Aquaculture Policy Recommendations

Minnesota Department of Natural Resources

January 14, 2008

Cost

Pursuant to Minnesota Statutes, Section 3.197, we estimate that it cost approximately $9,000 to produce this report. This includes staff time for attending meetings, drafting and reviewing the report and compiling comments and recommendations (approximately $7,500) and special expenses associated with conducting a field tour of private and public aquaculture facilities for involved stakeholders, agency staff and legislative leaders ($1,500). These costs do not include the costs of preceding research and public participation efforts conducted by the Department of Natural Resources prior to the requirement that this report be prepared.

EXECUTIVE SUMMARY

This report fulfills the requirements of Laws 2007, Chapter 57, Article 1, Section 14 which requires: *"By January 15, 2008, the commissioner shall report to the senate and house of representatives committees on natural resource policy and finance on policy recommendations regarding aquaculture."*

Aquaculture is the intentional stocking and raising of fish in artificial or natural ponds or wetlands. Aquaculture can be practiced in public or private waters under a license issued by the Department of Natural Resources (DNR). This report and recommendations focus on aquaculture activities occurring in public waters.

The following principles were followed in developing the recommendations in this report: 1) maintain stocking programs for walleye and other game fish utilizing both state and privately reared fish; 2) protect existing natural aquatic habitats and wildlife dependent on them; 3) continue adequate baitfish production for Minnesota anglers; and 4) provide for sustainable commercial aquaculture activities. In preparing this report, the Department of Natural Resources (DNR) drew on the results of much previous scientific study and stakeholder process.

There are many issues affecting the quantity and quality of natural wetlands in Minnesota. Fish rearing in natural wetlands is one of the most visible aspects of a much larger set of problems facing Minnesota wetlands.

Under Minnesota law, aquaculture is defined as an agricultural pursuit, but nearly all of the responsibility for administering aquaculture laws is assigned to the commissioner of natural resources.

There is now compelling scientific evidence suggesting that certain raising of fish in wetlands can have detrimental impacts on other wetland values. Therefore, strategies for avoiding or mitigating those impacts are needed, or state policy needs to be modified to clearly address the trade-offs associated with use of public wetlands for fish rearing.

Recommendations:

Previous studies and stakeholder processes achieved consensus on the following issues: 1) the importance of protecting wetlands from drainage; 2) preserving natural isolation of prairie wetlands and limiting wetland connectivity with other surface waters; 3) limiting unregulated stocking of fish in wetlands; 4) limiting carp and bullhead impacts; and 5) providing public notification of aquaculture activities

Licensing criteria.

- Do not license "fishless" basins, particularly those in a clear water state.
- Licensees should submit an annual report documenting quantity of fish production and aquaculture practices
- Do not issue permits for aquaculture in wetlands if $\geq$ 25% of the wetland basin is under a federal waterfowl conservation easement or if water levels of the wetland are being managed with state or federal Duck Stamp funds.

- Revoke or deny aquaculture licenses or administer other appropriate penalties for aquaculture activities in public waters if the licensee is in violation of wetland or clean water standards or regulations.
- Establish a maximum acreage or "cap" on the number of public water wetlands or acreage of public water wetlands licensed for private aquaculture.
- Require applicants to demonstrate acquisition of all necessary regulatory permits, or make issuance of an aquaculture license conditional on receiving all other required permits.

License fees and incentives.

- Develop a fee system that:
    - recovers the costs to manage the program,
    - considers the acres of natural wetlands licensed,
    - establishes a gradient of progressively higher fee classes for ponds based on degree of public resources impacted,
    - provides reduced rates for wetlands specifically constructed or restored for aquaculture purposes,
    - separates commercial licenses from hobby licenses,
    - increases fees for fish reared in wetlands and exported for out-of-state use, and
    - recovers new pond and renewal inspection fees.
- Fish disease testing requirements should be the responsibility of the licensee.

Application and licensing procedures.

- Provide sufficient advance time to allow for pre-licensing assessment of potential fish and wildlife and wetland impacts
- Clarify the five-year license provision and related issues on the length of licensing and renewal procedures

White sucker culture.

- Change eligibility requirements so that annual sucker egg purchase is not tied to numbers of acres of licensed wetlands.
- Options to decrease use of natural wetlands for sucker rearing:
    - increase fees for sucker eggs,
    - identify a cap on the number of acres of natural wetlands that can be licensed for white sucker rearing,
    - identify a cap on the quantity of sucker eggs which will be sold for private aquaculture rearing,
    - identify financial incentives for rearing white suckers in man-made or basins restored specifically for aquaculture,
    - limit the maximum size of basins for sucker rearing, and
    - restrict the use of aeration for over wintering sucker basins.

Landowner notification.

- Notification should be a standard part of the permit review process and a DNR responsibility. Notification for new basins and a gradual phase-in for renewals will be incorporated into the annual DNR review process.

Statute recodification.

- Move aquaculture statutes with DNR authorities from Chapter 17 (Agricultural Statutes) to Chapter 97C (Fisheries Statutes).

Information needs.

- Compile baseline data on physical and biological characteristics of licensed basins along with aquaculture activities as the first step in developing needed tools and methodologies for evaluating aquaculture impacts to wetland functions. Also include data on water quality parameters.
- More information is needed on impact of wetland interconnectedness on water quality and effective strategies to mitigate connectivity issues.
- Additional research is needed on the specific impacts of white suckers and other benthivorous (bottom-feeding) species on wetland functions and values.
- More investigation is needed on the potential impacts of other reared fish species besides walleyes that could be used for biomanipulation tools (e.g., northern pike,muskellunge, bass)
- Develop tools and methodologies to quantify "significant detrimental impact" to natural wetlands from aquaculture versus impacts from other causes.

Conclusions

DNR will begin implementing those recommended changes that are within existing department authorities by initiating rulemaking and changing agency procedures. In addition, DNR will work with policy makers, other agencies and stakeholders interested in implementing other recommendations that require changes to statutes.

Introduction

This report fulfills the requirements of Laws 2007, Chapter 57, Article 1, Section 14 which requires: *"By January 15, 2008, the commissioner shall report to the senate and house of representatives committees on natural resource policy and finance on policy recommendations regarding aquaculture."*

In preparing this report, the Department of Natural Resources (DNR) drew on the results of previous scientific studies and stakeholder processes (see section titled: "History of Fish and Wetlands Stakeholder Processes"). We also held a meeting in December 2006 with a variety of stakeholders representing aquaculturists, anglers, duck hunters, and environmental and nature organizations to discuss the newly completed summary of the current science. In the summer of 2007, a similar group with the addition of key legislators and staff was invited on a July 31, 2007 field tour to look at a variety of private and public aquaculture practices and wetlands in the New London area. This was followed up by a meeting of the same group of invitees on August 15, 2007 to review a summary of the science; conduct small and large group discussion on issues; and gain new recommendations and feedback on previously identified options. Finally, a draft of this report and recommendations were provided broadly in late November and early December through the DNR website with an online survey to assess support for and garner comments on potential recommendations. Notices of the availability of the report and the opportunity for input were provided to: 1) the list of invitees to the summer tour and meeting; 2) the invitees for the annual fisheries, wildlife and ecological resources roundtables, which includes several hundred leaders in the conservation community; and 3) aquaculture licensees. Input was taken through the end of December 2007.

Background

Aquaculture is the intentional stocking and raising of fish in artificial or natural ponds or wetlands. The term aquaculture does not include activities that only involve harvest and sale of wild bait such as minnows or leeches.

Aquaculture can be practiced in public or private waters under a license issued by the Department of Natural Resources. The DNR also practices aquaculture directly, to raise walleye and muskie for stocking in public waters. Waters used for raising fish may be impoundments, dugouts, diked ponds, tanks, natural wetlands and shallow lakes, or restored wetlands that were previously drained. This report and recommendations focus on aquaculture activities occurring in public waters.

The principles that the Minnesota DNR has followed in developing the recommendations in this report are to: 1) maintain stocking programs for walleye and other game fish utilizing both state and privately reared fish; 2) protect existing natural aquatic habitats and wildlife dependent on them; 3) continue adequate baitfish production for Minnesota anglers; and 4) provide for sustainable commercial aquaculture activities.

The DNR is working with policy makers, other State agencies such as Pollution Control Agency and Department of Agriculture, aquatic farming, wetland, and wildlife interests on policy for conducting and managing aquaculture in a way that will help avoid impacts to public wetlands, and to minimize and mitigate unavoidable impacts. Aquaculture

policy should be consistent with current scientific knowledge and criteria for licensing the use of wetlands should be clear and unambiguous.

In addition to concerns about wetland impacts, invasive species and fish diseases will be particularly challenging issues for both the DNR and for private aquaculturists. Internal protocols have been developed by DNR to prevent the inadvertent spread of invasives such as curly-leaf pondweed and spiny waterfleas via aquaculture activities. New testing and certification rules for viral hemorrhagic septicemia (VHS) are also in place and continue to be refined. Managing disease and invasive species issues will be even more complex in the future.

Aquaculture activities and other fish can affect quality of wetlands. Natural wetlands in Minnesota typically occur in one of two "stable states" – either a "clear-water" or "turbid-water" state. Most values of wetlands for wildlife and other wetland benefits are greater in a clear-water state. Because fish influence wetland food webs and nutrient dynamics, certain fish species have potential to induce shifts from clear, to turbid states, or to prolong turbid-water conditions.

Strongest influences of fish in wetlands result from benthivores (bottom-feeders) like carp and black bullheads, which are not intentionally introduced or raised by commercial fish growers. Among aquaculture species currently raised in wetlands, fathead minnows and white suckers probably have the greatest impacts on wetland quality because of a combination of their life histories, feeding habits and culture techniques.

Piscivorous (fish-eating) fishes such as walleyes may compete for invertebrate food sources with ducks and other species, but often have less impact on water clarity and, under some circumstances, may even improve water clarity in wetlands containing high-density populations of fathead minnows. Fathead minnows are a species native to prairie wetlands and are extremely prolific with multiple spawning cycles each year. Walleye fry stocked in wetlands containing dense populations of fatheads often suppress minnow populations, and may contribute to improvements in water clarity, invertebrate abundance, and even increases in submerged plants. However, it should be noted that improvements resulting from walleye stocking are usually short-lived and persist only 1-3 growing seasons after walleye stocking ceases.

Recovery of Minnesota's duck populations is dependent on the addition (net gain) of 2 million acres of production habitat, comprised of 64,000 wetland basins totaling 600,000 acres and 1,400,000 acres of grassland habitat. For details, see the Minnesota DNR Long Range Duck Recovery Plan at:
http://files.dnr.state.mn.us/outdoor_activities/hunting/waterfowl/duckplan_042106.pdf

Although fish rearing in natural wetlands has become a lightning rod for concerns about impaired water quality, it must be recognized that it is simply one of the most visible aspects of a much larger set of problems facing Minnesota wetlands. These include loss of temporary and seasonal wetlands, the introduction of invasive species such as common carp, increased connectivity of remaining wetlands, excessive sediment-laden runoff, and the overall loss of over 90% of Minnesota's prairie wetlands. Improvement in waterfowl breeding populations assumes, in addition to adding wetland and grassland acreage, that

there will also be improvements in existing wetlands with impaired water quality due to landscape changes and the occurrence of undesirable fish, including fish purposely introduced for rearing purposes.

For a full summary of the most recent scientific understanding of the effects of fish in wetlands, see *Fish Culture in Wetlands, a Review of the Science and Recommendations for Licensing Criteria*
http://files.dnr.state.mn.us/publications/fisheries/special_reports/164.pdf

History of Aquaculture Statutes
Under Minnesota law, aquaculture is defined as an agricultural pursuit (Minn. Stat. Sec. 17.491). Although most of the laws pertaining to aquaculture are located in Chapter 17 (agricultural statutes), nearly all of the responsibility for administering those laws is assigned to the commissioner of natural resources. The most recent changes updating aquaculture statutes were passed in 1991-1992. There is clear statutory policy that aquaculture will be practiced in a way that does not damage public resources such as game fish or wildlife nor harm the environment. Some examples of policy statements in current statutes (Minn. Stat. Sec. 17.4981) include: "Aquatic farms must be licensed and given classifications to prevent or minimize impacts on natural resources" and one of the purposes of the act is to "protect existing natural aquatic habitats and the wildlife dependent on them." Minn. Stat. Sec. 17.4984 includes a policy statement that an aquaculture license "…is not a determination of private property rights, but is only based on a determination that the licensee does not have a significant detrimental impact on the public resource."

Aquaculture statutes clarify that aquaculture in Minnesota is to be practiced in wetlands without harm to public resources. However, status and changes in wetland quality are extremely difficult to assess, categorize and assign to specific causes. Nonetheless, technical understanding of the effects of fish in prairie wetlands has improved during the past 15 years. There is now compelling scientific evidence suggesting that raising fish in wetlands can have detrimental impacts on other wetland values. Therefore, strategies for avoiding or mitigating those impacts are needed, or state policy needs to be modified to clearly address the trade-offs associated with use of public wetlands for fish rearing.

History of Fish and Wetlands Stakeholder Processes
The Minnesota Department of Natural Resources has worked toward resolution of this issue with the aquaculture industry, fisheries managers, wildlife managers, wetlands advocates and other stakeholders concerned about wetlands. Ecological consequences of aquaculture in Minnesota wetlands has been the subject of much previous and ongoing research and numerous stakeholder discussions over the last 8 years. A brief summary of previous work on this topic includes:

- Fish Rearing in Wetlands Report 2003 – seven meetings with over 40 participants representing a broad range of interests, from aquaculture groups; Minnesota Waterfowl Association; Ducks Unlimited; U.S. Fish and Wildlife Service; DNR Divisions of Fisheries and Wildlife, Ecological Resources, Enforcement, and Waters; Pollution Control Agency; Minnesota Department of Agriculture, Izaak Walton League, Audubon, and Minnesota Sportfishing Congress (See: *Fish Rearing in*

Wetlands Final Report May, 2003)
http://files.dnr.state.mn.us/fisheries/aquaculture/fish_rearing_report.pdf

- 2003 Legislative Report on Aquaculture Licensing – mandated by Minnesota Session Laws 2002, Chap 376, Sec. 17; identified a number of potential options for changing licensing procedures (See *Aquatic Farming License Study Report to the Legislature* January 14, 2003) http://files.dnr.state.mn.us/fisheries/aquaculture/aquatic_farming_lic_study.pdf
- 2004 Walleye and fathead minnow research report – basis for using fish for biomanipulation (see *Walleye stocking as a tool to suppress fathead minnows and improve habitat quality in semipermanent and permanent wetlands of Minnesota*) http://files.dnr.state.mn.us/publications/fisheries/special_reports/159.pdf
- 2006 Fish in wetlands white paper summarizing a review of the current science (see *Fish Culture in Wetlands, a Review of the Science and Recommendations for Licensing Criteria*) http://files.dnr.state.mn.us/publications/fisheries/special_reports/164.pdf
- December 2006 meeting – DNR initiated meeting with a variety of stakeholders discussed the newly completed summary of the current science and began to compile and seek feedback on a list of potential options related to future policy, practice and management of aquaculture
- July 31, 2007 field tour – involving key stakeholders and legislators; looked at a variety of private and public aquaculture practices and wetlands in the New London area.
- August 15, 2007 meeting – follow-up to the field tour; included a summary of science; small and large group discussion on issues; feedback on potential options and recommendations.

The science of fish in wetlands and the results of the stakeholders processes summarized above were used to inform the recommendations provided in the next section.

Recommendations

General. From previous studies, discussions, and stakeholder processes described above, general consensus was reached on:

1) the importance of protecting wetlands from drainage;
2) preserving natural isolation of prairie wetlands and limiting wetland connectivity with other surface waters;
3) limiting unregulated stocking of fish in wetlands;
4) limiting carp and bullhead impacts; and
5) providing public notification of aquaculture activities.

Despite much new data and ongoing stakeholder discussions, there is no general consensus on other aspects of the practice of aquaculture in natural wetlands at this time.

The DNR makes the following recommendations, based on discussions and input from a wide variety of stakeholders and considering the latest scientific data and understanding

on the impacts of fish in wetlands. Implementation of these recommendations would likely require a combination of statute change, rulemaking and new policy development.

As an overall principle, DNR recommends that aquaculture fees should, at a minimum, cover the state's costs in administering the program and be indexed to the amount of public wetland resources used for the private aquaculture activity. Also, DNR recommends that the same general sustainability standards that apply to private aquaculture activities be applied to DNR use of wetlands for aquaculture programs.

With shifts in state policy related to the practice of aquaculture in public waters, state financial and technical support to the aquaculture industry may be required to help the industry adapt to the new approaches. The state's anglers may also expect to see costs of certain bait increase and supplies could decrease for some species.

More specific DNR policy recommendations on aquaculture are provided below, grouped by general categories of: A) Licensing Criteria; B) License Fees and Incentives; C) Application and Licensing Procedures; D) White Sucker Culture; E) Landowner Notification; F) Statute Recodification; and G) Information Needs.

Category A. Licensing Critera.
The recommendations below relate to criteria for initial licensing decisions, reporting, revocation, and establishing limits on the use of natural wetlands for aquaculture.

A1. Do not license "fishless" basins, particularly those in a clear water trophic state. These types of wetlands are relatively rare on the landscape. Currently, this criterion is being applied on an interim basis by DNR to applications for new wetlands. The definitions of "fishless" and "clear water" need additional clarification. Definitions of "fishless" basins will likely include minimum criteria for number of fish and species present using specified sampling methodologies (i.e., trap mesh size, sample timing, etc). Definition of "clear water" will likely include minimum criteria as measured by secchi disk readings for clear water depth, chlorophyll a levels, and total phosphorous levels.

A2. Licensees should submit an annual report for each licensed basin documenting the species and quantity of fish produced; aquaculture practices including aeration, supplemental feeding, fertilization, stocking rates and other management activities; fish disease testing results; and invasive species detected on the basin during the previous 12 months, beginning with 2008 aquaculture license renewals. Current annual reporting requirements include sales of fish by species for Minnesota and those fish sold out of state, and any purchases of fish or eggs made by the licensee from in state and out of state sources for the previous year.

A3. Do not issue permits for aquaculture in wetlands if $\geq$ 25% of the wetland basin is under a federal waterfowl conservation easement or if water levels of the wetland are being managed with state or federal Duck Stamp funds. An exception could be made if the aquaculture activity is part of a program to improve the wetland under an approved plan (biomanipulation).

A4. Require applicants to demonstrate acquisition of all necessary regulatory permits before an aquaculture license is final, either by requiring the applicant to obtain permits prior to issuance of the aquaculture license or by making the aquaculture license conditional on receiving all other permits. These permits may include but are not limited to: water appropriation or work in public waters permit, aeration permit, and permits for any work conducted on shoreline or in floodplains.

A5. Revoke or deny aquaculture licenses or administer other appropriate penalties for aquaculture activities in public waters if the licensee is in violation of wetland or clean water standards or regulations. Employ conditional licensing in waters identified as impaired (e.g. no fertilization or supplemental feeding).

A6. Establish a maximum acreage or "cap" on the number of public water wetlands or acreage of public water wetlands licensed for private aquaculture. This maximum could be more, less or the same as existing licensed acreage, but would establish state policy on the allowable amount of public waters used for this purpose.

CATEGORY B. License Fees and Incentives.

The following recommendations relate to changes in the licensing fee system to fully recover agency costs and to encourage aquaculture activities that have less impact on natural wetlands (currently, there is a flat annual fee of $210 for an aquaculture license).

B1. Review fee options and develop a system that: (a) recovers the costs to manage the program, (b) considers the acres of natural wetlands licensed, (c) establishes a gradient of progressively higher fee classes for ponds based on degree of public resources impacted ranging from ponds with no connection to public waters, those that are permanently or intermittently connected to public waters, and those that are entirely public waters, (d) provides reduced rates for wetlands specifically constructed or restored for aquaculture purposes, (e) separates commercial licenses from hobby licenses, (f) increases fees for fish reared in wetlands and exported for out-of-state use, and (g) recovers new pond and renewal inspection fees.

B2. Fish disease testing requirements should be the responsibility of the licensee. Disease testing will vary depending the actual status of diseases in Minnesota waters. The goal of pre-disease detection testing is to monitor those basins and activities that could possibly be involved in transmitting a disease while the intent of post-disease detection testing is to contain and eradicate a disease. For example, according to current DNR VHS guidelines, fish disease certification would be required for all private aquaculture fish purchases by the State or stocked in State waters. A subsample of State rearing ponds would be tested each year on a rotating basis. This is based on the fact that DNR culture is single species with a known certified source, whereas private aquaculture involves multiple species from multiple sources. Guidelines for testing following VHS detection in Minnesota have not been finalized at this time, but will entail more comprehensive testing (e.g., testing of all public and private aquaculture basins or testing of all basins within the highest risk zone with reduced testing schedules further from the detection site). These guidelines will be completed in consultation with the Minnesota

Board of Animal Health, University of Minnesota Diagnostic Laboratory, USDA Veterinary Services, and other fish disease experts.

CATEGORY C. Application and Licensing Procedures.
The following recommendations relate to the timing of license applications and clarification of the five-year renewal provision.

C1. Provide sufficient advance time to allow for pre-licensing assessment of potential fish and wildlife and wetland impacts, wetland trophic condition assessment, and riparian owner notification. Ideal timing for basin evaluation is the growing season prior to the proposed use of the basin.

C2. Clarify the five-year license provision and related issues on the length of licensing and renewal procedures, including what happens at the end of five years. Consider going to a six-year licensing cycle to maintain licensee predictability for financing and management and so that additional work required for notification, inspections and renewals can be spread over three biennial cycles.

C3. Re-licensing would occur every five (or six) years and would involve an application review process including a site visit, additional data collection, and landowner notification.

CATEGORY D. White Sucker Culture.
The following recommendations relate to requirements for white sucker egg purchase and culture. The white sucker is a native species that is raised in a large number of natural wetlands, is commonly overwintered with aeration to achieve desired market size, and is a bottom-feeder. The combination of these factors means that this species likely has the greatest wetland impacts of any species raised for aquaculture.

D1. Under current statutes, the amount of sucker eggs that a licensee is eligible to purchase from the state is specifically tied to the number of acres of wetlands that the person has licensed. DNR recommends a change in sucker egg purchase eligibility requirements so that it is not tied to numbers of acres of licensed wetlands.

D2. Recommended options to reduce impacts of rearing white suckers in natural wetlands include: (a) increase fees for sucker eggs, (b) establish a cap on the number of acres of natural wetlands that can be licensed for white sucker rearing, (c) establish a cap on the quantity of sucker eggs which will be sold for private aquaculture rearing, (d) establish financial incentives for rearing white suckers in man-made ponds or basins restored specifically for aquaculture, (e) limit the maximum size of basins for sucker rearing, and (f) restrict the use of aeration for over-wintering sucker basins.

CATEGORY E. Landowner Notification
DNR recommends landowner notification for aquaculture licensing of all waters of the state that are not either: 1) constructed ponds; or 2) waters specifically restored for aquaculture purposes.

E1. Notification should be a standard part of the permit review process and a DNR responsibility. Notification for new basins and a gradual phase-in for renewals will be incorporated into the annual DNR review process.

CATEGORY F. Statute Recodification.
Current aquaculture statutes are primarily in Chapter 17 (Agricultural Statutes) yet most administration of the program is vested in the DNR.

F1. Move aquaculture statutes with DNR authorities from Chapter 17 to Chapter 97C (Fisheries Statutes). Marketing, food inspection and other statutes with Commissioner of Agriculture responsibilities should remain in Chapter 17.

CATEGORY G. Information Needs.
The following items are recommendations for additional data or information needed to improve future management and understanding of aquaculture in natural wetlands.

G1. Compile baseline data on physical and biological characteristics of licensed basins along with aquaculture activities (see A2) as the first step in developing needed tools and methodologies for evaluating aquaculture impacts to wetland functions. Work with other agencies and organizations to efficiently coordinate collection, monitoring and analysis of data on water quality and wetland condition.

G2. More information is needed on impact of wetland interconnectedness on water quality and effective strategies to mitigate connectivity issues.

G3. Additional research is needed on the specific impacts of white suckers and other benthivorous (bottom-feeding) species on wetland functions and values.

G4. More investigation is needed of the potential impacts of other reared fish species besides walleyes for biomanipulation tools (e.g., northern pike, muskellunge, bass)

G5. Develop tools and methodologies to quantify “significant detrimental impact” to natural wetlands from aquaculture versus impacts from other causes. Current science does not provide the tools or methodologies to specifically quantify significant detrimental impacts from aquaculture at this time.

Conclusions
DNR will begin implementing those recommended changes that are within existing department authorities by initiating rulemaking and changing agency procedures. In addition, DNR will work with policy makers, other agencies and stakeholders interested in implementing other recommendations that require changes to statutes.