of 919 tags. Anglers returning tags were asked questions regarding the date the fish was caught, length of the tagged fish, which part of the lake the fish was caught from, what lure/bait the fish was caught on, and if the fish was released or harvested. While tagged walleye were caught from most areas of the lake, 97% were caught within 44 miles of the tagging/release site. Results indicate that Bull Shoals' walleye fishery is a heavily utilized and well known fishery.

Effect of Various Exploitation Rates on Northern Wisconsin Walleye Populations

Steve Newman, Wisconsin Department of Natural Resources

Abstract: We examined the effects of various walleye exploitation rates on self sustaining walleye populations and the fish community in four northern Wisconsin lakes. Objectives were to evaluate the impact of low (0-5%), medium (10-25%), and high (35%) exploitation on walleye population size, reproduction, age and size structure; and determine the ramifications on other fish species. Angling was used to achieve the low and medium rates, whereas a combination of angling and artificial removals was used to achieve and maintain the high rate. The walleye populations were monitored intensively with fyke-nets and electrofishing for a period of approximately ten years, and the fish community was monitored by shoreline seining over the same period. Walleye growth, recruitment, and biomass tended to increase with exploitation, whereas age to maturity tended to decrease. The adult walleye density in the high exploitation lake declined but remained well within the range of densities found in northern Wisconsin. Change in the fish community was apparent only in the high exploitation lake, as the once abundant bluntnose minnow (*Pimephales notatus*) and mimic shiner (*Notropis volucellus*) became rare after implementation of the 35% rate.

Walleye Genetic Diversity and Stock Structure in Wisconsin

Jeremy Hammen, University of Wisconsin Stevens Point College of Natural Resources

Abstract: Maintaining genetic integrity in naturally recruiting walleye populations is a primary goal of the Wisconsin Walleye Management Plan. To understand the dynamics and realized threats to walleye genetic integrity, it is necessary to understand the spatial distribution of walleye genetic diversity across the state. Our objectives are to: 1) determine the extent of intra- and interpopulational genetic diversity in >25 naturally recruiting walleye populations in Wisconsin and, 2) determine whether the interpopulational diversity is consistent with multiple stocks of walleye in Wisconsin using genetic stock identification methods. A suite of microsatellite loci (≥ 12) have been used to measure the genetic diversity of sampled populations. Preliminary data show genetic diversity within these populations is consistent with similar studies of naturally recruiting walleye populations in Minnesota and Ontario. These data also show an apparent split between a Northwest cluster of populations and Northeast walleye populations in the state. These two major groups are consistent with major watersheds (Chippewa River/Mississippi River and Upper Wisconsin River) but differ with current management units. This study will help provide a more quantitative and usable framework to gauge walleye genetic integrity in Wisconsin and further efforts to effectively manage the resource while maintaining and conserving genetic diversity.

How Cold is Too Cold for Yellow Perch Eggs?

Andy Jansen, South Dakota State University Department of Wildlife and Fisheries Sciences

Abstract: Yellow perch *Perca flavescens* recruitment is erratic in many South Dakota waters. Consequently, extensive research has been conducted to investigate the early life history of yellow perch in South Dakota. Since 1995, surface trawling for larval yellow perch has been used to index reproduction. However, extensive variability in larval abundance among years and among lakes has lead our research focus to potential factors that may affect larval yellow perch dynamics. Therefore, the objective of this study was to estimate the magnitude and duration for decrease in water temperature that would induce mortality of yellow perch eggs. Yellow perch egg skeins were collected from nearby lakes in spring 2007 and 2008 and transferred to a laboratory tank system. Egg skeins were split into sections and randomly assigned to treatment or control tanks. The first experiment decreased water temperature by 6°C in 24 hours; however, no significant differences in mortality were observed between treatment and control tanks. To determine the lower end of the threshold, the next experiment decreased the water temperature by 8°C in 45 minutes. Results from this experiment will be compiled by July 2008. Future research will focus on the effects of decreasing temperatures on yellow perch larvae during the switch to exogenous feeding. Our current study helped provide a better understanding of yellow perch ecology and will influence the future design of research studies on perch populations in South Dakota.

Nonlethal Sampling of Walleye and Yellow Perch for Stable Isotope Analysis: A Comparison of Three Tissues

Justin VanDeHey, South Dakota State University Department of Wildlife and Fisheries Sciences

Abstract: Stable isotope analyses (SIA) have become increasingly useful in identifying energy flow and trophic relationships in aquatic and terrestrial environments. SIA are currently used to address a variety of topics, such as

determining dietary shifts from pelagic to benthic prey, modeling contaminant bioaccumulation in piscivorous fishes, and monitoring the effects of eutrophication on aquatic food webs. Additionally, SIA can reveal feeding interactions not detected by traditional gut content analysis. Traditionally, SIA have utilized white muscle, liver, gonadal tissue, bone collagen, otoliths, brain or entire fish (i.e., smaller specimens). One drawback with using these tissues, or whole fish specimens, is that fish must be sacrificed, which can be undesirable when working on rare species, species of concern, or sport fishes. The utilization of non-lethal sampling techniques in SIA would eliminate the need to sacrifice fish and would allow researchers to increase sample sizes. Therefore, the objective of this research was to determine if non-lethally obtained tissues (i.e., fins and scales) could be readily substituted for lethally obtained tissue (muscle) for SIA in walleye and yellow perch. Stable carbon (^{13}C) and nitrogen (^{15}N) isotope signatures were compared among the three tissues obtained from individual fish. We used linear regression to determine the coefficient of correlation for all three tissue types. Results are presented within. The ability to readily utilize non-lethally sampled tissue for SIA of economically and ecologically important species could provide fisheries scientists with the ability to track trophic dynamics and predator-prey interactions without inflicting undue mortality or performing cost prohibitive gut content studies.

Muskellunge Spawning Habitat Project

Joe Nohner, University of Michigan School of Natural Resources and Environment

Abstract: The muskellunge spawning habitat project has two goals: to thoroughly characterize spawning sites and to create a GIS-based model to predict the location of spawning habitat in northern Wisconsin's inland lakes. Musky spawning locations were revealed by spotlighting surveys, and confirmed by subsequent searches for deposited musky eggs. We identified the substrate (muck, silt, sand, gravel, cobble, and boulder) and recorded the percent cover of wood and vegetation at each site during egg surveys. Additionally, the dominant vegetation and substrate at depths 0-1.5m was mapped as polyline features for each lake.

Over the past two seasons we've confirmed 339 spawning locations and sighted 559 muskies in 26 lakes. *Preliminary* data suggest that muskies are using sandy substrates (209 sites, $p < 0.0005$) more often than boulders (3), cobble (88), gravel (10), silt (82), or muck (70). Additionally, spawning site confirmation was higher on sandy substrates than any other substrates ($p < 0.0005$). Muskies also were found spawning more commonly in vegetated habitats ($p < 0.0005$) and in habitats with woody debris ($p = 0.018$). A critical assumption behind these *preliminary* conclusions is that habitat types are equally abundant. The complete lake mapping will address this concern by comparing the frequency of habitat usage to the actual frequency of habitat types on an aerial basis.

Finally, the GIS-based model will be constructed using data from the 2007 and 2008 spawning seasons. Verified muskellunge spawning sites, depth, slope, aspect, vegetation, substrate, groundwater potential (using a GIS application of Darcy's law), effective fetch, and proximity to stream inlets will comprise potential model inputs. The model will likely be created using a hierarchical cluster analysis or pathway modeling. Information from the model and habitat assessments will be used by DNR and NGO's to inform habitat protection and restoration.

ETC STATE/PROVINCE UPDATES 2008 SUMMER MEETING

Indiana

During broodstock collection at Lake Webster, 185 fish were captured, including 100 females and 85 males. As many as 40 females and 50 males were successfully spawned. 2008 marked the first year eggs were taken on site at the Webster Lake. The on-site spawning operation went very smoothly. This year all eggs were disinfected with a 100 ppm iodine solution for 10 minutes prior to introduction to the hatchery as a precaution to VHS. Overall egg viability was 48.9%, even with transporting and disinfecting eggs. All streaked eggs were transferred to East Fork State Fish Hatchery. Our production goal of 500,000 streaked eggs was exceeded.

This year also marked the fourth year of PIT-tagging captured muskies. Among the 185 individuals captures, there were a total of 69 recaptures; eight were from 2008. Over 1,100 fish have been tagged throughout this experiment. A population estimate using Bailey's method yielded 2.77 adults per acre, however, multiyear analyses on the number of adults is currently underway.

To determine the success of muskie stockings throughout the state, Skinner Lake in District 3, Ball Lake in District 2, and Bass Lake in District 6 were sampled in early-April for four nights and five days using trap nets similar to those used during broodstock collection. Fish captured in the traps were measured to the nearest half-inch and a pectoral fin ray was removed for aging and growth estimates. Additionally, creel surveys were conducted at each site and specifically aim to gauge public opinion about current muskie stockings.

During the additional sampling, a total of 20 fish were collected at Skinner Lake. They ranged from 33 to 39 inches in length and were four to six years old. Growth rates were comparable to those found for Lake Webster.

At Bass Lake, a total of 67 muskies were captured. Lengths ranged from 32 to 43.5 inches and were four to eight years old. Back-calculated growth rates were average up to 3 years, but were slightly higher for fish 4 to 8 years old.

Only nine fish were captured at Ball Lake. Eight of these were captured in the first night, and only one was captured thereafter. Lengths ranged from 27.5 to 42 inches. Fish were 3 to 8 years old and growth was average compared to other nearby lakes.

Although the results of sampling at these three lakes were mixed, they may aid in the creation of criteria to determine if muskie stockings have been successful. A full report of the Lake Webster broodstock collection, population estimate, and plans for future years will be completed this winter.

Nate Thomas
District 3 Assistant Fisheries Biologist, IDNR
Northeast Regional Office
Division of Fish and Wildlife
1353 South Governors Drive
Columbia City, IN 46725-7539
Phone: (260) 244-6805
FAX: (260) 244-7247
NThomas@Dnr.IN.Gov

Illinois

An Update on Illinois Esocid Research

By Corey S. DeBoom and Dr. David H. Wahl

Stocking has become the primary management tool for establishing and maintaining muskellunge populations in Illinois. The high costs associated with producing these fishes create the need for efficient management practices. Previous research efforts have determined the size of fish and timing of stocking to maximize growth and survival. However, additional information on muskellunge stocking strategies is needed. Specifically, more biological data on different genetic stocks of muskellunge is needed to determine the best population to stock in a particular body of water to maximize growth and survival. In addition little research has focused on the response of fish communities and lake ecosystems to muskellunge stocking. As muskellunge increase in popularity and stocking becomes more widespread, potential impacts of muskellunge introduction on existing fisheries and aquatic communities must be considered. We are currently examining these questions in Illinois through a cooperative project between the Illinois DNR and the Illinois Natural History Survey, funded through a Federal Aid in Sportfish Restoration grant.

Current research is focused on stock evaluation comparing growth and survival of muskellunge from the Upper Mississippi River drainage stock, the Ohio River drainage stock, and the Illinois North Spring Lake progeny in two Illinois lakes and a pond study. In both the ponds and lakes, the Ohio River drainage stock and the Illinois population appear to have similar growth rates; both consistently higher than the Upper Mississippi River drainage stock. Results from lake introductions suggest that after the first summer, the Ohio River drainage stock and Illinois population typically have similar survival and both are higher than the Upper Mississippi River drainage stock. These, and future

introductions will need to be monitored over additional years to further assess long-term growth and survival differences among stocks.

In the past year diet samples were collected from 280 muskellunge across 4 Illinois lakes as part of a larger effort to address angler concerns regarding the predatory impacts of muskellunge on existing fisheries. Diet analysis showed that where present, gizzard shad dominated muskellunge diet in both numbers and biomass across all size classes and seasons. While this data provides a preliminary analysis of muskellunge diets in these lakes over the past year, more data is required to adequately characterize annual and seasonal fluctuations occurring over time. Specifically it is unclear how food habits of muskellunge may change in response to annual fluctuations in prey availability or whether consistent seasonal trends are present.

Analyses are also currently focused on examining the community and fishery effects of muskellunge introduction. We are utilizing a community data set including fish communities, zooplankton, larval fish, benthic macroinvertebrates, and nutrients collected on a series of control lakes as well as lakes which have received muskellunge stockings. Preliminary results indicate that largemouth bass and bluegill abundance have not been negatively affected by muskellunge stocking in two lakes for which data has been examined. In addition gizzard shad abundance has remained relatively constant although the average size of gizzard shad sampled in one lake has increased relative to controls. The increase in size structure of gizzard shad in this lake may be due to increased predation pressure on smaller size classes by juvenile muskellunge.

Dakota

Dakota Chapter AFS Report

Greg A. Wanner

South Dakota

New research proposed:

Age Structure and Recruitment Patterns of Northern Pike Populations in Northeast South Dakota

Dr. Brian Blackwell

Need:

Northern pike are an important top-level predator in many northeast South Dakota lakes and provide many angling opportunities. Although northern pike are an important part of aquatic systems in northeast South Dakota, little is known about the age structure or recruitment patterns of pike populations in these waters. It is generally known that northern pike recruitment is high following a spring increase in water levels that inundates terrestrial vegetation. However, knowledge concerning recruitment patterns of northern pike in natural lakes that generally have stable water levels is lacking. It has been assumed that northern pike in northeast South Dakota grow fast and are short lived, but this has not been validated.

Aging northern pike is difficult and for this reason has not been routinely done in South Dakota. Choosing an appropriate structure for aging pike has been a challenge. In recent years the use of otoliths to age northern pike has increased among fisheries workers while the use of scales and whole cleithra has decreased. However, otolith collection and preparation can be time consuming (otoliths need to be mounted in epoxy and sectioned) and may limit the number of northern pike an agency can age in a given year. Because of this, it would be beneficial to determine if another structure that may be less time consuming to collect and prepare could be used for aging northern pike.

Objectives:

- 1) Describe northern pike population characteristics in different lake types in northeast South Dakota.
- 2) Determine if cleithra cross sections can be used to age northern pike.

Methods:

Northern pike will be collected as part of already planned lake surveys during 2008 in northeast South Dakota using modified-fyke nets and experimental gill nets. Lakes were chosen based on prior history of northern pike catches to increase the probability that a minimum of 25 fish can be collected from each lake. Selected lakes will initially be grouped into three categories. The categories and the selected lakes are:

- 1) permanent natural complex fish community - Roy, Clear, and Pickerel lakes.
- 2) marginal natural simple fish community - Hurricane, Bullhead, and additional lakes.
- 3) new water - Cattail-Kettle, Lily GPA, and additional lakes

Collected northern pike will be measured for total length (TL, mm) and weighed (g). Sagittal otoliths and cleithra will be removed and placed in labeled storage until processed. Otoliths will be mounted in epoxy and sectioned through

the focus using an Isomet low-speed saw. Several otolith sections from each otolith will be mounted on a slide and examined under a microscope. Two or three readers will independently view the otoliths and all annuli counted. Age discrepancies between readers will be resolved before a final age is assigned. Although we will not validate otolith ages in this study, the assumption that otolith ages represent the true age will be assumed based on previous validations for other species.

Age-frequency histograms will be constructed to describe the age structure of each population sample. Annual mortality will be estimated through catch-curve analysis. Recruitment variability will be estimated using the recruitment variability index (RVI) and year-class strength will be indexed from the residuals computed during catch-curve analysis. Correlations between year class strength, climate variables, and water levels will be examined.

Cleithra will be cross sectioned and the sectioned cleithra mounted in clay so that the exposed edge can be viewed under a microscope. The exposed edge may need to be sanded and oil added to aid in observing annuli. Also thin sliced cross sections will be mounted on a slide and examined under a microscope. Two or three readers will independently age each structure. Age bias plots will be used to compare ages assigned to otoliths and cleithra. Precision of sectioned cleithra age estimates will be determined by calculating the percent agreement and mean coefficient of variation (CV).

Recent esocid research from South Dakota State University

Schoenebeck, C. W., S. R. Chipps, and M. L. Brown. In press. Improvement in an esocid bioenergetics model for juvenile fish. Transactions of the American Fisheries Society.

Abstract.— Feeding rate and water temperature are known to influence the accuracy of fish bioenergetics models. In an effort to improve the accuracy of a juvenile esocid bioenergetics model, we used a regression-based approach to develop a corrective equation that accounted for bioenergetic model prediction error associated with variable feeding rates and water temperatures. The regression model explained 58% of the variability in consumption rate prediction error ($\text{cal}\cdot\text{g}^{-1}\cdot\text{d}^{-1}$) for age-0 tiger muskellunge *Esox lucius* X *E. masquinongy* and included the following parameters; initial body weight (g), water temperature ($^{\circ}\text{C}$), and relative growth rate ($\text{cal}\cdot\text{g}^{-1}\cdot\text{d}^{-1}$). The corrected model accurately predicted observed food consumption and had lower prediction error (mean error = 7%) than the uncorrected model (mean error = 43%). Moreover, differences between observed and modeled estimates of cumulative food consumption were significantly greater than zero for the uncorrected model ($t\text{-stat} = 3.8$, $df = 38$, $P = 0.0003$), whereas differences between observed and adjusted model estimates of food consumption were not different from zero ($t\text{-stat} = 1.3$, $df = 38$, $P = 0.10$) indicating that the correction equation resulted in a significant improvement in model accuracy. We recommend using the corrective equation to adjust consumption estimates for juvenile tiger muskellunge when using the esocid bioenergetics model. Further work is needed to identify physiological mechanisms responsible for consumption-dependent error in fish bioenergetics models.

Jolley, J. C., D. W. Willis, T. J. DeBates, and D. D. Graham. 2008. The effects of mechanically removing northern pike density on the sport fish community of West Long Lake, Nebraska, USA. Fisheries Management and Ecology 15:251-258.

Abstract.— Removal of piscivores may affect population size structure, abundance and growth rates of the remaining fish community. A total of 572 northern pike, *Esox lucius* L., was removed from 25-ha West Long Lake, Nebraska from 2003 to 2006. The northern pike population was reduced from 36 fish ha^{-1} and 22 kg ha^{-1} in 2002 to 20 fish ha^{-1} and 9 kg ha^{-1} in 2006. The northern pike population shifted to dominance by smaller individuals. Relative abundance increased for bluegill, *Lepomis macrochirus* Rafinesque, but remained similar between years for largemouth bass, *Micropterus salmoides* (Lacepede), and yellow perch, *Perca flavescens* (Mitchill). Bluegill and yellow perch size structure increased probably because of reduced predation by northern pike. The effects of reduced northern pike density on largemouth bass were less evident. The largemouth bass population may be returning to higher density with smaller size structure observed before pike were introduced. The sport fish community responded positively to the removal of northern pike in this small lake.

North Dakota

Cooler spring weather conditions throughout the area likely decreased northern pike production with low numbers of pike stocked throughout the state. Rising water throughout the Missouri River basin is setting the stage for increased pike production next year in Lake Sakakawea and Oahe.

Minnesota

The MNDNR has been wrapping up an important dialogue with pike/muskellunge constituent groups. The dialogue began in 2006 with the formation of a "Pike/Muskellunge Work Group" that consisted of leaders from groups such as

the Muskie Alliance, Muskies Inc., Northerns Inc., Anglers for Responsible Muskie Management, the Minnesota Darkhouse and Angling Association, outdoor writers, and fishing guides as well as several DNR staff. The goal for this group was a long-range plan for management of large esocids in Minnesota. Consensus for the long-range plan was not attained, but based on public and professional critique, a workable plan was developed and the most current draft of the plan can be viewed at the MNDNR website http://www.dnr.state.mn.us/fisheries/muskiepike_2020.html.

Provided by Rod Pierce

Missouri

Missouri's second muskie plan was completed on December 1, 2007. The document contains background and individual lake information, as well as objectives and strategies that will guide Missouri muskie management through 2017. Hard copies are available to those interested, or can be viewed at <http://www.mdc.mo.gov/fish/sport/muskie/>

Recent management:

- All lakes, with the exception of Pomme de Terre, were stocked at a rate of one muskie (12- to 14-inches) per acre in fall 2007. Pomme de Terre Lake was stocked with 4,000, 12- to 14-inch fingerlings (0.5 muskie/acre).
- A spillway barrier was erected at 158-acre Henry Sever Lake.
- In January 1996 the statewide minimum length limit was increased from 30 to 36 inches. The only remaining exception has been at Hazel Creek Lake (530 acres.) which has had a 42-inch minimum length limit. Because of the high voluntary release rate of muskie statewide and the relatively low angler effort at Hazel Creek, there was no biological reason to maintain one lake under a different minimum length limit. On March 1, 2008, the 42 inch minimum length limit at Hazel Creek Lake was removed and replaced with the statewide length limit. The statewide daily limit is one muskie per day.

We continue to use the Show-Me Muskie project, a statewide volunteer muskie angler catch reporting system, to supplement the evaluation of our program.

Provided by Mike Anderson

Ohio

Greetings from Ohio and well wishes to all those in attendance – I hope to be able to join you next year at the ETC meeting. Unfortunately, the most notable esocid news out of Ohio is the discovery of VHSV in the Clear Fork Reservoir muskellunge population. The following is a 6/17/08 news release from the ODNR – Division of Wildlife:

COLUMBUS, OH - The Ohio Department of Natural Resources (ODNR) has confirmed that viral hemorrhagic septicemia (VHSV), a virus that causes disease in fish but does not pose any threat to public health, was confirmed present in muskellunge sampled during routine egg collection in Clear Fork Reservoir in late April. The reservoir is located in Richland and Morrow counties. The virus was found in ovarian fluid samples collected from the muskellunge as part of routine ODNR testing for VHSV, but has not resulted in a fish kill. The samples were sent to the U.S. Fish and Wildlife Service (USFWS) Fish Health Center in LaCrosse, Wisconsin, where the VHSV virus was initially isolated. It was later confirmed at the National Veterinary Services Laboratory, U.S. Department of Agriculture Animal Plant Health Inspection Service (APHIS) in Ames, Iowa.

These results mark the first isolation of VHSV outside the Great Lakes Basin. Fisheries officials believe VHSV has been a factor in recent fish kills of several species of fish in the Great Lakes that correspond with the end of spring spawning.....Routine surveillance, disinfection of eggs used in fish production, public education and additional VHS research will continue by the ODNR, Ohio Department of Agriculture and the U.S. Fish & Wildlife Service in an effort to minimize the spread of VHS and protect fish hatcheries.

(Added information) The big news is that the first round of test are back from the Fish Health Lab in LaCrosse and both the muskie fingerlings at the London State Fish Hatchery and at Konrad Dabrowski's lab at OSU tested negative. We have three more tests to clear at London before the facilities State Ag quarantine will be lifted about mid-September in time to stock those advanced fingerlings back into Clear Reservoir and Alum Creek Lake. We stocked Alum with the surplus fry from those same broodstock before we had notice of the VHSV. Another interesting note is the fact that Konrad's control group of fingerlings that were not treated with iodine at all where also negative for VHSV. So, it looks like no vertical or pseudo-vertical transmission of the virus from the positive ovarian fluid.

The Muskie Angler Log (MAL) can be found at <http://www.ohiodnr.com/muskielog/welcome.aspx>. This is an online tool that allows anglers to create an account via a username and password and then subsequently enter data pertaining to their muskellunge catches. The MAL allows only the specific angler to view his/her own records (as opposed to all other registered anglers being able to see his/her data as is the case with the Muskie Inc. Lunge Log, for example). The exceptions to this include Division of Wildlife (DOW) staff being able to use the data for management/research purposes and organized muskellunge club president's being able to access their member's data for the purposes of tabulating club competition standings. The MAL replaces the "scale envelopes" used by the DOW in the past. The DOW is no longer collecting scale samples from anglers. The MAL is the outcome of numerous focus groups both in-house (DOW) and with a suite of muskellunge angling groups. The MAL should prove to be a useful management tool for the DOW to monitor trends in catch, effort, and size structure for our muskellunge fisheries.

In other news, the Ohio Division of Wildlife plans to add two additional reservoirs to the state's muskellunge stocking program – Lake Milton and East Fork Lake. These lakes have the requisite forage and habitat and are also positioned geographically to more evenly distribute muskellunge fishing opportunities to all Ohio anglers. Thanks for your time and I look forward to reading the updates from the other participating states and provinces.

Curtis P. Wagner- Fisheries Biologist
Ohio Department of Natural Resources
Division of Wildlife- District 3
912 Portage Lakes Drive
Akron, OH 44319
(330) 245 - 3018
curt.wagner@dnr.state.oh.us

Ontario **Northern Pike**

- Literature review of northern pike regulations in North America.

Kerr, S. J. and T. Lasenby. 2003. A literature review of northern pike regulations in North America. Fish and Wildlife Branch. Ontario Ministry of Natural Resources. Peterborough, Ontario. 44 p. + appendices.

- Under the provincial Ecological Framework for Fisheries Management (EFFM) initiative, northern pike regulations were reviewed and streamlined. This included standardizing open/closed season dates, establishing standard catch and possession limits and developing recommendations for size limit regulations.

Ontario Ministry of Natural Resources. 2006. Guidelines for managing the recreational fishery for northern pike in Ontario. Fish and Wildlife Branch. Peterborough, Ontario. 13 p.

Muskellunge

- Muskellunge culture and stocking to restore the muskellunge population in Lake Simcoe. 2008 represented the fourth year of wild egg collections and stocking. To date, An article on muskellunge stocking in Ontario was recently published in Muskie, a Muskies Inc. publication.

Kerr, S. J. 2008. Muskellunge stocking and restoration in Ontario. Muskie. July 2008 : 22-23.

- Continued involvement in a cooperative angler diary project with Muskies Canada Inc. The 2008 project will mark the 30th consecutive year that this information has been collected. A review and analysis of this data set was recently published.

*Kerr, S. J. 2007. Characteristics of Ontario muskellunge (*Esox masquinongy*) fisheries based on volunteer angler diary information. Environmental Biology of Fishes 79 : 61-69.*

- Article on Ontario muskellunge regulations published in Muskie magazine.

Esocids (General)

- Continued involvement in the Cleithrum Project. The Cleithrum Project is a permanent repository for biological information on muskellunge and trophy pike. The source of samples and information are anglers and taxidermists who handle trophy fish. Information is utilized to determine growth rates and ultimate size upon which provincial size limit regulations are based.

Prepared by Steven J. Kerr, July 28, 2008

Wisconsin

Wisconsin Muskellunge Update
August, 2008
Tim Simonson, WDNR
(608) 266-5222, timothy.simonson@wisconsin.gov

1. **VHS** – The VHS virus was discovered in freshwater drum from Little Lake Butte Des Morts in spring 2007, and subsequently showed up in Lake Winnebago (drum) and Lake Michigan (low numbers of smallmouth bass, brown trout, alewife). So far in 2008, one fish kill, on Lake Michigan, has been attributed to VHS (round gobies) and VHS was detected in yellow perch during planned surveillance offshore from Milwaukee. An unusually high number of dead muskellunge (on the order of 10-20) were observed on Green Bay in spring 2007, but no large die-offs have been seen and all the tested muskellunge (via ovarian fluid and moribund fish) have come back negative so far. We tested many inland waters over the past two springs (2007 and 2008) and all have come back negative. We have enacted rules that prohibit transport of live fish and water from infected waters. DATCP is now has more stringent testing requirements for fish farms and stocking. We have destroyed some fish in our hatcheries and are testing forage and fingerlings before any stocking will occur. A federal order issued by the U.S. Department of Agriculture - Animal and Plant Health Inspection Service (APHIS) prohibits interstate transfer of muskellunge between Great Lakes states in order to prevent the spread of Viral Hemorrhagic Septicemia (VHS) (http://www.aphis.usda.gov/vs/aqua/pdf/vhs-fed-order_ogc-changes.pdf).
2. **Brood Stock Management** – Beginning in spring 2006, we implemented a brood stock management plan with three major elements: 1) Best management practices for hatcheries; identification of stock boundaries; and selection of optimum brood sources based on performance. This has resulted in major changes to our production system operations.
 - **Production BMPs:** Briefly, some highlights of the plan include: Switching to NR lakes as egg sources; 5-lake rotation for each putative strain (basin); achieving a minimum number of pairs to ensure effective population size (19-26 females and 3 males per female); spawning throughout the run; random selection of fish and pairs; all families contribute equally to stocking events. So far, the production system staff have been very cooperative and flexible in the face of many difficulties.
 - During 2007, Marty Jennings evaluated the brood stock management plan to date. The dilemma between having a large enough muskellunge population and the paucity of non-stocked waters has created a crunch to identify suitable candidate lakes to be designated as brood stock lakes, particularly in the upper Chippewa Basin. Ideally, we would like to have 10 lakes within each genetic management unit (which looks like, based on preliminary genetics sampling, will follow major watersheds). This would provide 5 primary lakes in the rotation and 5 alternates. This goal will be difficult to achieve in the Chippewa basin. Marty recommends the following criteria for candidate lakes: a minimum of 1000 acres, category 2 with known reproduction, genetic analysis scheduled or completed, and that stocking be suspended if the lake is selected as a brood lake. The following candidates were identified by NOR in recent meetings: Chippewa Basin - Butternut Lake, Chippewa Flowage East Basin, Chippewa Flowage West Basin, Lost Land/Teal Chain, Moose Lake (Sawyer), White Sand Lake (LDF). The two Chippewa Flowage basins should be used in successive years so that recipient lakes will not get Chippewa Flowage fish more than twice within 10 years on an alternate year stocking schedule. Further communications with the Lac Du Flambeau Band and genetic analyses are needed before White Sand Lake can be included. It also presents a challenge for the hatchery due to the distance from Spooner. SS conducted test netting on Lost Land/Teal this spring. The hatchery took eggs from Lac Courte Oreilles this spring. Wisconsin Basin – North/South Twin, Plum, Tomahawk, Pelican, Moen Chain, Big/Little Arbor Vitae, Squirrel. The committee recommended that if egg numbers are difficult to obtain, that category 3 lakes (e.g., Whitefish)

could be used for eggs as long as they can be kept separate in the hatchery and only used to stock universal receptor waters (outside the native range). The committee recommends that NO PIT tagging of brood fish take place in the Wisconsin Basin in 2008. Marty will continue to work with GTH to PIT tag brood fish in the Chippewa Basin and he plans to evaluate the practice before we expand it statewide.

- **Stock Boundaries:** Genetics Study (Brian Sloss) - Ed Murphy, the graduate student on the project, should have all the data collected so far analyzed and he is on schedule to complete the first phase of the project by September. Several more lakes were sampled this spring. A second student is on board to follow-up with a more refined look at stock boundaries.
 - **Optimum Brood Sources:** Leech Lake Study – We were planning to evaluate the performance of Leech Lake origin fish against our production fish in stocked waters outside the native range of WI muskellunge. In 2006, we had poor success with the fry. We did not produce enough fish to fill all the research quotas and the fish that were produced were small and appeared to have metabolic problems. Recent changes to DATCP rules on imports (VHA - Veterinary Health Assessment, requiring sacrifice of adult brood stock for imported eggs – valid only for 30 days), prevented us from obtaining eggs or fry from MN DNR in 2007 and 2008. We could request large fingerlings from MN (which could be VHS tested), but that would confound the study because the fish would be subjected to different rearing and hauling conditions. This study is on hold.
3. **Critical/Sensitive Habitat delineation:** UM, Musky Clubs Alliance, WDNR – Paul Cunningham is coordinating a joint project through Jim Diana, University of Michigan, aimed at delineating musky spawning areas using remote sensing data. During the past 2 springs (2007 and 2008), Joe Noehner, a graduate student did spotlight surveys during the spawning period on several NR musky lakes. Joe will attempt to develop a model to predict spawning areas in other lakes, based on the features of known spawning areas. The Musky Clubs Alliance has donated money for supplies and volunteer hours to assist with the spotlight surveys.
 4. **Great Lakes Spotted Muskellunge** – The Great Lakes Spotted musky program, active since 1989, is beginning to produce tremendous fishing on the Lower Fox River and Green Bay. However, this program is threatened by the same issues discussed under the Leech Lake Study, namely VHS and tighter DATCP restrictions on import of fish. We were not able to take eggs from the Fox River in spring 2007 or spring 2008. We hope to have approval for egg-disinfection procedures by next spring. We developed a brood stock management plan for the Great Lakes Spotted program, which includes a long-term plan for a brood source robust to VHS (i.e., increase diversity, other inland sources – brood lakes/holding waters); along with shorter-term recommendations related to egg disinfection; test-netting on other stocked waters and looking into conservation hatchery techniques. Additionally, WRSFH will lose one year of cool water production (08-09) during renovation. **54" length limit/harvest moratorium on Lake Michigan** – The committee endorses the approach taken to seek public input on the 54" minimum length limit through the Conservation Congress resolution process. This is the proper avenue to initiate a review of the management goals for this fishery. The department is open to reevaluating the management goals for the musky population in Lake Michigan. The department does not endorse the complete harvest moratorium proposed by the Green Bay Muskellunge Coalition in their January 8, 2008 paper to the Natural Resources Board. However, the committee discussed a structured approach, developed by David Rowe, to respond to potential fish kills on Green Bay this spring. One of the options is to seek voluntary closure of the fishery in the spring or to seek a spring closure via emergency rule if large numbers of dead muskellunge are discovered in the spring and they test positive for VHS. So, one option is a harvest moratorium in spring when the fish are most susceptible
 5. **Regulations - 2007 Spring Hearings** – Eliminated the size restriction on landing nets (currently 3 feet in diameter); Increased the minimum length limit on the St. Louis River, Douglas County, from 40" to 50" at the request of MN DNR; and Increase the minimum length limit to 45" on connecting waters of the Madison Chain of Lakes for consistency with the lakes. **2008 Spring Hearings** – Extend the open season for musky in the southern zone (south of UIS Hwy 10) to December 31; increase the minimum length limit for muskellunge from 45" to 50" on the Chippewa Flowage, Sawyer County; ; increase the minimum length limit for muskellunge from 40" to 50" on Bone Lake, Polk County establish uniform 40" minimum length limit regulations on the Black River, Lacrosse, Monroe, and Trempealeau Counties; extend the 40" minimum length limit on Sparkling Lake, Vilas County, to 2014.
 6. **Early Catch and Release Season** – A new statute, requiring the department to establish an early catch and release-only musky season with artificial lures and barbless hooks, was signed into law as part of the state budget last year. In order to take effect, the department needs to promulgate companion administrative rules. The passage of this law created a public outcry and the author of the legislation agreed to repeal the law at his

earliest opportunity. The department has chosen not to proceed with promulgation of administrative rules, in anticipation of the law being repealed. Therefore, there will not be an early C&R season in 2009.

7. **Stocking Guidance** – The capability of small lakes to produce numbers of trophy-sized fish is extremely limited. However, several small waters are being managed as popular action fisheries. The Musky Team recommended general guidance on lake size criteria for stocking. For action waters, the recommended minimum lake size is 200 acres. For trophy waters, the recommended minimum lake size is 500 acres. These are guidelines and do not retroactively remove waters from quotas. The team asked all biologists to critically review their quotas, based on density, fishing effort/public use, and distance from hatchery, encouraging them to remove smaller waters where appropriate.

WDNR Muskellunge Home Page: (<http://dnr.wi.gov/org/water/fhp/fish/musky/index.htm>)

Muskellunge Management Update (Publication FH-508): <http://dnr.wi.gov/org/water/fhp/fish/pubs/muskydoc.pdf> with links to **stocking** and **creel data**.

Wisconsin Muskellunge Waters. Lists of Waters (Publication RS-919-96):
(http://dnr.wi.gov/fish/musky/muskywaters_list.html)

Muskellunge Management Team Web Page: (<http://dnr.wi.gov/org/water/fhp/fish/musky/muskymanteam.html>)

The **Musky Partners Web Page** (http://dnr.wi.gov/org/water/fhp/fish/musky/muskywaters_partners.html)

Washington

Our tiger muskie program is small (we release into only seven lakes), but robust and gaining popularity with anglers every year. As you can imagine, some of our biggest critics were biologists from our own agency but we have silenced most of them with good information. We have diet studies from five lakes, two of which have runs of wild migratory salmon and the others have good trout fisheries. We also have a very active and enthusiastic chapter of Muskies Inc. (just over one year old now) and they are getting a visit from the incoming president in May. We gone from our first tiger muskie tournament, September 2006 to six tournaments across the state this year.

We also have, good or bad, a rapidly growing northern pike population in a river/reservoir in the northeastern corner of the state and we are trying to jump on it early to monitor it and see how it changes. It could turn out to be a trophy fishery because of the growth rates and forage base, IF they don't eat themselves out of house and home. They are trickling down from Montana so they aren't going away. The best thing we can do is try to keep an eye on them and see how it goes.

By Bruce Bolding (boldibdb@dfw.wa.gov)