Fisheries Branch Directive	Program: Commercial Guideline Type: Management (Management, Administrative)
Subject: **HARVEST OF SPAWNING FISH** Revision Date:	Date Approved: February 5, 2007  Director, Fisheries Branch

1.0 Introduction

In consideration of Manitoba's constitutional obligations to Aboriginals, and in order to maximize sustainable benefits for Manitobans from its fisheries resources, some harvest of fish migrating or concentrated for spawning may be permissible. Provided that conservation can be assured, harvest of spawning fish may be appropriate given that it is an extremely effective means of harvesting fish (i.e. least cost), and given that the product harvested may only be available at that time of the year (i.e. caviar).

To guide decision-making, Manitoba has defined conservation as it relates to fisheries as:

> *"the protection of essential ecological processes and fish habitat, the maintenance of biological diversity and the harvest of fisheries resources in a sustainable fashion. Key points in meeting the protection of ecological processes include the maintenance of an adequate brood stock for propagation purposes and the adequate protection of brood stock when concentrated for spawning."*

Therefore it will be key to assure that:

- any fish harvest, including during spawning, maintains the brood stock in sufficient numbers to sustain the fishery at the level of maximum benefits;
- the eggs that have been spawned are not unduly disturbed/destroyed by the fish harvesting activity; and
- fish stock assessment and harvest monitoring information be collected (consistent with index netting and stock assessment guidelines).

Following the precautionary principle, where information is lacking, caution in decision-making must be exercised. This will obviously result in restrictive harvest practices that will tend to result in less than maximum benefits being realized.

2.0 Factors Affecting Conservation of Spawning Fish

Factors affecting the conservation of spawning fish can be divided into two broad categories: 1) those that are specific to a species, and 2) those that are specific to a particular situation.

2.1 Species-Specific Factors

Trophic Level - Species occupying a lower trophic level can withstand a higher level of exploitation than "top carnivores" because top carnivores tend to be relatively less abundant and less fecund than

fish species who occupy lower levels of the food web. If the fish community is changing from one in which forage species are suppressed by top carnivores to one in which forage species are rapidly increasing, roe and spawn fisheries for the forage species may be encouraged while roe and spawn fisheries for the top carnivores would be discouraged.

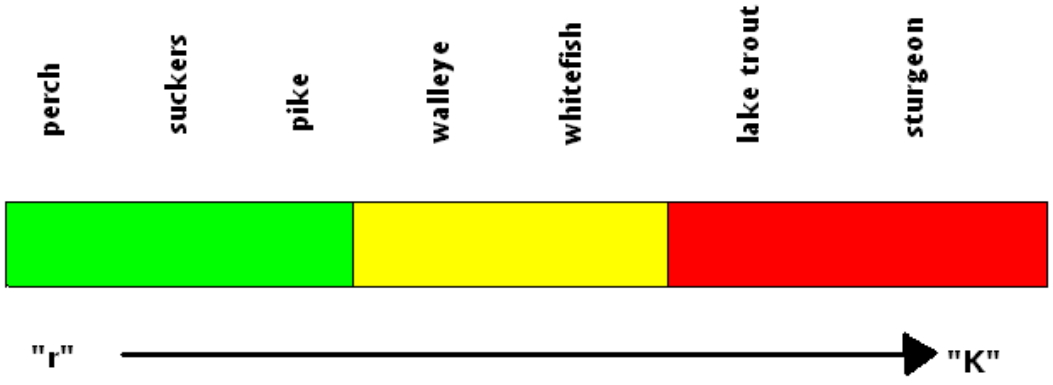
Reproductive Strategy – "r" and "K" reproductive strategies arise from parameters in the logistical population growth model. In general *"r-selected individuals attempt to maximize their fitness* (i.e. population size) *by improving their ability to reproduce rapidly in an uncrowded environment … whilst K-selected individuals maximize fitness by increasing their contribution to a population that remains at its carrying capacity"* (Begon and Mortimer, 1981).

K-selected species invest relatively large amounts of energy into reproduction to increase the individual fitness of their progeny given that they will have to compete in a population that tends to remain constant. Nest-building by brook trout, larger egg size/greater egg development by salmonids, nest protection by small mouth bass and multiple-year egg maturation of lake sturgeon are all examples of K-selection reproductive strategies. Year classes tend to be moderate in size but relatively consistent from year to year.

On the other end of the spectrum of life history strategies are r-selected species which produce numerous less developed progeny. They tend to be broadcast spawners and therefore generate periodic, strong year classes when: 1) adequate brood stock are present, 2) environmental conditions are optimal for spawning and early development, and 3) the environment is "uncrowded". Fish species that are r-selected therefore have a relatively greater "reproductive rebound-ability" than K-selected species.

As with most ecological systems/principles a range of strategies exists in a continuum from "r" to "K" with lake trout and lake sturgeon being clearly "K", and perch and mullets being clearly "r". Consequently, the more K-selected a species is, the less suitable is spawning harvest of that species.

Mean age of Maturity – Strictly speaking, mean age of maturity is a reflection of the reproductive strategy of a species. It is worth noting above that as the scale moves from "r" to "K" the mean age of maturity increases, indicating an increasing recovery time required if spawning stocks are depleted. This is important in terms of contingency planning in that some additional comfort is afforded by the



fact that fish that mature quickly will recover in a relatively short period of time if they experience excess harvest of brood stock. Given this, a stock of a fish species that matures early will be able to withstand greater spawning harvest pressure (e.g. suckers, perch).

Value – Species that are of a lower commercial value will not be pursued as intensely as those that are more valuable (for either legitimate or illegal marketing). It may be reasonable to assume that that spawning harvest of species for which a lower price is paid (e.g. suckers) will cease due to economic reasons earlier than those of higher value (e.g. sturgeon) and consequently be of reduced conservation concern. Spawning harvest for high-valued species should be avoided given the strong market incentive and their extreme vulnerability at that time.

Species Suitability - To determine how tolerant a species is to spawning harvest, the following matrix was developed.

Species	Factors				Conclusions
	Trophic Level	**Reprod. Strategy**	**Age of Maturation**	**Value**	
Perch	- mid level omnivore → moderate concern	- "r" → low concern	- early (2-3 years) → low concern	- high value → high concern	Low concern. Biology and logistical difficulty with spawning harvest would tend to counter high value.
Suckers	- bottom level → low concern	- "r" → low concern	- early (3 years) → low concern	- low value → low concern	Low concern.
N. Pike	- top level piscivore → high concern	- "r" → low concern	- early (3-4 years) → low concern	- moderate value → moderate concern	Moderate concern as "r"status tend to counter trophic level.
Walleye	- top level piscivore → high concern	- "r" → low concern	- middle (5-7 years) → moderate concern	- high value → high concern	Moderate to high concern given trophic level and high value. Although r-selected not strongly so.
Whitefish	- mid level omnivore → moderate concern	- "K" → high concern	- middle (5-6 years) → moderate concern	- moderate value → moderate concern	Moderate concern due to: 1) middle trophic level and age at maturation and 2) moderate "K" status lower concern.
Lake Trout	- top level piscivore → high concern	- "K" → high concern	- late (10-15 years) → high concern	- low value → low concern	High concern due to biology of species.
Lake Sturgeon	- bottom level → low concern	- "K" → high concern	- late (20-27 years) → high concern	- high value → high concern	High concern due to strong "K" status, late maturation and high value.

Guideline - Given the above, the following guidelines should be followed with respect to determining whether a species should be considered appropriate for spawning run harvest:

- **Suckers** - There is relatively little concern with spawning harvest of suckers for commercial purposes provided that other species' migration and spawning are not significantly hampered.

- **N. Pike** - Despite their top predator trophic level, the ability of pike to rebound quickly and prolifically when conditions are appropriate means that spawning period harvest may be reasonable where no significant recreational fishery exists or where other top predator (i.e. walleye) rehabilitation is being undertaken.

- **Walleye** - Given the high value of walleye and the high to moderate concerns about their trophic level and age at maturity, spawning period harvest should be discouraged.

- **Whitefish** - Caution must be exercised in the harvest of spawning whitefish owing to its K-selected reproductive strategy and its recent increase in value. Whitefish spawning run harvest should only be permitted if population assessment information indicates that stock abundance is not being compromised.

- **Lake Trout/Lake Sturgeon** - Spawning time harvest of lake trout and lake sturgeon should be avoided.

2.2 Situation-Specific Factors

Constitutional Obligations – Constitutional obligations to provide food fisheries for Status persons will determine whether spawning harvest occurs. Existing and future Supreme Court decisions (e.g. "Sparrow") will guide managers' decision-making.

- **Guideline –** As identified in the Conservation Regulation Procedure Directive PR/09/07/001, the four tests of Sparrow must be applied prior to any infringement on constitutionally protected rights to fish. These tests are: 1) justification, 2) first priority of harvest allocation, 3) transparency, and 4) least infringement.

Abundance – Obviously, if a fish stock is depressed, spawning run harvests should be avoided. Fish stock assessment determination from index netting catch per unit of fishing effort (CUE) of the "target" species is critical information in determining the status of a fish stock. CUE can be compared to previous years' data for target species and CUE of other fish species in a lake. Fishery management history will also help determine the status of the fish stock, as indicated by changes in "abundance" (measured by CUE) over time.

- **Guideline –** Consistent with the precautionary approach, where evidence indicates that fish stock abundance is likely depressed, commercial harvest during spawning should not occur. Where long-term harm to the fish stocks is likely, constitutionally-protected rights for Aboriginals to fish for food may be infringed on, provided the "Sparrow tests" have been satisfied.

Harvest Method – Escapement during spawning period harvests is critical for stock sustainability. Harvest method, along with effort, determines what amount of escapement occurs. In order to assure

escapement, the Fisheries Act (Canada) states that no more than two-thirds of a river/stream can be obstructed. Gear type or method is also important in determining the level of disturbance that will affect eggs on any spawning grounds. For example, methods that require fishers to walk on substrate where fish have spawned will damage developing fish eggs. Thus eggs are destroyed in proportion to the amount of substrate disturbance that occurs.

- **Guideline –** Spawning harvest methods should: 1) leave one-third of the channel width open for fish passage and ensure that fish passage can reasonably occur, 2) be as size specific to the selected portion of the brood stock being harvested as possible, and 3) not harmfully alter or disrupt fish habitat.

Timing – Because "r" type fish species' spawning success depends on environmental conditions, it may be wise to disperse the allowable fishing effort/harvest over the entire spawning period, rather than to focus all the effort at one time. This is because ideal spawning, fertilization, incubation, hatching and dispersal conditions will only occur occasionally and some escapement at all times should therefore be assured. Dispersing effort/harvest provides some environmental "insurance" in that some eggs from the entire time period will be available to contribute to year class strength.

- **Guideline –**Spawning harvest effort should be dispersed over the entire spawning period to insure against drastic harvest of those brood stock that are spawning during optimal spawning conditions.

Quota Species – To the extent that the combined allocation of a species is at its maximum for any given waterbody, harvest should be accounted for and included in the total allowable catch for that waterbody.

- **Guideline –** All fish harvest should be reported/monitored and recorded against the total allowable catch. Harvest should be regulated by quota or allowable harvest amounts, to the extent that this can reasonably occur.

3.0 Literature Cited

Begon, M. and M. Mortimer. 1981. Population Ecology. Sinauer Associates, Inc. Sunderland, MA 200 pp.