Southeast Minnesota Sculpin Reintroduction Plan

Final version - 11/24/03

Goal

The goal of this project is to increase the distribution of sculpin by re-establishing viable, self-sustaining populations in Southeast Minnesota trout streams where native populations are presumed to have been present historically, but were extirpated and unable to recolonize. This effort will restore an ecologically important species to these coldwater streams and provide an additional forage component to wild trout populations.

Justification

Slimy sculpin *(Cottus cognatus)* and mottled sculpin *(Cottus bairdi)* are native to Southeast Minnesota, and are found only in coldwater streams. Extensive land use changes around the early 1900's caused severe stream degradation, and most native brook trout and sculpin were extirpated during this time. Improved stream conditions, resulting from improved land use, are now favorable for brook trout and sculpin reintroduction.

Reintroduced brook trout have become established in many Southeast Minnesota streams; one data set showed that brook trout were found in 138 of 259 stream reaches. Some of these reaches were voluntarily recolonized by migrating brook trout from previously-stocked streams. Sculpin, however, have weaker dispersal capabilities than brook trout and are less likely to recolonize areas on their own. For example, Keeler et al (2003) found that reintroduced sculpin moved between 5m and 70m within 115 days of stocking, with ~50% moving <10m. Only 57 of 259 stream reaches from the previous data set had sculpin, suggesting that intentional reintroduction is necessary.

Brynildson and Brynildson (1978) demonstrated the feasibility of sculpin introductions locally with a successful reintroduction to a southwest Wisconsin stream.

Considerations

Disease testing is necessary to verify that donor stream sculpin will not transmit any pathogens to recipient streams. Minnesota DNR requires three years of negative tests from the donor stream before sculpin can be moved.

Sculpin spawn around mid-April to May. A nest cavity is cleaned by the male; following courtship displays eggs are deposited by the female in clusters on the undersides of stones. The male guards the nest 3 to 4 weeks, until the fry leave. Records indicate that sculpin can live at least 5 years but most die before age 3; see http://www.nanfa.org/articles/acmottledsculpin.htm for more life history information.

Although sculpin are native coldwater species, consideration of any effects on trout is also warranted. Minnesota DNR Investigational Report 249 provides a good local reference on trout/sculpin predation; a total of 292 trout and 1074 sculpin stomachs were examined from Southeastern Minnesota streams. Trout and sculpin were both found to eat benthos, but trout also ate fish and drifting insects, therefore there was some diet overlap but trout had plenty of other options. Both ate minor proportions of trout eggs, although a few larger trout ate a complete meal of trout eggs. Also, trout ate sculpin "in considerable numbers even when other forage fish such as suckers were available". The net effect of sculpin on trout is expected to be positive or neutral, as suggested by Moyle (1977) and by Ruetz et al (2003). It has even been speculated that sculpin predation on predaceous stoneflies may increase the numbers of drifting herbivorous insects for trout and reduce stonefly predation on trout eggs and young (http://www.state.ia.us/dnr/organiza/fwb/fish/iafish/miscfam/slimscul.htm 2003). Although an enclosure study found symmetrical growth rate suppression between fingerling brown trout and sculpin (but not between brook trout and sculpin, Zimmerman and Vondracek 2003a,b), growth benefits to adult trout from predation upon sculpin should more than compensate (Julie Zimmerman, U of MN, personal communication).

Proposed Recipient Streams

A subset of the coldwater streams which are believed to have held sculpin historically and which presently have suitable sculpin habitat:

Rock Creek	M-43-5
*Clear Creek	M-43-6
Klaire Creek	M-43-9
*Hay Creek	M-46
Latsch Creek	M-28
Miller Valley Creek	M-15
*Gilbert Creek	M-42
Gilmore Creek	M-24
Sugar Loaf Creek	M-42-1
*Trout Brook (Goodhue Co.)	M-46-1
Pickwick Creek	M-17
Little Pickwick Creek	M-17-2

*Asterisks denote streams where sculpin will be stocked in 2003. Management plan amendments and stocking proposals have been prepared for these streams. Similar proposals will be prepared for other listed streams as time permits.

Donor Streams

Three coldwater streams with good sculpin populations have been chosen as donor streams. Annual disease testing will be conducted as long as transfers from these streams are anticipated. Currently, all three streams have met or exceeded the minimum of three years of disease free status.

Cold Spring Brook	testing completed in 1999, 2000, 2001, 2002, and 2003
Beaver Creek	testing completed in 2000, 2001, 2002, and 2003
Garvin Brook	testing completed in 2000, 2001, 2002, and 2003

All donor streams will be tested for diseases again in 2004 and annually thereafter until other donor streams are identified or when transfers from these streams are no longer needed.

Collection/planting Protocol

Barrett and Grossman (1988) found that handling stress was a greater detriment of sculpin mortality rates than was electrofishing. In order to avoid extra stress around spawning time, to avoid handling and transport during hot weather, and for logistical reasons, this plan recommends collecting and transporting sculpin in late October.

Sculpin should be collected from an established set of stations for each donor stream, as marked with a GPS and flagged. The entire station should be electrofished, even if adequate numbers are collected early, to allow for comparisons over time (releasing any extra sculpin). All sculpin should be measured. A total of 200 sculpin should be collected from each of the three donor streams and divided evenly between the four recipient streams for that year.

The number of sculpin necessary to reestablish a population is uncertain. Bill Ardren (U of MN fish geneticist) suggested batches of at least 50 fish, 25 male and 25 female. Lee Peterson (MN DNR Peterson hatchery supervisor) suggested that 100-150 fish in several locations should be adequate. Brynildson and Brynildson (1978) found that 500 planted adult sculpin were able to quickly establish a population in their Wisconsin study stream. This plan recommends planting roughly 150 sculpin in each recipient stream (50 from each donor stream) for two consecutive years, since fish will not be aged or sexed.

Sculpin should only be planted at established stocking locations, as predetermined and marked with a GPS. These stocking locations should be in areas expected to hold sculpin, such as coarse-substrate riffles or colder-water areas. Measurements of all sculpin should be recorded for each stream.

Evaluation Protocol

Tracking sculpin numbers in the established donor stream stations will establish whether sculpin recolonize those areas after removal (again, note that only 200 sculpin will be stocked from a donor stream each year). Simple bar graphs and regression analyses will be used to examine recovery of juvenile sculpin, adult sculpin, and larger sculpin. If insufficient sculpin are collected from the station, adjacent areas can be sampled (measuring additional stream length for a separate CPUE) or alternate stations can be established. Data from original stations, alternate stations, and adjacent areas should be recorded separately.

Colonization and establishment will be tracked on recipient streams with stations at the stocked area, stations further upstream, and stations further downstream. As with donor streams, electrofishing stations should be established on the recipient streams, marked with a GPS, and flagged. Also like the donor stream stations, these should be in areas expected to hold sculpin, such as coarse-substrate riffles or colder-water areas. The entire station should be electrofished with one pass, with measurements taken on all sculpin. All stations on a recipient stream should be electrofished for several years after the stream is stocked, with continuation depending upon crew workloads and preliminary results. Unless other data (see below) show that sculpin catchability remains consistent, removal estimates should be completed on all recipient stream stations.

A different set of streams is currently sampled annually to examine long-term trends of trout, sculpin, and all other species. Addition of sculpin measurements to those efforts would provide information on natural sculpin population dynamics, for comparison with observed dynamics in the sculpin donor and recipient streams. Similarly, addition of sculpin population estimates (rather than one-pass CPUE) would quantify variability of sculpin catch rates.

NOTES

This plan was originally prepared for streams north of I-90 and the Lake City Fisheries Management Area. Additional management of sculpin populations is included as an action item in the "Fisheries Long-Range Plan for Trout Stream Resource Management in Southeast Minnesota 2004-2009" that was completed in November 2003. It is anticipated that additional donor and recipient streams for sculpin will be identified as part of the Long Range Plan and that stocking protocols may be modified as evaluations are completed.

- Pictures of slimy sculpin are available at
http://www.unb.ca/fredericton/science/biology/Fish_key/Cottidae/Sculpin.htm

- Pictures of mottled sculpin are available at
http://www.cnr.vt.edu/efish/families/cottidae.html

- Slimy sculpin and mottled sculpin are difficult to distinguish in the field, in fact, some ichthyologists feel they may not be separate species in Southeast Minnesota (Jay Hatch U of MN, personal communication). There is some evidence that mottled sculpin and slimy sculpin share characters in areas where they overlap, likely due to hybridization (http://livinglandscapes.bc.ca/cbasin/peter_myles/nat_cottidae.html 2003). Because suitability of the two species for individual recipient streams is unknown (beyond a general indication that slimy sculpin tend to inhabit headwaters while mottled sculpin are further downstream), and particularly for logistical reasons, this plan does not separate the species.

Below: Locations of established donor stream stations as of November 2003.

Donor Stream	Easting	Northing	Description
Cold Spring	545273	4905356	upper bridge 475ft upstream
Garvin Brook	595314	4872766	mouth of Peterson Creek
Beaver Creek	576970	4889144	first parking lot

Below: Locations of established recipient stream stocking locations for 2003.

Recipient Stream	Easting	Northing	Description
Clear Creek	541071	4919688	above upper bridge
Hay Creek	530438	4923413	spring and upstream riffle
Trout Brook	533843	4932273	above bridge
Gilbert Creek	550153	4921519	above and below bridge

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