INTERTEK FISHERIES CERTIFICATION

Main Assessment Report

Version 3: Public Comment Draft Report

Waterhen Lake Walleye & Northern Pike Gillnet Commercial Fishery

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Completed by:

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ACRONYMS

AFS	The Aboriginal Fisheries Strategy
BC	British Columbia
CAB	Certification Assessment Body
CEDF	Communities Economic Development Fund
cm	Centimetre
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPUE	Catch per Unit Effort
CR	Certification Requirements
DFO	Department of Fisheries and Oceans
ELA	Experimental Lakes Area
ETP	Endangered, Threatened and Protected
FAO	Food & Agricultural Organisation
FFMC	Freshwater Fish Marketing Corporation
FIHCS	Fisheries Inventory and Habitat Classification System
FMP	Fishery Management Plan
FN	First Nation
FWIN	Fall walleye index netting
GDD	Growing Degree Day
GLFC	Great Lakes Fishery Commission
H	Shannon Diversity Index
ha	Hectare
HCR	Harvest Control Rules
HS	Harvest Strategy
IMM	Intertek Moody Marine
IPI	Inseparable or Practically Inseparable (stocks)
ISBF	Introduced Species Based Fisheries
kg	Kilogram
LRP	Limit Reference Point
MCWS	Manitoba Conservation and Water Stewardship
mm	Millimetre
MSC	Marine Stewardship Council
mt	Metric tonne
ND	No date
NFFA	Northern Fishermen's Freight Assistance
NOAA	National Oceanic and Atmospheric Administration
NP	Northern Pike
NRTA	Natural Resources Transfer Agreement
PI	Performance Indicator
PSA	Productivity Susceptibility Analysis
RBA	Risk Based Approach
RBF	Risk Based Framework
SARA	Species at Risk Act
SDS	Sustainable Development Strategy
SG	Scoring Guideline
SICA	Scale, Intensity, Consequence Analysis
SFDI	Spawning Female Diversity Index
SSB	Spawning Stock Biomass
SSF	Sustainable Fisheries Framework
t	Metric tonne
TRP	Target Reference Point
UoC	Unit of certification
URP	Upper Reference Point
WE	Walleye
WL	Waterhen Lake
YOY	Young-of-the-year

EXECUTIVE SUMMARY

Report Objective

This report sets out the results of the assessment of the Waterhen Lake Walleye and Northern Pike Gillnet Commercial Fishery against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

The Fishery Proposed for Certification

The MSC Guidelines to Certifiers specify that the unit of certification (UoC) is "The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock) and management framework." Accordingly, the Waterhen Lake Walleye and Northern Pike Gillnet Commercial Fishery proposed for certification is defined according to two UoC.

Species:	Walleye (*Sander vitreum*)
Geographical Area:	Waterhen Lake, Manitoba, Canada
Method of Capture:	Gillnet
Management System:	Government of Manitoba, Manitoba Conservation and Water Stewardship and Department of Fisheries and Oceans, Canada (DFO)
Client Group:	Manitoba Conservation and Water Stewardship, Fisheries Branch

Species:	Northern Pike (*Esox lucius*)
Geographical Area:	Waterhen Lake, Manitoba, Canada
Method of Capture:	Gillnet
Management System:	Government of Manitoba, Manitoba Conservation and Water Stewardship and Department of Fisheries and Oceans, Canada (DFO)
Client Group:	Manitoba Conservation and Water Stewardship, Fisheries Branch

Assessment Highlights

The certification process started with the announcement posted on the MSC web site on December 20th, 2012. The site visit took place in early April, 2013 and the client draft report was presented in November, 2013. The report was sent for peer review in December 2013 and the audit team reviewed the comments received and redrafted the draft report as considered appropriate in January 2014. The client agreed with the changes and the Public Comment Draft Report was posted on the MSc web site in January 2014.

The client is Manitoba Conservation and Water Stewardship and the client group consists of all the licensed commercial fishermen on Waterhen Lake. The assessment team was: John Casselman (Expert Adviser P1), Peter Colby (Expert Advisor P2) and Ian Scott (lead assessor and Expert Adviser P3). The peer reviewers were Andy Hough and Andrew Gill.

Key Strengths & Weaknesses of the Fishery Under Assessment

The fishery in Waterhen Lake is relatively small in terms of scale with a limited number of fishers targeting a single species, Walleye that has a number of retained bycatch species including Northern Pike that comprises a unit of certification. The fishery takes places when there is ice on the lake, thus the temporal nature of the fishery is also reduced. The approach to fishery management has been a focus of substantial attention by the client and over recent years the lake fishery has been developed as a model for the sustainable harvest of other lakes in the Province of Manitoba. It is worthwhile emphasizing that the major strengths of the fishery are the incorporation of the fishers into management and their positive response to the responsibility. This has been promoted by an active fishery enforcement unit that continues to work closely with the fishers. The nature of the fishery is also its strength – with limited interactions with other elements of the ecosystem. The involvement of the Freshwater Fish Marketing Corporation (FFMC) that has a *de facto* monopoly on the commercial sales of the harvest provides a strong basis to establish robust traceability measures and to allow confidence in the veracity of the reported landings. The

management system with harvest strategy and harvest control rules developed over a number of years through the application of a variety of processes is considered robust and entirely suitable for a fishery of this scale. There are no major weaknesses in so long as the harvest strategy responds adequately to the signals from the fishery in terms of the indicators for wall eye. As time progresses, and as the availability of expertise allows, knowledge and understanding of the stock of Northern Pike could be approved to allow its assessment using the default assessment tree as opposed to the risk based framework. However, at reassessment the RBF may be used to assess Northern Pike for Principle 1 as both the SICA and PSA achieved scores of 80 or above.

Currently the Waterhen gill net ice fishery targets walleye. The retained by-catch of Northern Pike has also been certified. As the fishery is managed to reduce the risk of over fishing to the most susceptible species – walleye- the major weakness for Northern pike is the lack of a specific harvest strategy and related harvest control rules. While it is understood that the roe of captured female Northern Pike may be extracted to provide the specific product of Northern Pike caviar, the auditors are concerned that any increase in the market value of the roe may lead to the inception of a dedicated roe fishery which may, in turn, be detrimental to stock status. On that basis it is strongly recommended that fishery managers regulate against a specific roe fishery until such time there may be science based Northern Pike TACs and quota that could take account of the potential catch in such a fishery.

The Results

A summary of the overall scores is:

Principle	Walleye	Northern Pike
Principle 1 – Target Species	86.9	83.8
Principle 2 – Ecosystem	82.0	82.0
Principle 3 – Management System	88.6	88.6

The audit team made 12 recommendations. It is noted that these are not mandatory but recommendations of the audit team designed to support the client in maintaining the sustainability of the two fisheries.

Certification Recommendation

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PIs. It is therefore recommended that the Waterhen Lake Walleye and Northern Pike Gillnet Commercial Fishery be certified against the Marine Stewardship Council Principles and Criteria for Sustainable Fishing.

Conditions to Certification Recommendation

The fishery attained a score of below 80 against three PIs. This leads to conditions for continuing certification that the client is required to address. The conditions are applied to improve performance to at least the 80 level within a defined period. As a standard condition of certification, the client has developed an 'Action Plan' to address the conditions for continued certification. The conditions relate to:

Condition number	Condition	PI	Related to previously raised condition?
1	The harvest strategy for Northern Pike is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	1.2.1 (Pike)	No
2	For Northern Pike, well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	1.2.2 (Pike)	No
3	Research results are disseminated to all interested parties in a timely fashion.	3.2.4 (Both)	No

1. AUTHORSHIP AND PEER REVIEWERS

1.1 Audit Team Members

John Casselman P1 (Northern Pike) / P2

Dr John Casselman is an adjunct professor, Department of Biology, Queen's University. Formerly, he was senior scientist with Fisheries Research, Ontario Ministry of Natural Resources supervising research on Lake Ontario. He is a fisheries ecologist and environmental physiologist and has published extensively on fish, fisheries, climate change, and, most recently, on the decline of the American eel.

John has conducted invited studies throughout the world (for example, for CIDA, NSF, NSERC, Chinese Academy of Sciences in such places as the Canadian Arctic, Ethiopia, and the Tibetan Plateau), and is particularly interested in long term studies of fish and fisheries and the effects of climate and climate change.

John has won numerous awards, including the 2009 Great Lakes Fishery Commission Award for Distinguished Scientific Contributions and the prestigious 2008 American Fisheries Society Award of Excellence.

Peter Colby P1 (Walleye) / P2

Dr Peter Colby is a private consultant, past Research Scientist Emeritus and fellow of the American Institute of Fisheries Research Biologists. Peter is a world authority on the biology and management of percid fishes, primarily Walleye, with over 40 years of research experience in industry, academics and government.

Peter was leader of the Walleye research unit in the Ontario Ministry of Natural Resources charged with providing scientific advice for managing the Province's Walleye fisheries. In addition: he organized and/or chaired international meetings and workshops to develop and transfer corporate science policy; served as scientific advisor to North Central Region Assessment Units and; he is a consultant on fisheries problems and initiatives throughout the Great Lakes region.

Previously, Peter was a Senior Scientist Walleye Research Unit Leader and Aquatics and Tourism Effects Coordinator, with the Centre for Northern Forest Ecosystem Research**.** He has over 30 years' experience as a research scientist with the U.S. Fish and Wildlife Service and the Ontario Ministry of Natural Resources investigating and reviewing Great Lakes issues including, the status of the Walleye stocks in the Great Lakes, massive alewife mortalities, thermal discharges, eutrophication, and other water quality problems.

He has provided consultancy services on fisheries issues to: Woods Hole Oceanographic Institution; Province of Manitoba; State of Montana; Province of Alberta and; State of Wisconsin. He was a member of a peer review team selected by the U.S. National Academy of Sciences to assess the quality and vitality of the NOAA oceanic research and development program. In 2003 he was: a member of the NOAA Program Assessment Team to review the Minnesota Sea Grant College Program; Past Research Associate, Dept. Environmental and Industrial Health, University of Michigan; Adjunct Professor, Dept. of Biology, Lakehead University; and participant in scientific workshops in Finland, Poland, U.S.A. and Japan.

Peter has chaired, edited, coordinated, or published in several major international symposia including SCOL, PERCIS I, II, and III, and ASPY sponsored by the Great Lakes Fishery Commission (GLFC), the International Joint Commission, etc. He has participated in pre-assessment projects reviewing fisheries in relation to the MSC Standard requirements.

Ian Scott Lead Auditor / P3

Ian Scott is a fisheries consultant specialising in fisheries certifications, fisheries policy and fishery management issues with over 30 years of experience in the fishery sector. In recent years, Ian has advised the Governments of Turkey, Montenegro, Serbia, Yemen and the Dominican Republic on fisheries policy, including fisheries management, fleet development, the need for scientific research and fishery related environmental issues. He co-prepared fisheries management plans for Turkey, Serbia and Montenegro. Ian is/has been lead auditor on a number of MSC assessments: Portuguese Sardine, Canadian Sablefish, Scotia Fundy haddock, BC Spiny dogfish, Chilean hake, U.S. Atlantic Spiny Dogfish, Mexican P&L skipjack and yellowfin, Newfoundland Snow Crab, Maldives Skipjack, Maldives Yellowfin and Lake Erie fisheries. Two of the assessments have used the risk based approach (RBA). Ian has completed a large number of pre-assessments for Intertek Moody Marine (IMM) and is an MSC certified Fishery Team Leader and chain of custody auditor.

1.2 Peer Reviewers

Dr Andrew Gill

Dr Gill is an academic member of staff at Cranfield University, UK, and has over 15 years' experience as an aquatic ecologist with a particular interest in the fish and fisheries ecology and links with human activity. His currently duties at Cranfield include: developing research activity (aquatic ecology and anthropogenic impacts); Publication, preparation and research grant proposals; development and preparation of contracts and industrial liaison; teaching postgraduate and professional training courses in aquatic ecology, environmental river management, river restoration, coastal and estuarine restoration ecology, fish and fisheries biology, environmental impact assessment and ecological field techniques and surveying of inland aquatic and coastal developments.

From 2002 to 2003 he was a lecturer at the School of Biological Sciences, University of Liverpool where his responsibilities included: developing research profile (aquatic ecology and anthropogenic impacts); and teaching

undergraduate and postgraduate modules in fish & fisheries biology, animal diversity, river restoration, lake restoration, experimental methods and design, ecological field techniques.

Between 1988 and 2002 he held various positions: MSc Course Director - Restoration Ecology of Terrestrial & Aquatic Environments School of Biological Sciences, University of Liverpool; Lecturer in Fish and Fisheries Biology, Department of Environmental and Evolutionary Biology, University of Liverpool; Science Coordinator, Coral Cay Conservation (CCC), Headquarters, London; Research and Education Consultant Biologist, Belize; Scientific Officer, CCC, Belize Barrier Reef; and Research Assistant, Department of Zoology, University of Leicester

Dr Andrew Hough

Dr Hough has a PhD in marine ecology from the University of Wales, Bangor (1987-90). He has been involved in marine, coastal and freshwater environmental management since 1991, including management of fishery impacts on ecosystems and marine conservation biology, principally in European inshore waters.

He was manager of Moody Marine operations within Moody International Certification from 1999 to 2011 with particular responsibility for the implementation of MSC Certification procedures and development of MSC methodologies. He was lead assessor on many of Moody Marine MSC pre assessments and main assessments during this time. This has involved stock assessment analysis, evaluation of ecosystem effects and management effectiveness of groundfish, pelagic and shellfish fisheries in various administrations around the world. He now works as a freelance environmental/fishery management consultant and auditor.

1.3 Training in the RBF

Ian Scott has completed the training in the use of RBF as provided by IMM. He has used the approach in two fisheries: the Pole and Line Skipjack Fishery in the Maldives; and BC spiny dogfish.

2. DESCRIPTION OF THE FISHERY

2.1 Unit(s) of Certification and scope of certification sought

Eligibility for Certification against the MSC Standard

The fishery may be assessed within the scope of the Principles and Criteria for Sustainable Fishing as:

- It is not conducted under a controversial unilateral exemption to an international agreement;
- Fishing operations do not use destructive fishing practices;
- The fishery is not the subject of controversy and/or dispute;
- The fishery has not previously failed an assessment or had a certificate withdrawn;
- There are no catches of non-target stocks that are inseparable or practicably inseparable from the target stock;
- The fishery is not enhanced;
- The assessment will not result in an overlapping assessment; and
- The fishery is not based upon an introduced species.

Unit of Certification

The MSC Guidelines to Certifiers specify that the unit of certification (UoC) is "*The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock)".* Table 1 shows the Waterhen Lake Walleye and Northern Pike Gillnet Commercial Fishery UoC under assessment.

Table 1: Units of Certification

Species:	Walleye (*Sander vitreum*)
Geographical Area:	Waterhen Lake, Manitoba, Canada
Method of Capture:	Gillnet winter fishery
Management System:	Government of Manitoba, Manitoba Conservation and Water Stewardship and Department of Fisheries and Oceans
Client Group:	Manitoba Conservation and Water Stewardship, Fisheries Branch

Species:	Northern Pike (*Esox lucius*)
Geographical Area:	Waterhen Lake, Manitoba, Canada
Method of Capture:	Gillnet winter fishery
Management System:	Government of Manitoba, Manitoba Conservation and Water Stewardship and Department of Fisheries and Oceans
Client Group:	Manitoba Conservation and Water Stewardship, Fisheries Branch

Rationale for Unit of Certification

The Waterhen Lake Walleye is a distinct fishery that uses a specific gear to catch specific species. Northern Pike is a retained by-catch in the Walleye directed fishery. This UoC excludes any catch that is made when the ice fishing season is not open.

The area is discreet and the fishermen and fishing gear are well defined. The fishery is managed by Manitoba Conservation and Water Stewardship (MCWS), and the Department of Fisheries and Oceans, Canada (DFO).

Eligible Fishers

The eligible fishers will be all those licensed to commercially harvest Waterhen Lake in the ice fishery. There are no other eligible commercial fishers. Any new commercial licenses would automatically become part of the client group.

Scope of Assessment in Relation to Enhanced Fisheries

It is not considered that the fisheries under assessment are enhanced. While there has been some restocking of Walleye in the past this has not been a formal continuous programme. In 2011, there was unplanned stocking when it was not possible to transport available fingerlings to the planned location (Lake Chitek) (Galbraith (2012);[1] (Personal comment, Galbraith site visit). Accordingly, the species is native to the geographic region of the fishery; there are natural reproductive components of the stock from which the fishery's catch originates that maintain themselves without having to be restocked every year and stocking does not form a major part of a current rebuilding plan for depleted stocks. The two stocks are considered to be self-sustaining populations within Lake Waterhen, with limited immigration from Lakes.

Scope of Assessment in Relation to Introduced Species Based Fisheries (ISBF)

The fisheries under assessment are not ISBF.

[1] Lake Whitefish - 1993 2 million; WE Fry - 2003 2,.5 million, 2011, 1.2 million (originally for Chitek Lake).

2.2 Overview of the Fishery

Fishing Area

The commercial harvest schedule for Manitoba lists about 300 lakes. The schedule covers defined seasons, limits, and conditions applied to commercial fisheries. In Manitoba, the primary fish species under quota restrictions are Walleye (pickerel), Sauger, Lake Whitefish, Northern Pike, Goldeye and Lake Trout. Fishing seasons are categorized as open water or winter.

Figure 1: Lake Waterhen - Location

Source: Galbraith 2012

Waterhen Lake is located between Lake Winnipegosis and Lake Manitoba in the province of Manitoba (Figure 1). It is approximately 34 km long and at its widest 8 km. In general it is shallow, with a maximum water depth of 5 m. Lake Winnipegosis empties into Waterhen Lake through both the Little Waterhen and West Waterhen rivers. Waterhen Lake then drains southward through the East Waterhen River into Lake Manitoba.

The distribution of fish within Waterhen Lake varies according to species. Walleye is found in areas at inflow and outflow points where there is greater water movement. Northern Pike is distributed further north and in the shallower waters especially where there are reeds.

Three rural communities are located on or near Waterhen Lake.

- Skownan First Nation (FN) is located on the south shore. In May 2008, this had 1,236 registered persons including an on-reserve population of 677.
- The community of Waterhen is located on the east shore of the Waterhen River midway between the Waterhen Lake and Lake Manitoba. In the 2001 Canada Consensus its population was 171.
- The Metis settlement of Mallard is located on the south east end of Waterhen Lake. In the 2001 Canada Consensus its population was 145.

Fishery

As described by MCWS (2013), Waterhen Lake is classified as a multi-use fishery consisting of Aboriginal domestic harvest, commercial gill netting and recreational angling. Domestic harvest by Aboriginal communities in the area occurs throughout the year.

Two commercial fisheries operate on Waterhen Lake:

1. A limited entry winter commercial fishery (maximum 22 fishers) using gillnets subject to harvest control rules (HCR) such as quotas, seasons and gear); and
2. A year-round carp/sucker gillnet fishery subject to gear restrictions.

Recreational angling is confined mainly to the tributaries of the Waterhen Lake (Little Waterhen, East Waterhen and West Waterhen rivers). Provincial angling regulations apply to recreational fishers.

The winter commercial fishery targets Walleye which is the only species harvested under the annual lake quota of 36,300 kgs. Northern Pike is a by catch fishery and there is no quota. A number of other non-quota species are harvested: Lake Whitefish (*Coregonus clupeaformis*); Yellow Perch (*Perca flavescens*); Sauger (*Sander canadensis*); White Sucker (*Catostomus commersoni*); Shorthead Redhorse (*Moxostoma macrolepidotum*) (marketed as mullet); Cisco (*Coregonus artedi*) (marketed as tullibee); and Common Carp (*Cyprinus carpio*).

History of the Fisheries

As described in Galbraith (2012), Waterhen Lake has been commercially fished since 1931. Over the years, a number of regulations have been introduced to manage mesh sizes, quotas and commercial fishing seasons. Historically, the minimum allowable mesh size of gillnets used on Waterhen Lake ranged from 102 mm. to 108 mm. In order to remove overabundant small Northern Pike, in 1992 a 76 mm experimental winter fishery was established to catch Yellow Perch. Related regulations included the restriction of the fishery to a specified area of Waterhen Lake; a limit of eight 76 mm nets per fisher; and a maximum individual quota of 50 kg of "small" Walleye. In 1994, due to concerns over the harvest of small Walleye, the 76 mm winter fishery was discontinued. Subsequently, the minimum allowable mesh on Waterhen Lake was reduced from 102 mm to 95 mm. In 1996, the 76 mm fishery was reopened to reduce the Yellow Perch population. Measures implemented to protect Walleye stocks were a limited season, lake zoning, a maximum 10 % catch of Walleye and monitoring of compliance. Since 2001, a 76 mm fishery has not been authorized on Waterhen Lake with the minimum allowable mesh size of gillnets remaining at 95 mm.

Catch and Quotas

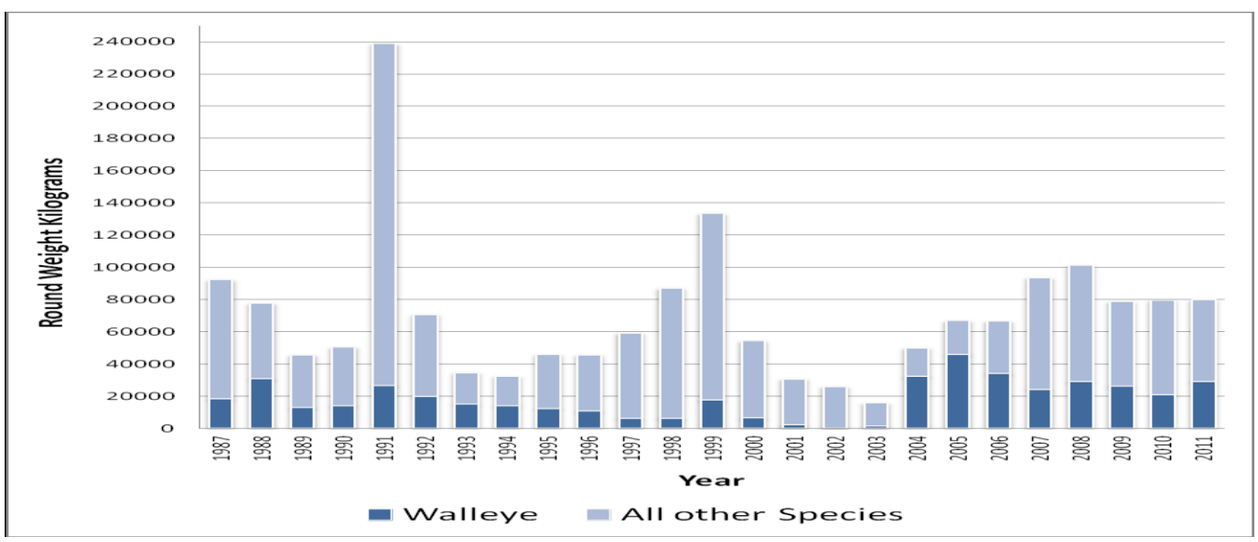
Quotas

Following a survey (annual commercial production from 1963 to 1972, annual domestic use, local sales, spoilage and angler harvest) that determined theoretical fish production capacity, in 1972 the Waterhen Lake quota of 45,360 kg covering Walleye, Northern Pike and Sauger (MCWS 2013) was reduced to 34,020 kg. Following a request from commercial fishers and the Skownan First Nation Band Council to address "*high grading*", in 1980 Northern Pike and Sauger were removed from the lake quota leaving only Walleye under a quota of 27,300 kg. The Walleye quota was raised to 30,900 kg and 36,300 kg in 1983 and 1987 respectively.

Catch

Since the current lake quota was set, the average annual commercial production (all species) from Waterhen Lake has been 66.3 mt, ranging from 15.7 mt (2003) up to 238.8 mt (1991) (MCWS 2013). During the same period, the average annual commercial production of Walleye has been 17.9 mt, ranging from 0.1 mt (2002) to 45.7 mt (2005). The average annual production of other non-quota species has been 48.1 mt, ranging from 14.2 mt (2003) to 212.2 mt (1991) (Figure 2).

Figure 2: Waterhen Lake annual commercial production of Walleye and other species from 1987 to 2011



Source: MWSC 2013

From 1987 to 2011, the average annual landed value for all species was $102,000, ranging from $9,000 (2003) to $347,000 (1991). The annual average landed value of Walleye was $62,000 ($400 (2002) to $137,000 (2005)) (table 4). In the 5 seasons up until 2012, the average annual catch of Walleye was 25.6 mt; respective figures for Northern Pike and Mullet were 26.7 mt and 26.4 mt respectively (table 2). Aboriginal communities harvest Waterhen Lake for an unknown

but limited quantity of Waterhen Lake fish (Galbraith 2012) for non-commercial use. A 2010 survey showed that a limited quantity of fish (mainly Walleye) are caught and kept by recreational fishers (table 3).

Fishing Season

Commercial gillnetting on Waterhen Lake is a winter fishery. Until 1960/61, the fishery was open November 11 - February 15; it was then changed for an opening on the first day ice makes after November 1. In 1961/1962, the season was extended to March 10 and from 1968/1969 until the present to March 31.

Gear Description

During the winter season, jiggers are used to set gill nets under the ice. A jigger is a plank of wood, about six feet long, that comes equipped with a steel-tipped wooded arm hinged to an iron rod. From the end of the iron rod is a long rope. To set nets, a hole is first drilled through the ice. Once the jigger is in the water, the operator pulls at the rope, forcing the steel tip to dig into the ice. When this happens, the jigger slides ahead a short distance (i.e. a few feet). Then the rope is released and the steel tipped arm loses its grip on the ice. The operator then repeats the pull / release technique until the jigger has advanced the length of the net, where a second hole is drilled and the jigger and rope is retrieved. Attached to the rope is the gill net. As the rope progresses under the ice, the gill net gradually moves into position (MCWS 2013).

Table 2: Waterhen Catch (Round Wt.) by Species 2007 - 2012

YEAR	WHITEFISH	WALLEYE	PIKE	PERCH	MULLET	CARP
2007-08	272	23,971	40,134	272	23,699	0
2008-09	2,815	28,920	24,925	0	39,907	0
2009-10	2,497	26,150	16,026	0	30,146	454
2010-11	3,723	20,702	29,873	227	21,565	0
2011-12	4,858	28,148	22,745	227	16,616	0
TOTAL	14,165	127,892	133,703	726	131,932	454
AVERAGE	2,833	25,578	26,741	145	26,386	91
PERCENTAGE	3%	31%	33%	0%	32%	0%

Source MWSC 2013

Table 3: Waterhen Lake Recreational Catch 2012

Fish caught by species in Waterhen Lake in 2010

	Walleye	Pike	Channel catfish	Smallmouth bass	Perch	Lake trout	Rainbow trout	Brown trout	Brook trout	Other species*	Total fish
Resident	10,948	942	-	-	-	-	-	-	-	912	12,802
Canadian nonresident	-	-	-	-	-	-	-	-	-	-	-
Other nonresident	-	-	-	-	-	-	-	-	-	-	-
Total	10,948	942	-	-	-	-	-	-	-	912	12,802

Fish kept by species in Waterhen Lake in 2010

	Walleye	Pike	Channel catfish	Smallmouth bass	Perch	Lake trout	Rainbow trout	Brown trout	Brook trout	Other species	Total fish
Resident	6,147	-	-	-	-	-	-	-	-	-	6,147
Canadian nonresident	-	-	-	-	-	-	-	-	-	-	-
Other nonresident	-	-	-	-	-	-	-	-	-	-	-
Total	6,147	-	-	-	-	-	-	-	-	-	6,147

* Other species caught were Freshwater Drum

Source: Galbraith 2012

Table 4: Waterhen Lake: FFMC Production Records (kg) 1987 - 2011

Waterhen Lake - FFMC Production Records - Round Weights (kgs)													
Year	Mullet	% of Annual Harvest	Perch	% of Annual Harvest	Pike	% of Annual Harvest	Sauger	% of Annual Harvest	Walleye	% of Annual Harvest	Whitefish	% of Annual Harvest	Total
1987	20,400	22.1%	5,535	6.0%	34,517	37.5%	246	0.3%	18,354	19.9%	13,019	14.1%	92,157
1988	1,448	1.9%	5,348	6.9%	26,237	33.8%	420	0.5%	30,717	39.5%	10,596	13.6%	77,689
1989	7,584	16.6%	4,310	9.4%	19,302	42.3%	340	0.7%	12,831	28.1%	1,219	2.7%	45,627
1990	0	0.0%	3,798	7.5%	26,272	52.1%	548	1.1%	14,175	28.1%	3,397	6.7%	50,453
1991	34,311	14.4%	23,416	9.8%	146,881	61.5%	1,643	0.7%	26,593	11.1%	3,072	1.3%	238,831
1992	0	0.0%	5,065	7.2%	44,382	63.0%	366	0.5%	19,610	27.8%	1,040	1.5%	70,462
1993	0	0.0%	4,424	12.8%	13,986	40.5%	68	0.2%	15,142	43.8%	607	1.8%	34,554
1994	0	0.0%	10,184	31.5%	7,887	24.4%	55	0.2%	14,117	43.7%	34	0.1%	32,318
1995	34,213	49.3%	5,972	8.6%	14,776	21.3%	106	0.2%	13,173	19.0%	772	1.1%	69,461
1996	39,915	57.6%	6,123	8.8%	9,842	14.2%	62	0.1%	12,100	17.5%	727	1.0%	69,294
1997	37,162	62.8%	4,606	7.8%	9,430	15.9%	67	0.1%	6,249	10.6%	439	0.7%	59,154
1998	67,215	77.3%	5,601	6.4%	6,192	7.1%	61	0.1%	6,316	7.3%	594	0.7%	86,921
1999	100,902	75.7%	5,953	4.5%	6,780	5.1%	18	0.0%	17,604	13.2%	1,918	1.4%	133,357
2000	38,449	70.7%	1,094	2.0%	5,700	10.5%	4	0.0%	6,529	12.0%	2,531	4.7%	54,351
2001	15,419	50.3%	10,205	33.3%	1,867	6.1%	0	0.0%	2,173	7.1%	953	3.1%	30,628
2002	15,843	61.1%	1,121	4.3%	4,471	17.2%	0	0.0%	114	0.4%	777	3.0%	25,920
2003	11,966	76.0%	63	0.4%	1,658	10.5%	0	0.0%	1,562	9.9%	309	2.0%	15,736
2004	10,868	21.8%	185	0.4%	4,834	9.7%	1	0.0%	32,172	64.5%	1,505	3.0%	49,847
2005	11,328	17.0%	70	0.1%	9,319	13.9%	1	0.0%	45,686	68.4%	421	0.6%	66,826
2006	12,295	18.5%	112	0.2%	19,732	29.6%	1	0.0%	34,163	51.3%	186	0.3%	66,591
2007	25,609	27.4%	517	0.6%	42,739	45.8%	1	0.0%	23,979	25.7%	500	0.5%	93,391
2008	42,708	42.3%	146	0.1%	26,702	26.4%	6	0.0%	28,933	28.6%	2,562	2.5%	101,076
2009	32,183	41.0%	151	0.2%	17,149	21.8%	11	0.0%	26,156	33.3%	2,319	3.0%	78,521
2010	23,110	29.1%	313	0.4%	31,837	40.1%	13	0.0%	20,743	26.2%	3,277	4.1%	79,301
2011	21,473	26.9%	306	0.4%	24,564	30.7%	19	0.02%	29,116	36.4%	4,343	5.4%	79,821
2012													
2013													
Total	604,401		104,618		557,056		4,057		458,307		57,117		1,802,287
Aver		34%		7%		31%		0%		25%		3%	

Source: Galbraith (2012)

Legal / Administrative Status

See below.

Management Operation

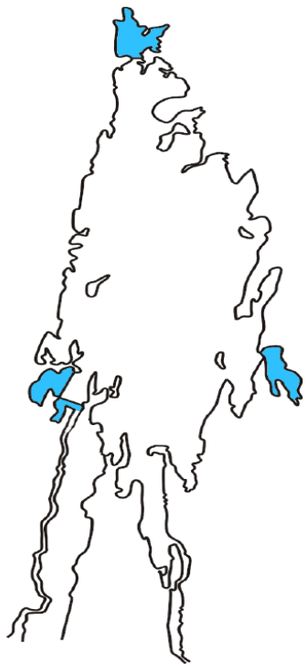
The allocation of fishing opportunities on Waterhen Lake fits with identified priorities and established management practices. Commercial fishing is regulated through a number of measures authorized under federal and provincial legislation to ensure that the Waterhen Lake fishery resource is utilized in a responsible and sustainable manner; there is limited entry into the fishery with commercial fishing licences issued according to the by-laws of the Constitution of the Lake Waterhen Fishermen's Association; fishing in areas of open water is not allowed, even if the winter season has started; the minimum allowable mesh size allowed during the winter commercial fishing season is 96 mm; the minimum allowable mesh size used during the Carp / Sucker open water fishery is 203 mm; the lake quota for the winter commercial fishing season is set at 36,300 kg (measured in round weight) of Walleye; a licenced fisher may use only

gillnets to commercially harvest fish on Waterhen Lake; and the maximum length allowed per commercial fishing licence is 5,700 m of gillnet.

In addition, a number of voluntary controls have been implemented by local commercial fishers (MCWS 2013); to protect critical spawning and rearing habitat in the Waterhen ecosystem, the Lake Waterhen Fishermen's Association voluntarily decided to close 3 specific areas of Waterhen Lake to all commercial fishing (figure 3); and the Lost Gear Clean-up Program of the Lake Waterhen Fishermen's Association minimizes ecosystem impact through the prevention of "ghost" fishing. Commercial fishers remove abandoned gill nets found during the winter fishing season. If the gill net cannot be removed due to being frozen in the ice, it is retrieved once the ice clears. Commercial fishers also retrieve any gill nets lost during the open water season when notified or if found.

Figure 3: Waterhen Lake Closed Areas

Appendix 5: Areas of Waterhen Lake Closed to Commercial Fishing.



Source: MCWS (2013)

Management Units

Waterhen Lake is a single discrete management unit.

Fishing Areas

See above.

2.3 Principle One: Target Species Background

Walleye

Taxonomy and Geographic Range

Walleye belong to the family Percidae (Order Perciformes) and Genus *Sander*. Because of the presence of a *Tapitum lucidum* in the retina of the eye, adult Walleye are negatively phototactic and crepuscular or nocturnal in its feeding habits. They are tolerant of a wide range of turbidity with a tendency to be more active during the daytime in turbid waters (Colby *et al*.1979).

Walleye are native to the freshwaters of North America. They are most commonly found in fresh and only rarely in brackish waters. In Canada, Walleye can be found in the St. Lawrence tributaries in Quebec, north to the east coast of upper James Bay, northwest from Hudson Bay coast in Ontario to Athabasca, Great Slave and Great Bear Lakes, north in the Mackenzie River to the delta, south through the Peace River drainage of northern British Columbia and south, east of the foothills, to southern Alberta (Park 2010, citing DFO 2008).

Waterhen Lake is located centrally within the Walleye range of distribution in North America.

Greater detail on Walleye taxonomy, physiological tolerance, life history, distribution and general biology and ecology is available in (Colby *et al*. 1979) and (Barton 2011).

Migration & Stock Structure

Mature members of self-propagating Walleye populations, whether stream- or lake-spawning, migrate from their overwintering grounds to their spawning grounds in the spring; they continue to their summer feeding grounds shortly after spawning. In a number of areas, Walleye have been observed to disperse throughout available habitat shortly after spawning. After spawning the fish return, generally by the same route, with males usually remaining longer on the spawning beds than females.

Differences in migration patterns for different age groups have been observed among some Great Lakes stocks (Colby *et al*. 1979). Walleye migrate to shallow shoals, inshore areas, or tributary rivers where spawning takes place. Walleye also move vertically in the water column in response to light intensity, temperature, and food availability (DFO 2006, Park 2010).

It is thought that there is a degree of mixing by Walleye in Waterhen Lake and adjacent lakes and connecting river systems; however, the extent of movement between these systems is not well understood (Park 2010).

Walleye longevity, like age at maturity, is inversely related to Growing Degree Day (GDD) (Colby & Nepszy 1981). The compilation of data by Bozek *et al*. (2012a) from populations spanning 1,000 and 5,000 GDD indicates a longevity range of 4 to 32 years. In Canada, the maximum age of Walleye likely varies between 10 and 12 years in the southern extent of their range to more than 20 years in the north (Park 2010 citing DFO 2006). Geisler 2012 sampled 161 Walleye from Waterhen Lake and obtained an age frequency distribution ranging ages 0 to 10; they were predominately 1-6, peaking at age 3. If a paucity of older fish is confirmed by further sampling by MCWS this would suggest that fishing pressure is fairly intense.

Males mature between ages 1 and 4 and first spawn between ages 2 and 5 the following spring; respective figures for females are 4 and 6 years and 5 and 7 years. Most males (92.3%) were mature at age 3, but no females were mature at this age. However all females (100%) were mature at age 4 (Geisler 2012).

Habitat

Water quality data is not available for Waterhen Lake. However, data for the Waterhen River[2] shows that total phosphorus roughly from 20 to 60 ug/L (Water Quality Management Section (2013)). Waterhen Lake is shallow, turbid and likely borderline meso-eutrophic making it prime habitat for Walleye. MCWS (2013) report the predicted thermocline would be 10m citing (Shuter *et al*. 1983) but in Waterhen Lake where the maximum depth is only 5m, no stratification occurs. The Secchi depth is near optimal at about 1.4 m (Lester *et al*. 2002), and summer temperatures hover in the Walleye optimal growth range for almost two months (Christie & Regier 1988).

Growth & Average Maximum Size

Latitudinal differences exist in seasonal growth patterns and annual growth rate (Bozek *et al.* 2011a). The authors report that annual growth rate increases from north to south (citing Carlander 1997), that a fivefold difference in growth exists between southern and northern populations (citing Colby *et al*. 1979), and these differences were largely due to variation in annual input of thermal energy (measured in GDD) (citing Colby & Nepszy 1981). More recently a bi-phase growth model was presented in Bozek *et al*. (2011a) citing several authors, which predicts a rapid, approximately linear, juvenile growth phase, followed by a gradual reduction in growth rate after sexual maturation.

The von Bertalanffy growth model (Geisler 2012) is used to describe growth comparing total length against age in Waterhen Lake. Female Walleye reach a maximum length of 696.9 mm and males 522.7 mm. Total lengths range from 158 mm for young-of-year (YOY) Walleye to 679 mm in a 10 year old fish. Waterhen Lake Walleye has very similar growth rates until its fourth year. Males mature at 2.4 years (50%) and 356 mm total length and females 4.3 years and 461 mm. (MCWS 2013). Judging from the growth curves presented by MCWS 2013, the average maximum size in Waterhen Lake is about 650 mm for females and 550mm for males.

Average Age at Maturity

In Waterhen the average age at maturity (50% mature) of Walleye is 2.4 and 4.3 years for males and females respectively (MCWS 2013).

Reproduction

Walleye spawning occurs in the spring and early summer shortly after ice break up in relatively shallow water, varying in depth from a few cms. to several m. (Colby *et al*. 1979) but usually at depths of less than 2 m. (MCWS 2008). Spawning occurs most frequently at temperatures between 7° and 9° c, but has been observed in waters ranging from 6° to 11° c. (DFO 2006).

Walleye are nocturnal spawners, and migrate to rocky areas such as white water below impassable falls and dams in rivers (MCWS 2008) and over flooded vegetation in marshy areas (Colby *et al.* 1979), or boulders to coarse-gravel shorelines or shoals of lakes to spawn.

In general, Walleye spawn over various bottom types in streams and lakes, where sediments and sufficient exchange or movement of water permit an adequate supply of oxygen to the developing embryo (Colby *et al*. 1979). A recent and

[2] Downstream approximately 11 km. at Provincial Road 328 (Kevin Jacobs CWS pers.com.)

extensive review of Walleye (spawning, incubation, age 0, juvenile, and adult habitat and respective water quality requirements) is now available (Bozek *et al*. 2012b).

Walleye males that mature earlier than females migrate to the spawning grounds first and remain a few days after the females have left. They are not territorial, nor do they build nests. Prior to spawning there is a lot of pursuit, pushing, circular swimming, and fin erection. Some spawning groups rush upward into shallow water, stop with the females rolling on their sides releasing their eggs and simultaneously milt is released by the males. Spawning usually takes place in groups, of one large female and one or two smaller males or two females and numerous males (Park 2010).

The maximum number of eggs released by one female has been estimated at 612,000 (DFO 2006). Fertilized eggs settle to the bottom where they stick to stones and debris, hatching in approximately 3 weeks depending on temperature (MCWS 2008). Within 10 to 15 days of hatching, juvenile Walleye disperse into the upper levels of open water. By the latter part of the summer, YOY Walleye moves towards the bottom. Growth at this time of year is fairly rapid in the southern part of the species range, but slower in more northern latitudes (DFO 2006).

Fecundity

Because fecundity increases roughly proportional to body weight, the fecundity of a population is usually characterized by its relative fecundity or number of eggs/ body weight (Bozek *et al*. 2011a). There is significant positive effect of GDD on relative fecundity; however, high variability exists within climatic zones (Baccante & Colby 1996, Lester *et al*. 2000, and Morgan *et al*. 2003). Relative fecundity increases with GDD, ranging from 20,000 eggs/kg in the north (GDD ~ 1100) to 80,000 eggs / kg body weight in mid–latitude (GDD~2500). Bozek *et al*. (2011a) provide the following example of variability: the range in relative fecundity of populations living at the northern fringe (GDD~1100-1300) was 20,000 - 60,000 eggs/kg body weight. Baccante & Colby (1996) found sufficient data to estimate population fecundity for ten Walleye populations (GDD 1200-2500) and found that it takes 1 million eggs to produce on average 68 adults.

No fecundity data is available for Waterhen Lake. It would be possible to compare Walleye fecundity in Waterhen Lake with those sets of lakes in Minnesota from which their Shannon Diversity index (H) was derived. If Walleye in Waterhen Lake are found to be less fecund they may need to protect more adults to ensure sufficient recruitment, and shift the target reference point on their performance indicator from 6 towards 7.

Prey & Predators

Walleye diet shifts from invertebrates (copepods, crustaceans, and very small fish) to fish as they increase in size. Adults' prey is dependent on availability; Yellow Perch, cyprinids and Ciscoes are common food items. In Lake Erie, prefer soft-rayed fishes to spiny-rayed fishes (Knight *et al*. 1984). Walleye also eat crayfish, snails, frogs, mudpuppies, and rarely, but on occasion, small mammals when forage fish and insects are scarce. Adult Walleye may be cannibalistic feeding on juvenile Walleye. Northern Pike is probably the most dominant predator of Walleye of all age classes. Juvenile Walleye are consumed by Yellow Perch, Sauger, adult Walleye, and double crested cormorants (DFO 2006, Park 2010, Nate *et al*. 2011).

Natural Mortality (m)

As longevity is inversely proportional to mortality rate, mortality rate should increase with GDD (Bozek *et al*. 2011a). By assuming that the lowest mortality values at each level of GDD represent lightly exploited populations it was demonstrated that *m* increases from approximately 0.13/year at 1,000 GDD to 0.39/year at 3,000 GDD. *M* for Walleye in Waterhen Lake is assumed to be near 24% for the available 1,575 GDD above 5°c (CWS 2013, citing Lester *et al*. 2000). The assumption of 24% seems reasonable for population at that latitude.

Stock Dynamics

The Walleye stock dynamics for Waterhen Lake suggest the population is receiving fairly heavy fishing pressure as evidenced by the early and rapid rate to maturity, rather short longevity and relatively high total mortality. Colby & Baccante (1996) concluded from their research and from the literature that a sustainable yield for Savanne Lake, Ontario was about 1kg/ha. Walter Lysack (pers.com.) believed that a sustainable yield of 1kg/ha reasonable for many Manitoba Walleye waters (Lysack, 1988, 1997, 2000 & 2004). However, it is likely an anomaly that Lake Winnipeg with high nutrient loading and recent smelt invasion is producing 1.9kg/ha.

The recent harvest of 1.1 kg/ha is high for a Walleye population but Waterhen Lake offers superb Walleye habitat, and using the thermal habitat area model (Christie & Regier, 1988) the 36 mt quota is set low (MCWS 2013). This quota (1.44 kg/ha) is believed to be obtainable by both clients and stakeholders but has no biological basis. Since 2004 the Waterhen Lake Walleye fishery has experienced an unprecedented continued high level of fishing, averaging 27.5 mt, or about 1.1 kg/ha (MCWS 2013). In 2012, 34.6 mt of Walleye was harvested and the 2012/2013 fishing season was closed on January 12, 2013 as the fishers approached the quota (MCWS 2013).

Stock Status

Presently the stock is at a level that maintains high productivity and with the reference indicators and management plan in place ensures there is a low probability of poor recruitment due to over fishing, providing established procedures are followed and enforcement is rapid if required. It is highly likely that the stock is above the point where recruitment would be impaired as evidenced by the four reference indicators.

The Walleye stock is being maintained around but mostly above the stock upper reference points (URP). Only two reference points, spawning stock biomass and spawning female age diversity, have dropped below the URP in the four years. This suggests that the adult population is at or nearing its sustainable level.

A third reference indicator CPUE has approached the upper stock reference point in two of the past four years and currently looks good. The CPUE reference point of 6 for Waterhen Lake is equivalent to 15 (6x2.5= 15) for fall walleye index netting (FWIN) in north western Ontario. Ontario's index nets are 2.5 times longer. The relative abundance benchmarks for north western Ontario's FWIN are 10.7 for average CPUE, 5.1 for 25% quartile and 15.5 for the 75% quartile (Morgan *et al*. 2003) thus the abundance of Walleye in Waterhen Lake looks very good.

The fourth indicator is Total Mortality. An increase in total annual mortality higher than 60% will lead to a reduction in the lake quota for Walleye. The URP of 60% is derived from the Percid Community Synthesis Population and Yield Characteristics Working Group (Lester *et al.* 2000). The reference points have been set at apparent high levels because mortality is calculated by tracking individual year classes and averaging their mortalities rather than calculating mortality from catch curves (MCWS 2013). Mortalities calculated from catch curves are more erratic due to variable year class strength, but also render a lower estimate of mortality, and are thus less precautionary (Gangl 2001).

The most recent total annual mortality rate estimate (2012) was below the URP and 2010 and 2011 estimates were below target reference points (TRP) suggesting caution. The 2013 data should be informative, as the quota has been approached for the second year in a row. How the four reference points respond to the past two years harvest should reflect their sensitivity in determining stock status and if any management action is required. Presently, the Walleye population in Waterhen Lake appear healthy and the four reference indicators show no cause for alarm.

Reference Points

The four reference indicators (spawning adult biomass, spawning female diversity, adult density (CPUE), and total mortality including their lower, upper and target stock reference points) are considered adequate and justifiable, but their appropriateness must be reviewed over time.

Spawning stock biomass (SSB) is an index that relates to Walleye recruitment. Studies in Lake Erie have attributed as much as 20% of the variability in Walleye recruitment to SSB (MCWS 2013 citing Madenjian *et al*. 1996) and a multi- lake study attributed 10% of recruitment variability to SSB (MCWS 2013 citing Beard *et al.* 2003). Limited index netting information to-date does not allow for accurate estimation of spawning stock in Waterhen Lake. Therefore, the total mass of gravid female Walleye caught is used as a surrogate for the standing stock of mature females. Resting females (i.e. mature females without developing eggs) are not included in the total (MCWS 2013). The SSB measured since 2009 are associated with good harvests and an index above 40 kg. Only in 2011 was the upper stock reference point below 40 kg; thus the reference point was set at 40 kg. The LRP has been arbitrarily set at 50% of the URP; the level expected to maintain a sustainable yield of 20,000 kg. The Target Reference Point (TRP) has been set at 50 kg. In 2012, the index was 46 kg and the four years ranged from 39 to 65 kg, close to the target and well above the URP. The value of this index should improve with a few more years of data.

The Spawning Female Diversity Index (SFDI) monitors the status of the female Walleye. There is growing evidence among a variety of fish species that larger and older females produce eggs with larger oil droplets resulting in larvae that both grow faster and survive starvation better than those from younger females (Frances *et al*. 2007), and this likely applies to Walleye (MCWS 2013). To maintain adequate age diversity among spawning females and a satisfactory recruitment relationship, the Shannon Diversity Index (H) was selected as one of the four reference indicators.

The reference indicator limits were selected from Gangl & Pereira's (2003) study of Minnesota's ten large Walleye lakes. The TRP H=0.60 is the mean value for the stocks studied in those ten lakes. The lower threshold of the 80% confidence interval, is selected as the URP H=0.58. The LRP H=0.31 represents the average of the Red Lakes diversities before and after collapse (CWS 2013). In 2012, H=0.80; the lowest for the four years was H=0.40 in 2010. Thus they were within URP and LRP. The H values for 2011 and 2012 were well above the TRP.

The annual adult density index is the CPUE geometric mean. A CPUE value of 5 was selected as the Upper Stock Reference Point; it is associated with an annual harvest of 20,000 kg, a level that has historically been considered good fishing. The selected lower reference point (LRP) is 40% of the upper reference point, but this is without justification. The TRP, 5.8 fish per net night, was selected because harvests associated with values around 5.8 were pretty good. The reasoning is sound and relates to indices developed for north western Ontario (Morgan *et al.* 2002). The lowest index value (5.0), which occurred in 2010, did not result in over fishing. However, allowing a reduction in adult density of 40% may not be precautionary if it results in a negative fish community response.

Total Mortality is based on tracking year classes and averaging their mortalities rather than calculating mortality from the catch curve. Mortalities from catch curves are more erratic due to variable year class strengths, but also render a lower estimate of mortality, and therefore are less precautionary (Gangl 2001). Natural mortality is assumed to be near 24% for the available GDD above 5°c (Lester *et al.* 2000). Mortality due to recreational fishing is assumed to be low. Subsistence fishing cannot be easily quantified, but is assumed to be low. The commercial fishery is the principle source of Walleye mortality in Waterhen Lake.

Due to the difficulty of partitioning, the harvest control rules (HCRs) are based on total mortality. One historic estimate of total mortality for Walleye in Waterhen Lake was about 46% as a result of a tagging study in the 1970s. The URP

(60%), and TRP (53%) were calculated according to Ontario's guidance on safe fishing (Lester *et al*. 2000). Preliminary modelling using Waterhen Lake Walleye weights at age showed yield-per- recruit (with a 96 mm minimum mesh) was maximized at a total mortality (A) of 70%. Only 13% of the maximum yield-per-recruit was sacrificed at A=0.5, but the SSB more than tripled (sexes were not split for the modelling). The LRP of 70% was selected with some caution recognizing that it was also the rate of harvest that led to a contraction in the Lake Winnipeg Walleye fishery in the mid-1990s. If total mortality falls between 60% and 70% an action response is triggered. The 2012, total mortality was 64% and the harvest season was closed early reducing the quota from 36,300 kg to 34,640 kg. Previous harvest mortality rates were above the URP. The 2012 level of harvest may be nearing or exceeding sustainable yield and the performance indicator is sensitive and working.

Harvest Strategy

The Waterhen Lake winter commercial fishery targets Walleye and Northern Pike. The fishery is designed to sustain Walleye which is the species most prone to stock collapse owing to its late maturation. The Northern Pike fishery is considered sustainable under the Walleye harvest strategy (HS) because female Northern Pike have spawned two or two times before they are susceptible to the minimum size mesh (96mm) allowed in the Waterhen Lake fishery. Low market value mullet (White Sucker and Shorthead Redhorse) is the only by-catch making up more than 5% of the harvest (MCWS 2013). The fishery is considered performing well under the 96mm minimum mesh regulation, selecting for an average size walleye of 477mm. Female walleye are 76% mature at 477mm.

As noted above, four reference indicators have been selected with the support of the commercial fishers to guide the commercial Walleye harvest in Waterhen Lake and these are assessed on the basis of LRP, TRP and URP as; low, medium, or high risk. Harvest control measures are to be implemented in response to changes in the reference indicators estimated from annual stock monitoring. Mesh size, allowable yardage, quota reductions are the control measures. The reference points selected are based on rationale that, harvest over the past nine years have been at a sustainable high level, and that the values obtained using these reflect stock status.

Finally the harvest strategy is based on fishers having an alternative fishery in the vicinity (Chitek and Inland Lakes) that is accessible and has the potential to reduce effort on Waterhen Lake.

Harvest Control Rules

Several harvest controls rules (HCR) are used to regulate the Waterhen Lake Walleye fishery: access is limited to 22 commercial fishing licenses all of which are utilised with a waiting list should any become available; it is a winter gillnet fishery with a time limit that can control the total number of days fished (effort); the length of gill nets is controlled thus limiting effort limited; the catch is monitored weekly; the mesh size is controlled (lower limit is 96mm) and may be changed subject to agreement from fishermen who must invest in the new nets; there are closed fishing zones to protect early life history stages; and to avoid overharvest of a given species certain areas of the lake may not be fished.

A drop in CPUE from the ULR would result in a decrease in the net yardage allowed for each fisher. If the Index CPUE was to decrease, maximum yardage would also reduce until the LRP of 2 walleye per index net was reached. 2,100 m. of net will be allowed at CPUE values below the LRP to provide some income for the fishers. The fishery has remained strong (over 20 mt annually) since indexing began and there has been no need to shorten yardage.

When SSB falls below the TRP of 40 kg, the level expected to maintain a sustained walleye of at least 20,000 kg, the minimum mesh size will be increased to reduce the capture of some immature females. If the SSB falls below 40 kg, the minimum allowable mesh size would be increased to 102mm; if the SSB falls to 30kg the minimum allowable mesh size would be increased to 108mm; and if the SSB drops to 20 kg the minimum allowable mesh size would be 114mm. Female Walleye caught in 114mm nets will be of a size that would have spawned once or twice and should be sustainable (Myers and Mertz 1996; Abrosov 1969). Increasing the minimum size mesh will allow more female walleye in any recruiting year class to contribute to the SSB indicator. However caution is required. The female walleye must be mature, because a sudden increase in growth could result in harvesting too many females before reaching maturity and result in recruitment failure. Population decline due to harvesting or a greater supply of food may cause an increase in growth, indicating the need for caution when using smaller mesh nets such as 96mm.

When H is above 0.58, no maximum gillnet mesh size will be implemented. However, when values of "H" fall below 0.58 into the "medium risk" zone a maximum mesh size regulation of 114mm will be put in place to conserve and enhance age diversity among spawning females. If the LRP of 0.31 is reached a maximum gillnet size of 108mm will be imposed to allow for a number of larger fish (generally larger mature females) to escape the fishery. However, the auditors are concerned that there may be too broad a range and subsequent overlap of size and age of fishes caught by either mesh size due to snagging, entangling, and age variation etc. to provide the protection desired, and more drastic means may be required. I**t is recommended that there is some evidence to support the effectiveness of mesh size selectivity to obtain the desired results**. Finally, if the HCRs for SSB and H are both in the critical zone a minimum mesh size of 114mm would be imposed. The fishers are capable of making rapid conversion to mesh size changes.

If total mortality increases more than 60% the lake quota for walleye will be reduced to allow the stock to rebuild.

Information

To ensure that the management plan is executed effectively the Waterhen Lake fishery is monitored by collecting data from: annual index netting, commercial log books and on-site (Basin Hole) inspections. In addition MCWS consults and meets with the Waterhen Lake Fisherman's Association and other stakeholders through a formal annual review process, as well as informal meetings to consider specific issues. There is an annual stock assessment report to detail the status of the Waterhen Lake fishery.

Post season analyses are conducted with the Waterhen Lake Fishermen's Association, Chief and Council of the Skownan First Nation, Manitoba CWS, and other pertinent resource users/stakeholders, such as recreational angler groups/associations, commercial tourism lodge operators and outfitters, etc. to review the previous year's fishing activities and to make recommendations toward improving management measures.

Stock Assessment Method

An external review process to determine if the management plan meets the goals/objectives is conducted by independent third party review who are fisheries professionals (from outside Manitoba) that possess the necessary knowledge and expertise in managing sustainable freshwater fisheries.

Northern Pike

Taxonomy and Geographic Range

Northern Pike (*Esox lucius*), which is an important keystone piscivores in Northern Hemisphere fish communities, has a broad global distribution. The species is found primarily in fresh water in a circumpolar band around the world from 35 to 75 °N latitude. In this area, Northern Pike occurs over a major portion of all continental masses except for narrow Arctic and sub-Arctic fringes, some coastal areas, and limited internal drainages (e.g. formerly Kawarthas of Ontario) (Crossman & Casselman 1987). The species has commercial, recreational, and subsistence value. Indeed, in the 1980s, total commercial harvest in Europe was almost 20,000 mt and in North America 3,200 mt. In North America, commercial fisheries are restricted to northern portions of the range, whereas in the southern portion, Northern Pike provide important recreational fisheries.

Populations in North America were long suspected to be sufficiently distinct from those in Europe to deserve a special name. As a result, the names "Northern Pike" and "Great Northern Pike" came into use. In the mid-1800s, Northern Pike in North America were often referred to by the names "pickerel" and "northern pickerel". The name pickerel is now properly restricted to three small members of the Northern Pike family. This can cause confusion when using older references and literature. The confusion is increased by the lingering practice, in some parts of North America, of referring to walleye (*Sander vitreum*) by the name "pickerel". Northern Pike are in the family referred to as Esocidae, in the order Esociformes. Other well-known common names for Northern Pike include jack, jackfish and, if disappointingly small, anglers often refer to them as "*hammer handles*".

In general, the native distribution of Northern Pike occurs in North America from Alaska south to Missouri and Nebraska, east of the Rocky Mountains and west of the Appalachian Mountains. It occurs in Lake Champlain and the Hudson River and penetrates east of the Appalachian Mountains into Vermont, New Hampshire, and central Massachusetts. In Canada, it occurs from Labrador south of Ungava Bay, is absent from the Maritime Provinces and present throughout Quebec, upstream in the St. Lawrence River from the Nicolet River throughout Ontario, and through the western provinces, including Alberta. In British Columbia, it was historically restricted to the extreme northeast corner, throughout the Yukon and Northwest Territories except for the northern and eastern coastal areas and the Arctic oceans (Scott & Crossman 1973a, see distribution map, p. 358). Northern Pike has been introduced widely, both officially and unofficially and even illegally. Introductions have been especially prevalent in the southern part of the range throughout the central United States (Harvey 2009). These are generally not well documented. They have also invaded extensively in some areas within the range; e.g. the Kawartha lakes and the Algonquin watershed in Ontario. There is some evidence that their distribution is expanding northward with climate change (e.g. Yukon, Northwest Territories and Nunavut).

Manitoba, by virtue of its topography, is ideally suited to the species and may be the centre of North American abundance. The terrain is relatively flat and, as part of the ancient glacial Lake Agassiz Basin, contains an abundance of relatively shallow mesotrophic lakes, which are prone to spring flooding, producing ideal wetlands for Northern Pike spawning and nursery habitat (Casselman & Lewis 1996). This is borne out by the fact that not only are Northern Pike abundant but they are an important commercial species, producing an average of almost 1,400 mt annually over the past decade, accounting for 11.4% of the commercial fish harvest in Manitoba (MCWS 2012). During that time, Manitoba accounted for well over half the commercial harvest in Canada (56%). Waterhen Lake is one of the most consistently productive commercial Northern Pike fisheries based around a commercial fishery that primarily targets walleye. An average annual Northern Pike harvest of about 16 mt over the past 22 years (MCWS 2013) appears to have been generally sustainable.

Migration & Stock Structure

Northern Pike is generally a sedentary species that shows evidence of territoriality (Diana 1980) and is not strongly migratory, particularly if cover and food are adequate. Numerous field studies have confirmed that home ranges are usually limited (Raat 1988), and if adequate vegetation and cover is present, the summer area might be as limited as 100–1,500 m^2 (Malinin 1972). Extreme movements have been reported, but these are rare and are usually associated

with marking studies (Carbine & Applegate 1946). However, these extremes may be associated with fish that have been affected by handling. Movement is most extensive in spring and autumn; the former related to spawning and the latter to improving foraging opportunities related to gonadal development and often involve large females.

While Northern Pike are tolerant of a wide range of temperatures and oxygen concentrations, they move locally and within the water column to respond to changes in these environmental factors. In summer, adults can move deeper to cooler and more optimal temperature conditions (approximately 20 °C or lower) and, if prey is scarce, can move to cooler temperatures, where metabolic rate would be lower. Winter activity patterns associated with oxygen depletion can greatly affect Northern Pike distribution (Casselman & Harvey 1975). In winter, they approach the ice/water interface as oxygen is depleted in deeper waters. They stop feeding when oxygen falls below 2 mg/L (Casselman 1978a). Swimming is maximal at the optimum temperature of 20 °C and decreases considerably below 6 °C.

If spawning habitat is abundant, spawning migrations are not extensive, usually only several kilometres from the summer habitat, although more extensive migrations have been reported (up to 76 km, Carbine & Applegate 1946). There is some evidence that after spawning, Northern Pike consistently return to the same area of the water body. There is considerable evidence that Northern Pike home to the same spawning grounds year after year (Frost & Kipling 1967; Bregazzi & Kennedy 1980). Spawning occurs in spring, usually just after ice-out, but with climate change, there is evidence that this is occurring appreciably earlier at the southern part of the range, from 4 to 6 weeks earlier in the past four decades (Casselman, unpublished data).

Autumn movements are less well understood and usually involve feeding forays associated with gonadal development in large, mature individuals, particularly females. Seasonal activity patterns indicate that the faster-growing, mature females are more vulnerable to capture by stationary gear and angling in midsummer and late winter (Casselman 1975). The latter can result in selective harvest of mature females from the population at a time when gonadal development is greatest. This selective mortality must be taken into consideration when managing for sustainable fisheries. Winter fisheries, both recreational and commercial, particularly the latter involving winter gill-netting on Waterhen Lake, would, by virtue of time of year, harvest disproportionately more female fish, in particular those that are actively foraging in association with the last stages of gonadal development.

Since Northern Pike are generally sedentary and the inflow (Little Waterhen and West Waterhen rivers from Lake Winnipegosis) and outflow (East Waterhen River into Lake Manitoba) of Waterhen Lake are in the extreme south end (MCWS 2013), the northern portion of the lake is essentially a backwater basin with low flow and potentially the best Northern Pike habitat, which no doubt would provide ideal spawning, nursery, and summer habitat. This is confirmed through the personal observations of commercial fishers, who report that approximately 90% of the commercial harvest of Northern Pike comes from the north half of the lake. The Northern Pike population of Waterhen Lake can be assumed to be non-migratory and resident. It is unlikely that there would be much movement of Northern Pike out of, or even into, the lake, since the high-flow southern portion of the lake is most distant from the most ideal Northern Pike habitat. A mark-recapture study would be the most definitive way to confirm this and should be considered.

Considerable information exists concerning stock structure of some Northern Pike populations; one of the best general summaries is found in Raat (1988). The literature review includes populations over a broad geographic range exposed to different levels of exploitation and encompassing various time periods. For 56 populations, mean Northern Pike density was 39 fish/ha, biomass was 32.2 kg/ha, and mean individual weight was 826 g. However, for comparison of Northern Pike populations in central Canada, the most up-to-date and thorough data can be found in Malette & Morgan (2005) for Northern Pike from FWIN of 412 Ontario lakes from 1993 to 2002. These data are particularly relevant to the present review because a similar type of gill-net indexing program is being conducted in Manitoba, including Waterhen Lake (Bonar *et al*. 2009; MCWS 2013). Relative abundance for the Ontario populations, indicated from the FWIN catch data, was relatively low; mean CPUE and percentiles for 412 Northern Pike populations were 2.2 (P_{25} – 0.9 and P_{75} – 3.0). Northern Pike in those populations had a mean length of 581 mm (P_{25} – 528 and P_{75} – 627) and weight of 1,472 g (P_{25} – 994 and P_{75} – 1,804). Mean annual mortality (A) for males was higher, 49.6% (P_{25} – 41.9 and P_{75} – 57.9), than for females, 35.5% (P_{25} – 27.5 and P_{75} – 44.1), indicating that for these populations, females were, on average, considerably older and longer-lived. Indeed, mean age of the oldest age group that had four or more individuals was 3.9 years (P_{25} – 3 and P_{75} – 5) for males compared with 4.6 (P_{25} – 3 and P_{75} – 6) for females. Northern Pike can live up to 30 years of age in unexploited lakes in northern Saskatchewan (Casselman, unpublished data) but in most exploited populations are considerably younger, usually not greater than 8-10 years of age and in heavily exploited populations can be as little as 2-3 years old.

Seasonal sampling and associated activity patterns can greatly affect the interpretation of stock structure and status, particularly when using passive index methods such as gill-netting. Since seasonal activity patterns vary with sex (Casselman 1975) and Northern Pike show strong sexually dimorphic growth and differential survival, it is particularly important to take sex into consideration when sampling and assessing stock structure and status.

Northern Pike sampled in 2011 from the WFIN indexing program in Waterhen Lake provided some limited insights concerning stock structure (Pellissier 2012). Opercula bones were used for age assessment. The method has limitations because first annuli are often obscured (Frost & Kipling 1967; Casselman 1996). However, modal age of males was 2 and females 3. Most of the fish ranged in length from 400 to 600 mm and were 2 to 4 years of age. The largest fish was 700 mm and 7 years of age. A small sample of six fish between 200 and 300 mm TL was assessed as young-of-the-year. CPUE for 2011 WFIN sampling was not provided by Pellissier, and sample size was too small to be very informative.

For the future, it would be better to understand the stock structure of Northern Pike in Waterhen Lake. Commercial-catch sampling should be conducted and the index sampling effort should be increased to catch at minimum of 200 Northern Pike as part of the indexing program. This would be most efficiently conducted by including species-specific gill-net effort, possibly considering location (more vegetated areas), depth (shallower), and type of net (colour) so as to better index the Northern Pike population. Also, better biological data needs to be acquired for age, growth, sex, stage of maturity, and possibly stomach contents. Incorporating the cleithral method of interpreting age and growth and back-calculating size-at-age would greatly increase accuracy and precision. Annuli can be more precisely measured on cleithral bones than almost any other esocid calcified structure, particularly opercula (Casselman 1996).

Habitat

Northern Pike are a common and abundant species, found in 45% of the total freshwater area of North America (Casselman & Lewis 1996).

Limnological characteristics of typical Northern Pike lakes are described in a review of the extensive Ontario Lake inventory survey (Johnson *et al.* 1977). Nearly 70% of the lakes that contained Northern Pike had either only Northern Pike or Northern Pike and Walleye. Northern Pike lakes typically had a mean depth of 2–6 m, littoral zones (<6.1m) that were 60–80% of the total surface area, Secchi disc transparency of 2–4 m, total dissolved solid levels between 50 and 128 mg/L, and were nearly neutral or slightly acidic. Northern Pike can tolerate a wide range of alkalinity, and populations appear sustainable at pH as low as 5.0 (Inskip 1982).

The Ontario FWIN program, 1993-2002, sampling more than 400 lakes that contained Northern Pike, provided a good overview of what constitutes a "typical" Northern Pike lake and its habitat (Malette & Morgan 2005). Water-body means and percentiles were: surface area 2,939 ha (P_{25} – 202 and P_{75} – 1,820); mean depth 6.9 m (P_{25} – 3.6 and P_{75} – 8.5); littoral zone 63% (P_{25} – 44 and P_{75} – 84); maximum depth 25.1 m (P_{25} – 11.6 and P_{75} – 32.0); Secchi depth 3.2 m (P_{25} – 2.3 and P_{75} – 4.0); and growing degree days >5 °C were 1,519 (P_{25} – 1,376 and P_{75} – 1,686).

Northern Pike are large-bodied piscivores that tolerate a wide range of environmental conditions (Casselman 1978a). However, they are primarily a cool-water fish with an optimum temperature for growth of approximately 20 °C (Casselman 1978a). Northern Pike are also found in warm- and cold-water fish communities. Spawning and nursery conditions and habitats are the factors that most often exclude Northern Pike or limit their abundance. Shallow vegetated areas and flooded wetlands provide the most suitable of these types of habitats, and year-class strength is correlated with water levels (Casselman & Lewis (1996)). Northern Pike do not do well when water level fluctuates widely during the spring spawning season (commencing when water-body temperatures have warmed to 8–12 °C) or when drought conditions occur (Casselman 1996). Optimum temperature for growth of YPY Northern Pike is in the range of 22–24 °C. Abundance of YOY and older life stages is positively correlated with depth (Inskip 1982; Casselman 1996); they are usually found in <10 m of water. In gill-netting surveys of Great Slave Lake, 90% of the Northern Pike were caught in <10 m of water within 400 m of shore (Rawson 1951). In oligotrophic lakes, Northern Pike are typically confined to the shoreline. Habitat preference changes with life stage (Inskip 1982), but vegetative cover is of primary importance (Bry 1996).

A summary of depth-stratified multi-mesh gill netting in north western Ontario lakes (Laine 1989) provided empirical evidence that Northern Pike were more abundant in shallow waters, regardless of trophic status of the water body; 60% of the Northern Pike caught were taken shallower than 6.5 m, 33% from 6.5 to 13.0 m, and only 7% deeper. More productive ecosystems produced greater catches; 68% of the catch came from meso-eutrophic lakes, which had the highest average Northern Pike densities of 7.76/ha, 24% from meso-trophic lakes with a density of 2.80/ha, and 8% from oligotrophic lakes with a density of 0.69/ha.

Adult abundance and distribution are related to the extent of macrophyte cover, which is optimal from 35 to 80%, and association is inversely related to body size (Casselman & Lewis 1996). Summer habitat can be limited if surface temperatures greatly exceed the optimum, 20 °C, or oxygen concentration falls below 1.5 mg/L (Casselman 1978a). Temperature is a major controlling factor affecting growth, which rises rapidly above 10 °C, is maximal between 19 °C and 21 °C and declines abruptly at higher temperatures. The upper lethal temperature is 29.4 °C, but in winter, Northern Pike can tolerate temperatures as low as 0.1 °C (Casselman 1978a). If oxygen is depressed in midsummer in shallow backwater areas of heavily respiring vegetation (on cloudy, calm days), summer kills can occur, but winterkills related to late-winter oxygen depletion are more common and are exacerbated by long, cold winters with thick ice and heavy snow cover and are more prevalent in shallow lakes (Casselman 1978a, 1996). Winterkills are accentuated by low water and winters that lack a mid-winter thaw. The species is, however, remarkably tolerant, surviving in oxygen concentrations as low as 0.04 mg/L (0.3% air saturation) and caught alive at these levels. Northern Pike begin to seek higher oxygen levels when the concentration falls below 4 mg/L, and they cease feeding below 2 mg/L. Critical oxygen concentrations depend on temperature; the upper range of the lower incipient lethal oxygen concentration varies between 0.5 and 2.0 mg/L. Since Northern Pike populations are associated with relatively shallow water bodies, oxygen concentration and depletion are particularly important, especially under drought conditions.

Winterkills can greatly affect standing stock and can be quite selective. Partial winterkills and low winter oxygen can have a profound effect on structure of the population, selecting against fish that are faster-growing, old, large, and female, leaving populations with individuals that are significantly smaller, younger, slower-growing, and male (Casselman & Harvey 1975). Winterkills have been known to occur in Manitoba Northern Pike populations. Lysack (2004) reported that dead Northern Pike were found in December 2001 in the Rocky Lake–Reader–Root marsh complex, and

winterkill was implicated, associated with lower than normal water levels and large quantities of decaying vegetation. Indeed, commercial fishers of Waterhen Lake reported that a winterkill occurred in the late 1970s. Winterkills were very prevalent in shallow water bodies of central North America during the winters of 1976–77 and 1977–78. This coincides with the fishers' observations and underlines the importance of local observations in understanding and explaining fish distribution and dynamics.

If temperatures increase substantially, Northern Pike growth, recruitment, and production would be reduced, particularly if midsummer temperatures significantly exceeded the optimum and if water levels decreased because of drought; these could also exacerbate winter oxygen depletion, which could become an important concern. **It is recommended that water temperature and water quality, particularly winter oxygen levels, be measured routinely in Waterhen Lake.**

Waterhen Lake is a shallow (mean depth 3.7 m, maximum depth 4.4 m) meso-eutrophic lake (MCWS 2013) with a midsummer Secchi depth of approximately 1.5 m in 2012 (W. Galbraith, MCWS, personal communication). This is slightly more turbid than would be ideal for Northern Pike (2–4 m) but would probably not hinder visual predation and growth; Northern Pike could compensate by feeding at higher light intensities, during the daytime. Indeed, in clear water, Northern Pike feed four times more actively on cloudy than on bright, sunny days, and their activity is much more crepuscular (Casselman 1978a). Offshore in Waterhen Lake, emergent phragmites are bordered by bulrushes out to approximately 1 m deep. *Potamogeton* beds are sparse, but dense areas of *Myriophyllum* occur to depths of 2 m. It appears that vegetative cover is ideal for Northern Pike and sparse enough to provide considerable vegetation/open-water interface, which is important for this ambush predator. The lake is polymictic, and in midsummer, temperature is near the optimum for juvenile Northern Pike but, with global warming, could start to exceed this. Northern Pike have a slightly lower optimum temperature for growth than do WE (Casselman 1978a; Christie & Regier 1988).

The operation of commercial gill nets in the winter fishery is unlikely to have any significant impact on habitat.

Growth

Northern Pike growth has two major components, somatic and reproductive. Optimum temperature for somatic growth has been thoroughly studied; it is greatest at 19 °C for mass and 21 °C for length (Casselman 1978a). Indeed, swimming activity is correlated, peaking at 20 °C (Casselman 1978a, 1996). If summer conditions are optimal, Northern Pike can reach a large ultimate size. Northern Pike populations in Ontario, as documented from the FWIN series, 1993-2002, provide good specific insights into size and growth (Malette & Morgan 2005). Females are faster-growing and live to a larger ultimate total length: mean $L\infty$ for females was 1,052 mm (P_{25} – 957 and P_{75} – 1,140) and for males 854 (P_{25} – 803 and P_{75} – 95); K for females was 0.171 (P_{25} – 0.147 and P_{75} – 0.193) and for males 0.200 (P_{25} – 0.177 and P_{75} – 0.220), with a mean ω value for females of 18.0 and males 17.1. Northern Pike show sexually dimorphic growth, with females growing faster and larger than males.

Availability of prey fish is particularly important, and the species is strongly piscivorous. Lysack (2004) showed that Northern Pike >400 mm TL in Manitoba Northern Pike populations were primarily piscivorous, eating suckers, small Northern Pike, yellow perch, and other prey fish. Although smaller Northern Pike also ate some fish, they were primarily insectivorous. Cannibalism in Northern Pike can be prevalent. In a controlled laboratory rearing study, Beyerle & Williams (1968) documented that Northern Pike quite specifically selected soft-rayed species over spiny-rayed ones. Northern Pike can be significant predators on all sizes of Walleye (Park 2010). Observational evidence suggests that large Northern Pike prefer large prey fish, and soft-rayed species such as red horse and white suckers are heavily consumed (Casselman, unpublished data).

Large Northern Pike are important predators, stabilizing the fish community, removing the largest prey fish, and appropriately decreasing their overall abundance. Selective removal of large Northern Pike by either recreational or commercial (size-selective gill-net) fisheries can destabilize the fish community and, in the extreme, produce an undesirable abundance of small "hammer handle" Northern Pike. Lysack (2004) considered that the proportion of Northern Pike >600 mm was a good measure of this effect. If large Northern Pike are present, cannibalism can be a mechanism for natural population control (Mann 1996).

Understanding growth of Northern Pike in the natural environment requires accurate age assessment. This can best be achieved by using age assessed from interpretation of the cleithral bone, a validated method for the species (Casselman 1996). Reconstruction of body size by back-calculating at each annulus can be easily performed from the cleithral bone and is well understood (Casselman 1996). Measurements at each annulus can be done more precisely than for any other calcified structure. Back-calculation provides considerably more data (one estimate per annulus) than a simple single measure of empirical body size-at-age and, quite importantly, eliminates the need to correct for size related to seasonal growth caused by sampling in the growing season.

Changes in growth rate within a population can provide useful evidence for changes in exploitation rate. In addition, accurate age interpretation is critically important, since age is used in five of the seven major parameters available to examine changes in exploitation and overexploitation: age structure, mortality estimates, variation in year-class strength, growth, and age at first maturity (OMNR 1983).

Age and growth of Northern Pike has been studied extensively, using various calcified structures, particularly scales and cleithra (Casselman 1996). In a review of circumpolar Northern Pike populations, Casselman reported that almost 40% had individuals older than 7 yr, with a maximum age of 30. In natural populations, females live longer, grow faster, and

are larger than males (see summary FWIN data above). Casselman (1996) provided a circumpolar fork length-at-age growth standard equally weighted for sex for species assembled from 73 datasets. A conversion from fork to total length was provided: $TL_{(cm)} = 0.442 + 1.048FL_{(cm)}$ (FL range. 12.3–87.6 cm). The standard for total length is: age 1 – 196, 2 – 337, 3 – 441, 4 – 520, 5 – 588, 6 – 653, 7 – 671, 8 – 719, 9 – 749. Using back-calculated lengths provided by Pellissier (2012) for Waterhen Lake, correcting size at the first annulus to 200 mm after using a Walford growth transformation, it appears that Northern Pike in this sample were growing only slightly, but not significantly, faster than is standard for the species (up to 6 years of age, 102.5 ± 2.7%). Indeed, average length-at-age data reported in the Ontario FWIN Northern Pike data summary, 1993–2002, adjusted 1 yr to match calendar age, also indicated slightly faster growth like that of Northern Pike from Waterhen Lake (up to 9 years of age, 103.3 ± 14.8%). However, average lengths-at-age for the Ontario Northern Pike populations were considerably more variable, larger in early years and smaller in later years.

Growth rate of Northern Pike from Rocky Lake-Root-Reader Marsh in 1999 (Lysack 2004), using age determined from anal fin sections, was slightly faster than that of Waterhen Lake Northern Pike in 2011 (Pellissier 2012). Lysack (2004) reported that a 2003 sample of Northern Pike reached a maximum size of approximately 800 mm FL in 13 years. Age composition changed seasonally, with a modal age of 4–5 at spawning time and 1–2 at other times of year. Age and growth data for Northern Pike from Manitoba lakes are limited (W. Lysack, personal communication).

Validated procedures of accurately interpreting age and growth of Northern Pike be used in the future, probably using the cleithral method, in routine indexing and commercial catch sampling and that size-at-age be compared with a growth standard and used to develop age-related performance indicators.

Weight of Northern Pike is extremely variable and varies on a seasonal basis in relation to gonadal development. But if weight is corrected for stomach contents and gonadal development, it can be an extremely descriptive measure of somatic condition. Weights of Northern Pike caught in the fall can be affected by gonadal development. However, the FWIN data indicates that the gonadosomatic index, even for the females from these populations, was relatively small, usually <5%. The mean length-weight relationships for these datasets can be used for general length (mm)-weight (g) conversions and are: mean female total weight = $10^{0.00000212}$ total length$^{3.22}$ and mean male total weight = $10^{0.00000415}$ total length$^{3.14}$.

Reproductive growth is less well understood but has been examined for some populations by intensive sampling on a seasonal basis (Casselman 1978b). In both males and females, gonadal development commences in a decreasing temperature regime in early fall (usually early September in the central portion of the North American range). Males feed heavily and are more active at that time of year and reach their maximum gonadosomatic index of 1–4% rather quickly, in 1–2 months. Females build considerably more ovarian material over a long period of time, with the gonadosomatic index peaking at 10–30% by mid- to late winter. Actively feeding, maturing females are especially vulnerable to exploitation at that time of year and can easily be targeted by both recreational and commercial gill-net fisheries. Relative size of the ovaries is directly related to size and age.

Reproduction

Northern Pike are early-spring spawners, using inundated wetlands. Environmental-habitat conditions associated with spawning and nursery areas have been studied and reviewed in detail, and a system for classifying and ranking major physical characteristics and requirements has been developed (Casselman & Lewis 1996). Hummocks of grasses and sedges are the most actively used areas for broadcasting eggs, and depth of the nursery habitat is directly correlated with fish size and age. Rules of thumb for the first year of life are that water depth is approximately 10 cm for every 10 mm of body length for every week after peak spawning (Casselman & Lewis 1996). Spawning habitat is usually less critical or limiting than nursery or juvenile habitat.

Number of eggs per female increases with body size. Scott & Crossman (1973a) suggested that an average female would produce 32,000 eggs. However, the review conducted by Raat (1988) suggested a mean absolute fecundity for the species that was almost twice as great (N = 15, mean and 95%CI – 60,000 ± 17,000) and a relative fecundity of 25 ± 4 eggs/g. The species is highly fecund, probably considerably greater than reported by Froese & Pauly (2013), and approaches the fecundity of Walleye. Fecundity needs to be measured directly for Waterhen Lake Northern Pike.

Northern Pike populations in Ontario, as documented from the FWIN series, 1993-2002, provide some general data on age and length at 50% maturity. On average, females were first mature at 1.97 years of age (P_{25} – 1.42 and P_{75} – 2.41) and a total length of 462 mm (P_{25} – 421 and P_{75} – 500), whereas first maturity for males was at 1.82 years (P_{25} – 1.31 and P_{75} – 2.48) and a total length of 424 mm (P_{25} – 375 and P_{75} – 466). When determining age and size at spawning time, it is important to put size and age in context in relation to time of year sampled. FWIN netting is conducted in fall, so at time of spawning, size would be somewhat greater, and age the next spring would actually be designated as one year older, corresponding to the number of growing seasons, or calendar years of life.

The 2011 sample of 51 Northern Pike from Waterhen Lake was somewhat inadequate for assessing maturity; 100% of the 2-year-olds were mature. However, no fish of age 1 were present in the sample, so it is possible that age at first maturity could be somewhat younger (Pellissier 2012). **It is recommended that the various types of reproductive information be acquired and used to develop and monitor an indicator of the spawning stock of Northern Pike in Waterhen Lake. Indeed, as in Walleye, a Northern Pike index of spawning stock biomass could provide a target reference point.**

Prey & Predators

Quite generally, freshwater fish can be divided into three thermal guilds, depending upon temperature preference and optimum temperature for growth. The three thermal guilds are as follows: warm-water fish have very high temperature preferences and optima (> approx. 25°C), cool-water fish do best at intermediate temperatures (approx. 15-25°C), and cold-water fish at the lowest temperatures (< approx. 15°C).

Northern Pike are keystone predators in the fresh waters of North America,. Their invasion into cold-water fish communities has had significant negative effects on salmonid populations (Sepulveda *et al.* 2013) and, under these circumstances, produced record-high Northern Pike growth (Casselman 1996). In reality, Northern Pike can best be classified simply as omnivorous carnivores. Optimum food size has been calculated to be between one-third and one-half the length of the Northern Pike. One might assume that they are opportunistic, but some selection occurs for soft-rayed fish. Scott & Crossman (1973a), quoting Toner, estimated that in one year, a Northern Pike could eat 43 kg of trout and perch, and in Heming Lake, Manitoba, consumed a staggering amount of prey (Lawler 1965). Northern Pike are also competitors of Walleye, competing for important prey such as yellow perch, although they co-exist productively in most lakes, with Northern Pike consuming larger individuals.

Northern Pike are essentially a crepuscular ambush predator that relies on camouflage within vegetative cover (Casselman 1996) but can switch very adaptively to invertebrate feeding (Lysack 2004), and quite importantly in stabilizing community structure, they can be strongly cannibalistic. Under these conditions, Northern Pike can become prey, but in warm-water fish communities, the main predators of the younger life stages are other cool- and warm-water piscivores, most notably percids and centrarchids. It is documented that Northern Pike deliberately introduced into a Canadian boreal lake detrimentally affected the littoral-zone invertebrates (Venturelli & Tone 2005). Northern Pike, especially YOY and yearlings, which live primarily inshore, can greatly impact cyprinid populations (Findlay *et al.* 2000). In a review of 36 lakes in the Canadian Shield, there is well-documented evidence of the importance of the piscivory of Northern Pike and Walleye on white suckers and yellow perch (Bertolo & Magnan 2004); fish communities that are somewhat similar to that of Waterhen Lake Piscivory decreased abundance and increased predator-induced mortality, growth rate and condition in the prey species. This “top-down” control produced well-documented effects on community structure.

Cormorants are present on Waterhen Lake and are known predators of Northern Pike; consumption by cormorants, in the extreme, can be major, and their importance as a Northern Pike predator should not be overlooked. A calculation of biomass of fish consumed by cormorants will reveal an unexpectedly high consumption. Cormorant impacts on the Northern Pike population of Waterhen Lake should be appraised and predation levels monitored. However, the primary source of mortality in Northern Pike populations is associated with fisheries; on Waterhen Lake this appears to be exclusively from commercial gill nets.

Natural Mortality

Many estimates of mortality exist for exploited Northern Pike populations but very few unexploited ones. Hence, natural mortality estimates are rare. The few that exist seem typical for cool-water fish. In a 15-yr study conducted by Snow (1978) on Murphy Flowage, Wisconsin, it was estimated that total annual mortality rate was 66%, with natural mortality accounting for 40% and angling exploitation 26% in this angled population. The extensive review of Northern Pike literature conducted by Raat (1988) produced numerous annual mortality estimates but few measures of natural mortalities, and these were at the 30% level. In a study of fished populations in the Mackenzie River delta, Howland *et al.* (2001) provided instantaneous mortality estimates ranging from 0.27 to 0.33, which were considered to be primarily due to natural mortality. There are numerous ways of calculating mortality rate, but for quick insights, the simple procedure of using maximum age to estimate total instantaneous mortality rate (Z) by Hoenig (1983) can provide quick approximations. As indicated earlier, Northern Pike can live up to 30 years of age. This would suggest a natural mortality rate as low as 14% at the extreme. In most Northern Pike populations in the southern part of the range that are relatively unexploited, Northern Pike can live to be 15–20 years of age. This corresponds to a mortality rate of 20–25%. In exploited populations, where Northern Pike live only to 8–10 years of age, it can be crudely estimated that annual mortality rate would be 35–40%. If an adequate sample is drawn, maximum age of the sample can be informative; however, to obtain reliable mortality estimates, adequately large index netting samples should be acquired annually (N of approximately 200) and detailed year-class analyses conducted.

For reference purposes, the FWIN Northern Pike sample for more than 200 lakes in Ontario provides some useful comparative data. For those lakes, mean estimated annual mortality (A) for males was higher, 49.6% (P_5 – 32.8 and P_{95} – 71.6), than for females, 35.5% (P_5 – 18.1 and P_{95} – 58.2). The 5% percentile may be a reasonable estimate of natural mortality for the species.

The relatively small sample of Northern Pike examined from 2011 in Waterhen Lake had a maximum age of 6. This corresponds to an annual mortality rate of approximately 50%. However, the sample was inadequate to provide reliable mortality estimates. **It is recommended that appropriate techniques be developed to annually determine mortality rate of the Northern Pike population of Waterhen Lake and that it be used as a reference-point performance indicator to assess Northern Pike exploitation on an ongoing basis, preferably refined for thermal conditions (GDD).** This could parallel what has been done for walleye.

Susceptibility to Fishing Gear

Fisheries can be quite selective for size, age, and sex. Recreational fisheries can be selective by choice if not regulated, as can commercial fisheries if they involve live-capture gear. However, gill nets sample lethally and catch fish that are vulnerable to the gear, depending upon mesh size, location, and time of year of the fishing effort.

Northern Pike are a substantial part of the Waterhen Lake commercial catch but are second in value to walleye, worth considerably less, only about one-quarter of the walleye value (MCWS 2013). Because of their low value, in the past they have essentially been captured incidentally as a non-targeted species. Since walleye is the primary target species, mesh size of the primary fishery is predetermined at 96 mm, and the associated walleye harvest rule seems appropriate for Northern Pike because if changes are made, only coarser mesh would be used. If finer mesh were used, it would result in increased harvest of large Northern Pike, which would be undesirable because it would result in an increasing loss of the predatory services that the larger fish perform. As discussed above, it has been suggested that the primary fishery is at the south end of Waterhen Lake, not where Northern Pike are most abundant. If the fishery were to move to the north end of the lake, where Northern Pike apparently are more abundant, targeted effort could occur and could be quite selective for large, mature females, particularly if it were conducted late in the season when mature, large fish would be more active and vulnerable.

Northern Pike are strongly piscivorous and are often baited into fine-mesh gill nets by the presence of entangled prey fish, so gill-net selectivity curves for this species often deviate considerably from the conventional gilling and wedging distributions. The commercial gill nets used to fish Northern Pike in Waterhen Lake seem, on cursory observation, to be unique by colour, type of twine, and possibly even hanging ratio**.** It is important to know whether the selectivity of the commercial nets is similar to standard index nets. **It is recommended that assessment be conducted using these specific nets to determine gill-net selectivity for Northern Pike and that selectivity curves be prepared and considered when designing performance indicators. Likewise, selectivity and catchability of Northern Pike should be taken into consideration in the FWIN index gill nets. Indeed, retention of various types of gill nets has been studied recently not only for Northern Pike but for other species, providing valuable correction factors (Walker *et al*. 2012).**

Selective overfishing of large, old Northern Pike can permanently alter the structure and dynamics of the population and fish community. Gill-net fisheries of Northern Pike populations in the Mackenzie River delta, primarily for subsistence use, were shown to be locally intense, selectively removing larger, older fish and resulting in overfishing of local stocks (Howland *et al.* 2001). This occurred because the Northern Pike were essentially non-migratory although they did undergo limited seasonal movements.

Northern Pike caught in multi-mesh index gill nets used in Waterhen Lake and two other Manitoba lakes (St. Andrews and St. Martin) provide evidence that Northern Pike caught in gill nets of a commercial mesh size of 96 mm would, on average, probably be larger than 500 mm (Pellissier 2012). It can be estimated that Northern Pike of this size would be at least 4 years of age, providing indirect evidence that Northern Pike caught in commercial nets of this size would have spawned several times.

Koshinsky (1970), considering the compensatory reaction of Northern Pike to selective exploitation, referred to Lawler (MS 1965) and detailed that in the classic Heming Lake Northern Pike -removal exercise, it was possible to sustainably remove 4.4 kg/ha/yr from this northern Manitoba lake. During removal, abundance increased, resulting in smaller Northern Pike that were slower-growing. Spawning was still successful, even though most of the fish were less than 2 years old. Otto (1979) examined Northern Pike response to heavy fishing in a Swedish lake, showing that numbers increased substantially, but unexpectedly growth improved. However, this was an initial response to the removal of large fish and immediately resulted in an increase in prey-fish abundance.

Sex-selective mortality is every bit as important as size and age and should be taken into consideration when managing Northern Pike populations that have winter fisheries. Seasonal activity patterns of the sexes can result in selective harvest and mortality that makes maturing females more vulnerable in summer and winter (Casselman 1975, 2013). Late-winter fisheries, both commercial and recreational, are particularly selective of spring-spawning cool-water fish.

Given seasonal activity patterns, a gill-net indexing program conducted in the fall would be expected to catch disproportionately more males than at other times of year except at time of spawning (Casselman 1974). However, the small (51) FWIN fall 2011 sample of Northern Pike from Waterhen Lake contained disproportionately more females than males (3.4:1); this seems unexpectedly high. Quite notably, the oldest fish in the sample were disproportionately female. Although the sample may not be adequate, it does suggest that females may have been disproportionately more abundant in the lake at that time. More intensive index sampling of Northern Pike needs to be conducted to better understand sex ratio, using both indexing and commercial catch sampling, and changes should be monitored, possibly using sex ratio at age as a reference-point indicator.

Stock Status

Habitat and environmental conditions in Waterhen Lake are ideal for Northern Pike production. High water levels and regular inundation of the surrounding low wetlands will give maximum Northern Pike recruitment (Casselman and Lewis 1996). If water temperatures remain low, they are close to ideal although somewhat above optimum (Casselman 1978). The lake is shallow and heavily vegetated, producing ideal nursery and growth habitat (MCWS 2013). As long as the lake does not warm appreciably due to climate change and does not winterkill because of increased macrophyte production,

the Northern Pike population should remain highly productive. Approximately a third of the total annual harvest between 2008 and 2012 was Northern Pike.

Very limited information exists concerning the current status of the stock other than what has been detailed above. From the limited data provided by Pellissier (2012), growth rate appears to be average. Maturity appears to be moderately young, typical of the species. Indeed, given the ability of Northern Pike to mature at a younger age when heavily exploited, it is unlikely that recruitment overfishing would occur from this type of fishery (see details above). Fishing mortality under existing conditions does not appear to be unduly high. Cormorants are present on the lake and can be a significant predator on young Northern Pike.

Seasonal activity patterns affect seasonal sampling and can affect the ability to assess stock structure and status, particularly when using passive sampling gear such as gill nets (Casselman 1975). It is particularly important to take sex of the Northern Pike into consideration when assessing stock structure and status. More intensive index sampling, as well as commercial-catch sampling, is needed to provide the data necessary to determine the status and dynamics of the sexes, particularly important when a winter fishery is conducted, and can be very selective in the harvest of Northern Pike by size, age, and sex.

Reference Points

Reference points have not been developed for Northern Pike. It has been generally concluded in the past that the harvest control rules applied to Walleye were adequate to afford a sustainable Northern Pike fishery. Northern Pike are the primary piscivore in the lake, and if the incidental harvest created by a targeted Walleye fishery can in any way result in an altered size structure in the Northern Pike population, then specific harvest control rules should be applied to Northern Pike. Indeed, it would be a good management practice to establish reference points. This should be done if Northern Pike becomes a more valuable species due to a targeted roe fishery.

As pointed out in the Strategic Plan for Ontario Fisheries report on identification of overexploitation (OMNR 1983), various indicators should be used in combination to assess exploitation. The report recommends yield, abundance, age structure, total mortality, mean age of the catch, variation in year-class strength, growth, and age at first maturity. Other indicators should also be considered, such as spawning-stock biomass and changes in sex ratio with age.

Harvest of Northern Pike is more variable than that of Walleye; this reinforces the need to acquire specific fisheries-independent assessment data that can be used to develop species-specific performance indicators and reference points. Using these and managing this keystone piscivore is particularly important in maintaining fish-community stability and sustainable fisheries, including those associated with the more valuable walleye. Selective mortality in Northern Pike needs to be monitored, using both index and commercial catch data, and reduced or at least managed very carefully where possible. This is especially important if in the future the commercial Northern Pike fishery targets large, gravid females for roe. Changes in sex ratio with age in esocids provide a valuable way of quantifying and assessing changes in exploitation (Casselman 2013, presentation to American Fisheries Society, Little Rock, Arkansas) and can signal important changes in relative abundance of mature females with age.

Harvest Strategy

Northern Pike populations and their fisheries have been studied fairly extensively. There are long-term studies that can provide useful insights that can be related to the commercial fishery of Waterhen Lake. In a 20-yr study of Northern Pike in Lac la Ronge, Saskatchewan, Koshinsky (1970) reported that in locations of intense fishing, there was selective removal of large Northern Pike and a substantial increase in prey-fish abundance. Indeed, in Lac la Ronge in the 1950s and 1960s, resurgence in abundance of yellow perch and white suckers in some locations was linked with overexploitation of Northern Pike. Considering the inshore area <10 m deep, an annual harvest of 1.48 kg/ha/yr was sustainable. Koshinsky emphasized the importance of utilizing coarse fish as is being done in the commercial fishery of Waterhen Lake. Koshinsky concluded that only 0.45 kg/ha/yr could be harvested if the population were not to be altered significantly. This was only approximately 30% of what was deemed to be the harvest that could be taken from a sustainable Northern Pike fishery. This level of exploitation would not significantly alter size structure of the population, leaving appreciable numbers of large Northern Pike to control prey fish, including small Northern Pike. Such predation was considered necessary to maintain a stable prey-fish community.

Since the auditors recommended that a Walleye harvest of 1.0 kg/ha/yr would be sustainable in Waterhen Lake, it is possible to use yield partitioning of the commercial catch to estimate crudely what might be a sustainable harvest of Northern Pike. A detailed study by OMNR SPOF Working Group 12 (1982) of partitioning overall potential yield from the morphoedaphic index (Ryder 1965, 1978) permits an examination of allowable yield for Northern Pike in relation to Walleye. In that review, it was suggested that commercial yields as a per cent of potential yield were 20% for Walleye compared with 10–20% for Northern Pike. This range for Northern Pike suggests that a harvest of 1.0 kg/ha/yr would be sustainable but that it might, indeed, be half that if the harvest strategy was to maintain adequate numbers to have a targeted fishery for large Pike. This is similar to results from Lac la Ronge, where Koshinsky (1970) recommended that only 0.45 kg/ha/yr should be harvested if the structure of the Northern Pike population was to remain unimpaired, with adequate numbers of large Northern Pike.

Commercial harvest data exist for a 22-yr period from 1991 to 2012 for Waterhen Lake (Park 2010, updated to 2012 by W. Galbraith). During that time, mean annual harvest of Northern Pike was 15,616 ± 9,423 kg (± 95% CI), representing 22.3 ± 7.3% of the total commercial harvest. Assuming that the area of Waterhen Lake is 27,000 ha, this harvest per unit

area is 0.58 ± 0.35 kg/ha/yr. When harvests of Northern Pike and Walleye for the period (excluding two abnormal years, high for Northern Pike in 1992 and low for Walleye in 2003) were log-transformed, they were highly significantly positively correlated (N = 20, r^2 = 0.56, P = 0.0001). When comparing harvest of Northern Pike relative to that of Walleye in Waterhen Lake for this 20-yr period, on an average annual basis it was somewhat less (0.86 ± 0.34). Over the 22-yr period, Northern Pike harvest was twice as variable as that of the target species, Northern Pike (CV = 136 vs. 66%, 2.1x).

Since harvest-strategy performance indicators for the target species, Walleye, focus on the four years from 2009 to 2012 (MCWS 2013), it is most appropriate to examine the same timeframe for Northern Pike. Annual rate of exploitation before this period, from 1991 to 2008, was 0.51 kg/ha/yr for Northern Pike and 0.54 kg/ha/yr for Walleye. However, during the 4-yr period from 2009 to 2012, harvest was considerably higher, 0.87 kg/ha/yr for Northern Pike and 0.96 kg/ha/yr for Walleye. The reason for this increase is unknown; in fact, harvest was uniformly high and relatively stable for both species back to the mid-2000s. It is known that fish production and abundance correlate with water level, particularly for Northern Pike (Casselman & Lewis 1996). There is cursory evidence that flooding was prevalent during the period and that high water levels might have been involved. Nevertheless, such environmental factors could be important and should be taken into consideration when managing commercial fisheries that involve Northern Pike.

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As pointed out in the Strategic Plan for Ontario Fisheries report on identification of overexploitation (OMNR 1983), various indicators should be used in combination. The report recommends yield, abundance, age structure, total mortality, mean age of the catch, variation in year-class strength, growth, and age at first maturity. Other indicators should also be considered, such as spawning-stock biomass and changes in sex ratio with age.

Koshinsky (1970) emphasized that there were various methods of estimating sustainable harvest of Northern Pike but that, in reality, many were unreliable when tested on Northern Pike in Lac la Ronge. This was strong evidence that sustainable harvest should be specifically calculated for the water body of interest. Also, it is apparent from the review conducted here that at the present time, there is inadequate data, on either the Northern Pike population of Waterhen Lake or its commercial fishery, to evaluate the level of exploitation and its sustainability. This reinforces the recommendation to acquire direct information concerning rate of exploitation appropriate to maintaining a sustainable harvest of Northern Pike while maintaining a well-balanced prey-fish community, especially if there were a need to manage a Northern Pike roe fishery that targets maturing females.

Harvest Control Rules & Tools

Northern Pike is a retained by catch in the Waterhen Lake Walleye winter commercial gill-net fishery (MCWS 2013). It is considered that minimum mesh size limits and harvest control rules in place to govern the Walleye fishery permit a sustainable fishery for Northern Pike (MCWS 2013) and the Northern Pike harvest is at a sustainable level. However, if Northern Pike became a more valued commodity, selective harvest, either by location or by season, could result in selective removal of larger individuals. As indicated previously, there would be little concern about collapsing the Northern Pike population, but its role as a primary fish predator might be impaired and harvest control rules and tools should be used to ensure that this does not occur. The role of Northern Pike in the fish community is important enough that they should not be managed by default.

At the present time, there is inadequate information on the Northern Pike population of Waterhen Lake to develop and evaluate harvest control rules. In addition to the aforementioned recommendations concerning conducting adequate index sampling that more specifically assesses Northern Pike, it should be emphasized that commercial-catch sampling of Northern Pike should be conducted throughout the fishing season, acquiring a typical harvest sample to describe all appropriate biological parameters on the catch, as indicated above, and that this be conducted and examined on a spatial and temporal basis. Temporal sampling, possibly on a bi-weekly basis, should be conducted to specifically monitor the harvest. Control rules similar to those used for Walleye should be developed and implemented; possibly including additional indicators as described earlier, e.g., changes in sex ratio at age.

A spring trap-net commercial fishery could be used to stabilize and balance the fish community through selective removal of small Northern Pike, suckers, and large perch. A somewhat similar program has been implemented elsewhere in Manitoba, referred to as the “spring creek mullet fishery” (W. Galbraith, MCWS, personal communication). It might be assumed that switching to finer mesh sizes (e.g., 76 mm) in the commercial gill nets could accomplish the necessary fish-community adjustments. This has been attempted in the past in Waterhen Lake but appears to have been unsuccessful. Finer-mesh gill nets would simply remove more large Northern Pike, increasing the abundance of small Northern Pike, accentuating the problem, and possibly even increasing predation on small Walleye. Considering the expected response of the Northern Pike population of Waterhen Lake, decreasing mesh size of the commercial gill nets would not accomplish the desired outcome. A more selective type of harvest would be needed. Historically, spring coarse-fish removal programs have been conducted quite successfully in Ontario, using live capture and sorting the

catch of large Great Lakes trap nets. These helped balance fish communities that were being selectively fished for large-bodied predators (Whitfield 1956). To ensure a sustainable Walleye and Northern Pike fishery in Waterhen Lake, the Lake Waterhen Fishers Association could cooperatively conduct a similar type of spring netting program that commercially harvests and reduces selected prey-fish species and sizes. **It is recommended that a spring live-capture trap-net commercial fishery be considered and, if necessary, used to reduce disproportionately abundant prey fish, including small Northern Pike, to maintain a sustainable, high-quality commercial Walleye and Northern Pike harvest.**

While Northern Pike are a substantial part of the Waterhen Lake commercial catch, as their value is only about one-quarter of that for Walleye (MCWS 2013), currently it is an incidental non-targeted species. Since Walleye is the primary target species, mesh size of the primary fishery is predetermined at 96 mm, and the associated Walleye harvest rule seems appropriate for Northern Pike because if changes are made, only coarser mesh would be used. If finer mesh were used, it would result in increased harvest of large Northern Pike, which would be undesirable because it would result in an increasing loss of the predatory services that the larger fish perform. As discussed above, it has been suggested that the primary fishery is at the south end of Waterhen Lake, not where Northern Pike are most abundant. If the fishery were to move to the north end of the lake, where Northern Pike apparently are more abundant, targeted effort could occur and could be quite selective for large, mature females, particularly if it were conducted late in the season when mature, large fish would be more active and vulnerable.

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Stock Assessment

Indexing methods should be developed to assess the Northern Pike population. Harvest control rules should be established, which would have a temporal and spatial component. Commercial-catch sampling should be conducted routinely. Index sampling, which can be conducted in conjunction with the FWIN program, has been discussed previously. It has been recommended that to better understand stock structure and status in Waterhen Lake, sampling effort should be increased to catch at least 200 Northern Pike as part of the indexing program. This would be most efficiently conducted by including species-specific gill-net effort, possibly considering location (more vegetated areas), depth (shallower), and type of net (colour) so as to better index the Northern Pike population. Also, better biological data needs to be acquired for age, growth, sex, stage of maturity, and possibly stomach contents. Incorporating the cleithral method of interpreting age and growth and back-calculating size-at-age would greatly increase accuracy and precision. Annuli can be more precisely measured on cleithral bones than almost any other esocid calcified structure, particularly opercula (Casselman 1996).

Northern Pike are strongly piscivorous and are often baited into fine-mesh gill nets by the presence of entangled prey fish, so gill-net selectivity curves for this species often deviate considerably from the conventional gilling and wedging distributions. The commercial gill nets used to fish Northern Pike in Waterhen Lake seem, on cursory observation, to be unique by colour, type of twine, and possibly even hanging ratio**.** It is important to know whether the selectivity of the commercial nets is similar to standard index nets. It has been recommended that assessment be conducted using these specific nets to determine gill-net selectivity for Northern Pike and that selectivity curves be prepared and considered when designing performance indicators.

Changes in growth rate within a population can provide useful evidence for changes in exploitation rate. In addition, accurate age interpretation is critically important, since age is used in five of the seven major parameters available to examine changes in exploitation and overexploitation: age structure, mortality estimates, variation in year-class strength, growth, and age at first maturity (OMNR 1983). It has been recommended that validated procedures of accurately interpreting age and growth be used, probably using the cleithral method, in routine indexing and commercial catch sampling and that size-at-age be compared with growth standards that have been provided for Northern Pike (Casselman 1996).

If temperatures increase substantially, Northern Pike growth, recruitment, and production would be reduced, particularly if midsummer temperatures significantly exceeded the optimum and if water levels decreased because of drought; these could also exacerbate winter oxygen depletion, which could become an important concern. It has been recommended that water temperature and water quality, particularly winter oxygen levels, be measured routinely in Waterhen Lake.

2.4 Principle Two: Ecosystem Background

Retained Catch & By-catch

Walleye, Northern Pike and Mullet are the only main retained species of the commercial gill net operation; the first two are subject of this MSC assessment process. While Yellow Perch (*Perca flavescens*) made up more than 5 % of the

harvest when the 76 mm fishery was operating this is no longer the case. There is a limited take of Lake Whitefish (*Coregonus clupeaformis*) and Sauger (*Sander canadensis*).

In Manitoba, mullet is the common name for any combination of species in the genera *Catostomus* and *Moxostoma*. In Waterhen Lake, mullet refers to White Sucker (*Catostomus commersoni*) and Shorthead Redhorse (*Moxostoma macrolepidotum*). The latter is called "red fin mullet" that averaged 7.4% of the total mullet registered in the four years of index data from 2009 (MCWS information to auditors). Using this figure as a proxy, it may be concluded that the share of the species in the Waterhen Lake total catch was about 3 % which is under the MSC definition (catch greater than 5% of the total, high value or vulnerable) of a main species.

Mullet has low market value relative to the other two; the average prices paid by the Freshwater Fish Marketing Corporation (FFMC) between 2008 and 2012 were $3.13/kg for Walleye, $0.79/kg for Northern Pike, and $0.39/kg for mullet (MCWS 2013).

Due to competition, high White Sucker populations are sometimes considered to have a negative impact on Walleye and Yellow Perch (*Perca flavescens*) (Johnson 1977, Hayes *et al* 1992); so it could be expected that productive percid populations could negatively impact mullet. While this would generally be considered a good thing, a research plan has been developed to understand the impact of the Walleye harvest strategy on mullet.

White Sucker is a bottom feeder and has no preferential food options; it is highly adaptable to different habitats and changing environmental influences. Generally, however, they are found in small streams, rivers, and lakes.[3] The White Sucker is also relatively tolerant of turbid and polluted waters. It is a bottom feeder that sucks up bottom sediments and other organisms that may be located there. Sexual maturity arrives at three to eight years. In addition, White Sucker females grow faster, get larger and live longer than males. Female White Sucker reaches maturity at a length of 421 mm in Waterhen Lake. While this is the size at which they are susceptible to a 96 mm mesh, it is plausible to consider that the Waterhen Lake population continues because they are less susceptible to gill nets than Walleye, almost always being gilled by the net and rarely entangled. White Suckers usually grow to be 30-50 cm long. (Michigan 2013). The White Sucker usually spawns in shallow water or streams in April and May, which may possibly be initiated by temperature changes and runoff from early snow melt. It is not uncommon for two or more males to gather with one female, who releases up to 10,000 eggs that can be fertilized by the gathered males. Larger fish species such as Walleye, Northern Pike, catfish, Muskellunge, and Sauger prey on White Sucker. Birds such as cormorants, loons, kingfishers and herons eat young suckers. Ospreys and bald eagles take their share of suckers, too. Raccoons, bears, wolves or other large predators can eat adult suckers exposed during their spawning runs in small streams. Maximum life expectancy for White Suckers appears to be 17 years

In general terms, policy has been aimed at reducing White Sucker populations (e.g. Colby *et al* 1987, Brodeur *et al* 2001) as there appears to be an inverse relationship between its numbers and those of Walleye that is a much more valuable species. A reduced White Sucker population would be considered a success of the Walleye HS for Waterhen Lake; a functioning population of apex predators will limit White Sucker density (Bertolo & Magnan 2005).

Although MCWS does not consider that the sustainability of White Sucker under any threat from the Waterhen Lake fishery, a study is being planned for an undergraduate thesis project to better understand the demographics, growth, and susceptibility of White Sucker to the Waterhen Lake commercial fishery.

The Shorthead Redhorse is native to central and eastern North America. It inhabits small to large rivers and lakes, and lives in the benthic zone; feeding on benthic invertebrates and plant material. When spawning, it moves into more shallow streams and spawns over gravel or rocky shoals; it will also spawn in springs with swift moving water. The spawning season ranges from March to June, depending on location. In order to spawn, the water temperature has to be between 7° and 16° C. During spawning, females can produce anywhere from 18,000 to 44,000 eggs. It can take anywhere from 2 to 5, even 6 years for the species to become sexually mature. In northern areas of cooler water, growth rates tend to be lower than more southern, warmer areas. Shorthead Redhorse average life span also varies depending on location; in more northern locations with cooler water it can live to 17 + years. This species is not endangered or threatened and is not currently at risk. [4]

As the retention of mullet depends on the market conditions, there is a possibility of discarding when market conditions are not favourable.

Lake Whitefish is a species of freshwater Lake Whitefish from North America. Lake Whitefish are found throughout much of Canada and parts of the northern United States. Lake Whitefish spawn from September through January in water 2 m to 4m depth. In the autumn, mature Lake Whitefish enter the shallows to lay their eggs on shoals of rubble and gravel. Fish of larval and post-larval stages feed on plankton. Once the larvae reach 76–100 mm they switch to feeding on bottom-dwelling animals (snail, insect larvae, and fingernail clams) that they will consume for the remainder of their lives. In late June and July, some inland lake populations of ciscoes and Lake Whitefish leave the deep, cool waters to eat mayflies and midges. Lake Whitefish's natural predators include Burbot, Lake Trout, and Northern Pike. Lake Whitefish are poorly understood in Waterhen Lake, but sizes from young-of-the-year (~170 mm) to 493 mm Total Length occur in the MCWS index nets including gravid females. It is not known whether these fish are a Waterhen Lake stock or strays from nearby Lake Winnipegosis

[3] http://en.wikipedia.org/wiki/White_Sucker
[4] http://en.wikipedia.org/wiki/Shorthead_Redhorse

Yellow Perch is a freshwater perciform fish native to much of North America. Latitudinal variability in age, growth rates, and size have been observed among populations of Yellow Perch, likely resulting from differences in day-length and annual water temperatures.[5] Typically, northern populations of Yellow Perch live longer and grow to larger sizes. However, southern populations of Yellow Perch generally grow much faster. In many populations, Yellow Perch often live from 9 to 10 years, with adults generally ranging from 10 to 25 cm in length. The Yellow Perch has also been widely introduced for recreational and commercial fishing purposes. It has also been introduced to establish a forage base for bass and Walleye. Yellow Perch typically reach sexual maturity in 2 to 3 years for males and 3 to 4 years for females. Yellow Perch are iteroparous, spawning annually in the spring when water temperatures are between 2.0° and 18.6°C. Spawning is communal and typically occurs at night. Yellow Perch are oviparous, as eggs are fertilized externally. They are commonly found in the littoral zones of both large and small lakes, but also inhabit slow-moving rivers and streams, brackish waters, and ponds. Yellow Perch commonly reside in shallow water, but are occasionally found deeper than 15 m or on the bottom.

Sauger is a freshwater perciform fish of the family Percidae that resembles its close relative the Walleye.[6] Their historical range consisted of eastern U.S west of the Appalachian Mountains, mostly southern, central, and western U.S up into southern Canada. The species' distribution and range has decreased from historical ranges because of degraded and fragmented habitat conditions; distribution within its home range varies by time of year because they are a migratory fish species. The fish is more typical of rivers whereas Walleye are more common in lakes and reservoirs. In many parts of their range, Saugers are sympatric with Walleye; hybridization between the two is not unknown; the hybrids, referred to as saugeyes, exhibit traits of both species. Being intermediate in appearance between the two species, saugeyes are sometimes difficult to differentiate, but they generally carry the dark blotches characteristic of the Sauger. Saugers, however, are usually smaller and will better tolerate waters of higher turbidity than the Walleye. Saugers require warmer summer water temperatures of 20° to 28° C. The need for warm water temperatures is thought to affect the northern and western boundaries of their range. Saugers generally move downstream to spawn during March-May depending on where their home locations are. They move upstream to their home locations from April-July after their spawning period is over. Females prefer rocky substrate and pools to deposit their eggs. As females increase in length, egg quality and fecundity increase. However, it is thought that egg production begins to decline after age 6 in female Sauger. Sexual maturity is reached between 2 and 5 years old. Other measures of sexual maturity are related to size. A Sauger is considered to be an adult when it reaches 250-300 mm. Sauger feed on a variety of invertebrates and small fishes depending on the time of year and size of the Sauger. Sauger is most likely to be found in large rivers with deep pools with depths greater than 0.6 m. Saugers face many conservation issues because of migratory barriers, habitat loss, entrainment in irrigation canals, and overexploitation.

Two other species are discarded; Brown Bullhead (*Ameiurus nebulosus*) and Burbot (*Lota lota*).

The former is a fish of the Ictaluridae family that is widely distributed in North America. It is a species of bullhead catfish and is similar to the Black Bullhead (*Ameiurus melas*) and Yellow Bullhead (*Ameiurus natalis*).[7] The species thrives in a variety of habitats, including lakes and ponds with low oxygen and/or muddy conditions. They eat insects, leeches, snails, fish, clams, and many plants. Even though Brown Bullhead is native to parts of Manitoba, Waterhen Lake is not considered within the species' natural range of distribution. It is believed that Brown Bullhead were introduced into Waterhen Lake due to water control and water diversion measures which have propagated the spread the fish species outside of its natural range of distribution. Because of their spiny fins Brown Bullhead sometimes entangle in the mesh where it is sewn to the lead line. As Brown Bullheads are considered an aquatic invasive species and no management measures and /or are undertaken for its protection. Until 2012, a maximum of two bullheads were caught in the MCWS index nets. In the latter year, 40 were caught.

The latter is the only gadiform freshwater fish.[8] It is the only member of the genus Lota.[9] Burbot live in large, cold rivers, lakes, and reservoirs. During summer months, they are typically found in the colder water below the thermocline. As benthic fish, they tolerate an array of substrate types including mud, sand, rubble, boulder, silt, and gravel for feeding. As crepuscular fish, Burbot are active hunters at night. Burbot populations are adfluvial during the winter months, and they migrate to near-shore reefs and shoals to spawn, preferring spawning grounds of sand or gravel. Burbot reach sexual maturity between 4 and 7 years of age. Spawning season typically occurs between December and March, often under ice at extremely low temperatures ranging between 1° and 4° c. Though a relatively short season lasting from two to three weeks, Burbot will spawn multiple times, but not every year. Depending on body size, female Burbot fecundity ranges from 63,000 to 3.5 million eggs for each batch. Rate of growth, longevity, and age of sexual maturity of Burbot are strongly correlated of with water temperature: large, older individuals produce more eggs than small, younger individuals. Burbot reach adulthood, around 5 years old. Average length of Burbot at maturity is approximately 40 cm. Maximum length ranges between 30 and 60 cm, and weigh between 1 and 3 kg. Adult Burbot are primarily piscivores, preying on lamprey, Lake Whitefish, Arctic Grayling, Northern Pike, suckers, stickleback, Lake Trout, and Yellow Perch. Burbot are hardly susceptible to gillnetting. After 4 consecutive years, no Burbot have yet been captured in the MCWS index sets.

[5] http://en.wikipedia.org/wiki/Yellow_perch
[6] http://en.wikipedia.org/wiki/Sauger
[7] http://en.wikipedia.org/wiki/Brown_bullhead
[8] http://en.wikipedia.org/wiki/Burbot
[9] http://en.wikipedia.org/wiki/Burbot

The various by-catch are subject to the same minimum mesh size, yardage and season length as the Walleye fishery. It is felt that Walleye are the least resilient of all the species caught in the fishery and the conservation measures directed at Walleye offer protection for by-catch species.

While fishers are required to report retained catch, this not the case for the discards. As such, anecdotal information is the only source of information with respect to the species composition and quantities of discarded catch. Stakeholders reported that there is limited discarded by-catch in the gill net fishery; given the quota arrangements there is little incentive for high grading or "bushing" as landings of incidental catch do not impact the quota. Discarded fish, as well as the waste from dressing the commercial catch, is left on the ice to be consumed by birds and wild animals. As such in may be considered as a benefit to the ecosystem as it contributes to winter survival of some species. The gear itself has no interaction with animals and birds. Ornithologists have expressed no particular concerns over this fishery that implies little or no negative interaction with birds such as cormorants.

MCWS is in the process of implementing the use of commercial logbooks as an additional source of data collection used in the fishery. These commercial logbooks will record harvest that is either retained catch not sold through the FFMC or non-marketed catch that is either discarded by-catch or culled catch.

ETP Species

As stated in the FMP (MCWS 2013); "*The management of the Waterhen commercial gill net fishery is guided by regulations contained in the federally administered Species at Risk Act that provides the legal framework for the protection and recovery of species that are designated as endangered or threatened*".

Manitoba Conservation (2002) identified 6 fish species at risk in the Province: Silver Chub (*Marchybopsis storeriana*), Bigmouth Shiner (*Notropsis dorsalis*), Carmine Shiner (*Notropsis rubellus*), Bigmouth Buffalo (*Ictiobus cyprinellus*) and Northern Brook Lamprey (*Ichthyzon fosser*) and Chestnut Lamprey (*Ichthyzon castaneus*). None of these species are found in Waterhen Lake. Lake Sturgeon that has been under management since 1992 is not found in Waterhen Lake (MCWS 2012).

A number of animals and birds are considered ETP species under the Manitoba Endangered Species Act (see http://www.manitoba.ca/conservation/wildlife/sar/sarlist.html) but none of these are known to interact with the Waterhen Lake fishery. Accordingly, here are no known direct or indirect (e.g. disposal of fish waste; movement of vehicles) interactions between the fishery and ETP species.

"*If in the future a fish species found in the lake becomes listed under the Species at Risk Act, a recovery plan would be required. The recovery plan would be led by DFO and would include participation by MCWS and lake stakeholders such as commercial fishers. The recovery plan would outline detailed plans that would outline short-term objectives and long-term goals for protection, sustainability and recovery of the listed fish species*" (MCWS 2013).

Habitat

The Fisheries Inventory and Habitat Classification System (FIHCS) is said to be a comprehensive computer database system containing information specific to individual water bodies within the province. North/South Consultants Inc. was contracted by DFO to compile and synthesize information on 1,000 water bodies for addition in the FIHCS (Park 2010). The auditors did not review the type and quality of information on the database. Monitoring of habitat conditions in 400 water bodies in the Province is now possible with a new fisheries inventory and habitat classification system. This new computerized system created by Fisheries Branch shows the status of fish habitats, explains the causes and effects of impacts, and identifies water bodies in need of rehabilitation or enhancement (Park 2010 citing http://www.gov.mb.ca/conservation/annual-reports/soe/fish.html).

The profundal areas of Waterhen Lake have soft, organic and clay sediments; near-shore it is limestone cobble and gravel over sand and clay with emergent Phragmites and then bulrush to about 1 m.. Sparse beds of Potamogeton and denser clumps of Myriophyllum occur to depths of more than 2 m. Rocky sediments surrounding islands with cormorant rookeries are carpeted with attached, filamentous algae. Secchi depth was close to 1.5 m in 2012 and shallower in 2011, when much less macrophyte growth was apparent.

Habitat impacted by the fishery was determined to be minimal. Gill nets are considered passive gear with low habitat impacts. Nets are pulled between two basin holes 90 m apart. One could imagine the weights on the lead line (typically an ounce each) disturbing the soft sediments between the basin holes along a track perhaps 30 cm wide. Anchor "stones", made e.g. from soup cans filled with concrete, hold the ends of the net down at the basin holes are lowered straight up and down. The audit team agrees with Park (2010) that these interactions are not highly likely to reduce habitat structure to appoint where serious or irreversible harm is expected.

Discarded catch and offal from dressed fish is left on the ice surface where ravens and wolves clean it up.

While one of the principle behind the FMP (MCWS 2013) is "*Fish Habitat - Healthy aquatic ecosystems / fish habitat is a prerequisite to healthy fish stocks*" there is no description or analysis of habitat issues within the plan.

Ecosystem

Performance indicators related to ecosystem components examine the broad ecological community and ecosystem in which the fishery operates in order to assess the impact of the fishery on system wide issues including ecosystem structure, trophic relations and biodiversity.

As can be noted from above, in looking at the HS for Walleye and Northern Pike one has to consider the implications for the wider community.

Specific ecosystem studies have not been undertaken for Waterhen Lake. However, based on what is known from similar ecosystems in Manitoba, it is considered unlikely that the fishery under assessment disrupts key ecosystem elements such as trophic cascade, depletion of top predators, truncation of size composition or changes in genetic diversity.

Lost gear and the potential for ghost fishing can be a concern in some fisheries, with respect to impacts on ecosystem components, including upon target and non-target species. Stakeholders consider that there is minimal gear lost in the fishery, and ghost fishing is not a major concern. However, in the event that there is lost and unrecovered gear, e.g. caused by a rapid thaw and breaking up of ice, there is a policy in place to retrieve lost nets and gear that has been implemented and managed by commercial fishers since 1985.

One of the objectives of the FMP (MCWS 2013) is "*Fishing operations (commercial, recreational and domestic/subsistence) should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends*". However, this concern is not covered by specific analysis in the FMP although there is pending research on whether gillnetting through the ice has an impact on benthic invertebrate biomass and diversity.

2.5 Principle Three: Management System Background

Introduction

This section covers: (i) Governance and policy aspects of the fishery under assessment with the aim of assessing the broad, high-level context of the fishery management system for the fishery under consideration; and (ii) the fishery specific management system i.e. that relating to the Waterhen Lake fishery.

The Context of the Fishery Management System

PI 3.1.1 Legal and / or Customary Framework

Legal Basis

The British North America Act (1867), now the Constitution Act (1867), vests the legislative authority for the protection and conservation of seacoast and inland fisheries to the Parliament of Canada. In 1868, Parliament enacted the Fisheries Act to carry out this responsibility. The Minister of Marine and Fisheries was given the responsibility for the Fisheries Act.

Until 1930, the Government of Canada administered and controlled all Crown lands and resources in Manitoba, Alberta and Saskatchewan. The Constitution Act of 1930 transferred legal effect to the Natural Resources Transfer Agreements (NRTA) in each of the Prairie Provinces. These agreements provided administrative control of Crown lands and resources to provincial governments, thus providing Manitoba the ability to manage its freshwater fisheries.

Thus, Manitoba's freshwater fisheries are subject to a mixed federal and provincial jurisdiction. "*The Canadian Parliament has exclusive constitutional jurisdiction to make laws for the conservation of fish, including setting fishing seasons, quotas, size limits and gear restrictions, and does this under the authority of the Fisheries Act (Canada) and regulations to that Act. In the case of Manitoba, the Legislature of the Province maintains constitutional jurisdiction to make laws relating to the use and allocation of fish in Crown (Manitoba) waters as part of the public property. This includes the right to determine who can fish on provincial Crown land (licencing), what conditions may be included in a licence and what fee would be paid for the licence. This authority is exercised under The Fisheries Act of Manitoba and regulations to that Act. Simply, those matters dealing with the conservation of the fish resource are addressed by the Fisheries Act (Canada) and the Manitoba Fishery Regulations made under the Act. Those matters relating to property rights in fish on Manitoba Crown land (water) are covered by The Fisheries Act (Manitoba) and regulations to that Act*" (Manitoba ND). Ultimately "*while the Government of Canada retains legal authority and responsibility for fish and fish habitat conservation matters, some of the day to day management and administration of federal fisheries regulations has effectively been delegated to Manitoba officials: The Minister of Conservation and Water Stewardship, the Director of Fisheries and fishery officers employed by Manitoba. Under the Manitoba Fishery Regulations (Canada), the Minister of Water Stewardship and the Director of Fisheries have been given the authority to vary close times, quotas and gear types established under those regulations. Changes to the Manitoba Fishery Regulations (Canada) are proposed by the Minister of Conservation and Water Stewardship to Fisheries and Oceans Canada. Fisheries and Oceans Canada then reviews the proposed changes and forwards them for approval by Federal Cabinet (Governor in Council). Legislative responsibility for management of fish habitat has not been specifically legislatively delegated to Manitoba officials. However, Manitoba Conservation and Water Stewardship continues to manage habitat as an adjunct to other fish management activities*".

The "*Canadian Code of Conduct for Responsible Fishing Operations*" (DFO 1998) outlines the general principles and guidelines for all commercial fishing operations that take place in Canadian waters based on the FAO "*Code of Conduct for Responsible Fisheries*". As such the principles and guidelines form the basis for fishery management planning on a national basis. The most important in relation to the Waterhen fishery refer to the need for fish harvesters to take appropriate measures to ensure fisheries are harvested and managed responsibly to safeguard sustainable use of

Canada's freshwater and marine resources and their habitats for present and future generations of Canadians, the importance of ecological sustainability and shared responsibility for stewardship, the need to implement and comply with regulations, the promotion of public awareness of the need for responsible fishing, the use of fishers' knowledge in generating scientific advice and developing fishery management policies and regulations. Attached to these principles are 36 guidelines.[10]

Since 2006, DFO has initiated various activities with the intent to place conservation and sustainable use of the fishery as a top management priority. In 2009, DFO adopted the Sustainable Fisheries Framework (SFF) that "*provides the basis for ensuring Canadian fisheries are conducted in a manner which support conservation and sustainable use*" (DFO 2012a).The SFF "*provides the foundation of an ecosystem-based and precautionary approach to fisheries management in Canada with new tools and policies being developed and implemented progressively over time*".

The *Species at Risk Act* (SARA) (2003) provides a framework for actions across Canada to promote the survival of wildlife species and the protection of the natural heritage. It sets out how to decide which species are a priority for action and what to do to protect a species. It identifies ways governments, organizations and individuals can work together, and it establishes penalties for failures to obey the law. Two federal Ministers are responsible for the administration of SARA. The Minister of Fisheries and Oceans is the competent Minister for aquatic species. The Minister of the Environment is the competent Minister for all other species at risk, including those found in national parks, national historic sites and other protected heritage areas. The Minister of the Environment is also responsible for the overall administration of SARA. SARA protects the plants and animals included on a list in Schedule 1; which is also referred to as the List of Wildlife Species at Risk. Candidate species are proposed for addition to the SARA List as a result of the work of the scientists and conservationists who are members of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). They conduct scientific assessments of the status of species. Community and Aboriginal traditional knowledge are included in species assessments when available. The Government decides which species are added to the SARA List.

Resolution of Disputes & Court Challenges

In Canada the Minister of Fisheries and Oceans has broad discretionary powers and the decisions are often the result of balancing interests, backed by strong public policy (Lawseth). This also applies to the responsible Minister in the Province. The Federal and Provincial management system is well defined by the legislation and FMPs. Disputes can be proactively resolved through the management arrangements that seek improved compliance with regulations and safer fishing practices and put in place joint scientific, monitoring, and enforcement programmes.

The ultimate appeal of last resort is to the Minister of Conservation and Water Stewardship in Manitoba and the Minister of Fisheries at the Federal level. These are the final authorities under Canadian legislation. Where parties are not satisfied with the decision of the Minister they have the right to redress through the Federal Court and Federal Court of Appeal system. There have been some examples of this at the Federal level: ((*R. v. Sparrow*, [1990],[11] *R. v. Marshall (No. 1)* [1999],[12] and *R. v Larocque* [2006][13]; and the Ecology Action Centre Society v Attorney General of Canada[14]. The confirmation of FN rights points to DFO compliance with binding judicial decisions. The Canadian Government's Aboriginal Fisheries Strategy (AFS) was established in 1992 to implement the Supreme Court of Canada's "Sparrow Decision". In response to that decision, DFO implemented the Initial Marshall Response Initiative in 2000. In 2001, DFO introduced the longer-term Marshall Response Initiative (MRI).

The auditors did not identify any cases at the Provincial level. Constitutional duties to First nations have to be fulfilled (see Ross River Dena Council *v* Government of Yukon http://manitobawildlands.org/lands_aborig_court.htm).

DFO seeks to be proactive in order to reduce the risk of legal disputes. Legal Services lawyers participate on DFO management and other committees and working groups. In addition, DFO managers and employees request legal advice or opinions on the legality of DFO programs, activities and policies from Legal Services and Justice regional advisory lawyers.

Similarly, MCWS is proactive. In 2012, The Fisheries Science group that is responsible *inter alia* for evaluating the impact of all project development in Manitoba on its fisheries resources reviewed 257 development proposals.[15]

[10] For example, guideline 1 states "*Apply sustainable fishing principles and sustainable fisheries development to all aspects of fish harvesting and management of fisheries*" and guideline 5 is "*Establish fisheries policies in full consultation with management and other regulatory agencies to ensure conservation of fish resources and protection of the environment*".

[11] 1 S.C.R. 1075 was a decision of the Supreme Court of Canada concerning the application of Aboriginal rights under section 35(1) of the Constitution Act, 1982. The Court held that Aboriginal rights, such as fishing, that were in existence in 1982 are protected under the Constitution of Canada and cannot be infringed without justification on account of the government's fiduciary duty to the Aboriginal peoples of Canada. http://en.wikipedia.org/wiki/R._v._Sparrow

[12] The Court held in the first decision that the famous Donald Marshall's catching and selling of eels was valid under 1760 and 1761 treaties between the Mi'kmaq and Britain, and that federal fishery regulations governing a closed fishing season and the regulating and the requirement of licenses to fish and sell the catch would infringe the treaty right. In the second decision the Court elaborated the extension of Aboriginal treaty rights stating that they are still subject to Canadian law. http://en.wikipedia.org/wiki/R._v._Marshall. http://reports.fja.gc.ca/eng/1999/1999fc24617.html

[13] It was ruled that the Minister of Fisheries and Oceans did not have the power to finance his Department's scientific research by issuing licences to fish and sell snow crab. http://www.fishharvesterspecheurs.ca/product/larocque-supreme-court-decision

[14] http://reports.fja.gc.ca/eng/2005/2004fc1087.html

[15] 39 proposals related to The Environment Act; 30 draft licences, 12 pre-licensing environmental screening proposals and one Environmental Impact Assessment; and another 175 proposals with potential implications for aquatic ecosystems. (MCWS 2012a).

Legal Rights

The NRTA provides that Indian people have the right to hunt, trap and fish game and fish for food all year in all lands where they have a right of access. Such rights are recognized and affirmed as part of the Constitution of Canada by Section 35 of the Constitution Act, 1982.[16]

The Aboriginal Fisheries Strategy (AFS) of 1992 provides the framework for the management of fisheries in compliance with the Sparrow decision. DFO negotiates annual agreements with Aboriginal groups that provide communal food, social and ceremonial fishing opportunities, co-operative management arrangements and economic development opportunities. Commercial communal licences have been provided to Aboriginal groups under the Allocation Transfer Programme. (DFO 2003).

Consultation, Roles & Responsibilities

Organisations and Individuals in the Management Process

A number of organisations and individuals involved in the management process in Manitoba have been identified that supports active stakeholder participation in the fishery management process.

The DFO's legislated mandate in fresh waters includes: management and control of the fisheries; and conservation, protection and restoration of fish and fish habitat.

The DFO mandate in fresh waters is implemented through agreements with provincial and territorial governments and other federal departments and this results in the shared stewardship of freshwater resources result. A fundamental aspect of policy and its implementation is confirmation of roles and responsibilities for freshwater fisheries management. For its part, the federal government sets national standards for fish habitat management; conduct scientific research to provide information for the conservation, restoration and development of fish habitats; and promote and encourage the participation of the public and private sectors and other interests in integrated resource planning and conservation of fish habitats. (DFO 1999). In this framework the remit of the Fisheries Branch of MCWS is the sustainable development of Manitoban fisheries resources to the benefit of citizens in general by maintaining sustainability and efficiently allocating available resources. (MCWS 2012a). The Recreational and Commercial Fisheries Management Section "develops, administers, and evaluates management programs and policies in the fisheries to ensure their integrated implementation to support resource sustainability of and the maximisation of related benefit. The Regional Fisheries Management Section implements regional fisheries programmes at a regional level covering sustainability, effective enforcement and strong consultation with stakeholders. Th FFMC is a federal crown corporation established under the Freshwater Fish Marketing Act in 1969. It has exclusive jurisdiction over the export and interprovincial sales of commercially harvested fish. Local user groups are involved in the management of specific water bodies. The Lake Waterhen Fishermen's' Association has developed a series of by-laws pertaining to the commercial net harvest within the lake.

Consultation Processes

In 2012, DFO concluded that in the Integrated Fisheries Resource Management Program Activity the *engagement of stakeholders in harvest decision-making is significant and includes annual consultations with stakeholders on management plans. However, few fisheries (29%) evaluated the effectiveness of the stakeholder engagement process is effective, and no official surveys have been undertaken to determine the effectiveness of national stakeholder feedback*". (DFO 2012a) The DFO Fishery Checklist indicated that there is a good governance regime to manage fisheries including stakeholder participation.[17]

Two of the Goals of the Aboriginal Relations Branch of MCWS are: lead or coordinate initiatives to manage natural resources in cooperation with Aboriginal communities; and develop, with Aboriginal people, a strategy for the development of agreements between Aboriginal people and Manitoba Conservation (MCWS 2012a).

In Manitoba, MCWS reports having "*developed and coordinated natural resource policy issues associated with First Nations, Metis and other Aboriginal communities*" in 2012 (MCWS 2012a). Some of the key results achieved by the Fisheries Branch in 2012 were "*Review of fisheries governance … to assure contemporary approaches to partnering and collaboration on management activities with key interest groups; Regulatory variances...to address season opening and closing dates and quota adjustments for sustainability purposes; input to policy development in key areas, particularly Aboriginal consultation, and eco-certification; Integrated planning continued by involving user groups through the work of the Fisheries Enhancement Fund Project Review Committee in Branch planning exercises. This process contributed to the key principle of user group involvement in developing fish management strategies*".

Long-term Objectives

DFO's freshwater activities adhere to the department's sustainable development principles as stated in *Sustainable Development – A Framework for Action*: shared stewardship, integrated management, an ecosystems approach, continuous improvement, the precautionary approach, and pollution prevention. Freshwater fisheries management

[16] http://www.gov.mb.ca/conservation/firstnations/index.html

[17] In 2008, the Checklist reported that stakeholders had the opportunity to participate in the collection of information for 100 stocks (92%), in decision making for 97 stocks (89%) and in the stock assessment process for 80 stocks (73%). The 2009 Checklist reported that stakeholders have the opportunity to participate in the collection of information for 117 stocks (97.5%), in decision making for 114 stocks (95.0%) and the stock assessment process for 93 stocks (77.5%). However, there is no process in place to evaluate the effectiveness of the engagement with stakeholders".

activities include some or all of: fisheries policy, planning and legislation; integrated fishery management plans; fiduciary responsibilities; allocation; licensing; harvest monitoring; compliance monitoring and enforcement; fishing industry analysis; and fisheries management administration (DFO 1999).

DFO's Sustainable Development Strategy (SDS) is an overarching policy to ensure sustainability in Canada's fisheries. One of the specific outcomes of SDS is a new fisheries management governance model to meet the needs of an evolving industry, recognizing principles of sustainable development, as well as the precautionary and ecosystem approach. DFO is preparing other policies on benthos, forage species and the precautionary approach.

Five strategies are proposed as the means for the Government of Canada to contribute to the attainment of the national freshwater goals: *Partnership with the Provinces and Territories*; *Science and Technology; Public Participation and Community Action; Legislation and Regulation;* and *Market Instruments.*

As described in MCWS (2013), the mandate of MCWS is to meet its Public Trust obligations by ensuring the rational, orderly use of the Province's fisheries resource within the resources' capacity to produce harvestable surplus. In achieving this mandate the goals are to: ensure "No Net Loss" of quality and quantity of fish habitats; ensure that adequate supply exists to meet Constitutional obligations for Aboriginals to fish for food; have sustainable community supported fishery management strategies; provide a diversity of angling opportunities; provide consistent, professional, high quality service to our clients and recommendations to elected decision makers; and facilitate public participation in resource management and decision making process.

MCWS (2013) specifically considers the precautionary principle. "*Management decisions and actions, whose impacts are not entirely certain but which, on reasonable and well informed grounds appear to pose serious threats to either the economy, the environment, human health or social well-being will be anticipated, mitigated and prevented as avoidance of serious threats to the fishery is less costly than rehabilitating a collapsed fish stock*".

Examples where MCWS has employed a precautionary approach in its decision-making process and management actions are: Exclusion of Channel Catfish for commercial harvest under Special Dealers Licences until an assessment of possible impacts on the fishery resource have been considered (case by case review); not licensing a Spring Mullet (*Catastomus commersoni*) harvest on tributaries of Lake Winnipegosis in the spring of 2004 due to concerns that the season posed a serious disruption to the Walleye spawning run and recruitment success; as well as, impacting the overall sustainability of the lake's ecosystem; in 2008/2009 the 76 mm mesh Yellow Perch fishery was discontinued as part of the Manitoba's commitment to the rehabilitation of the Lake Winnipegosis Walleye stock; as well as, supporting efforts to help address Walleye recruitment challenges and assist in the long-term recovery towards a sustainable fishery; the definition of an FMP is response to Lake Manitoba Commercial Fisherman's Association proposed a number of recommendations including the establishment of a fall open water commercial fishery, re-assignment of existing Walleye quota, and other administrative processes; and in 2010, MCWS declined a request made by commercial fishers for a winter season extension from March 15th to March 31st for the south basin of Lake Manitoba due to on-going concerns about spawning stock resource conservation (primarily pre-spawn Walleye); the need to involve other stakeholders in lake management decisions; and the lack of a fisheries lake management plan.

Economic & Social Incentives for Sustainable Fishing

Incentives

MCWS approach on policy is aimed at establishing sustainable economic efficiency in the Waterhen Lake fishery in the context of the sustainable commercial harvest of the available fish. Restrictive licensing and the lake quota established in full consultation with local fishers provide a sense of ownership of the Waterhen Lake fish resources. This is extended to a wider level through the inclusion of Chitek and Inland lakes as part of a HS designed to ensure sustainable effort. Established license rights provide an incentive for sustainable fishing especially as there are no additional fishers allowed. While there is a fuel subsidy (exemption from Provincial tax) this cannot be regarded as a perverse subsidy that encourage fishermen to fish unsustainably as the catch is limited by quota; indeed it may be considered that any increased profit may be an inducement to sustainable harvesting practises. As detailed in the "*Commercial Net Fishing Program Plan*" while economic assistance may be provided when circumstances dictate through the employment insurance and NFFA, "*in a fully allocated fishery, assistance should not be provided by granting increased access to fish harvest as this diminishes natural capital and represents a future liability for Manitobans….*". The minimum mesh size regulations are effective in maintaining the spawning stock. Sanctions are applied to when there is an infringement of regulations and these provide a further incentive to sustainable fishing through respect for regulations.

Subsidies

While in Manitoba certain lakes are eligible for assistance under the Northern Fishermen's Freight Assistance Program[18] Waterhen Lake is not an eligible water body.

The Fisheries Loans Program administered by the Communities Economic Development Fund provides loans on commercial terms to businesses and individuals involved in commercial harvesting and processing in Manitoba. Commercial fisheries are eligible for employment insurance if they meet the qualification criteria which are based on insured earnings.

[18] Designed to assist marginally viable commercial fishing operations through partial subsidization of the cost of transporting selected fish species from lakeside to Winnipeg.

The Fishery Specific Management System

As detailed in MCWS (2013) the management of the Waterhen Lake commercial gillnet fishery is based on three objectives:

1. The fishery must be conducted in a manner that does not lead to over-fishing or depletion of the harvested populations and, for those populations that are depleted the fishery must be conducted in a manner that demonstrates activities leading to stock recovery.
2. Fishing operations (commercial, recreational and domestic/subsistence) should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.
3. The fishery is subject to an effective management system that incorporates applicable federal and provincial legislation, policies and regulations and operational frameworks that require use of the resource to be responsible and sustainable.

The related decision making process is based on seven principles:

1. Fish Habitat - Healthy aquatic ecosystems / fish habitat is a prerequisite to healthy fish stocks;
2. Public Trust - Fish stocks are "natural capital" and represent a public "trust" managed by Manitoba on behalf of all Manitobans;
3. Biological sustainability – Sustainability of fish stocks is paramount for long-term industry viability;
4. Pre-cautionary Principle - Fish management decisions and actions, whose impacts are not entirely certain but which, on reasonable and well informed grounds appear to pose serious threats to either the economy, the environment, human health or social well-being will be anticipated, mitigated and prevented as avoidance of serious threats to the fishery is less costly than rehabilitating a collapsed fish stock;
5. Integrated Management - Consultation with government agencies, development proponents, fishers and the public will enhance awareness and understanding and the efficiency of fisheries management;
6. Tenure - Individual allocations and tenure of access right will reduce over-capitalization and facilitate fishery rationalization; and
7. Fairness - Where adjustments to tenure or reallocation to another use or user is necessary, a fair process will facilitate transition to a desired state.

The Outcome of Decision-making Processes

On average, there are four formal meetings between MCWS and fishers each year to discuss a variety of issues. In recent years the main topics have been agreement of the FMP and the eco-certification process. While there does not appear to have been a specific meeting to discuss resource status, given the approach of the MCWS this is done on an informal basis. Fishers provide advice to MCWS on the status of the stocks and potential management measures and MCWS takes this into consideration when considering the need for action. At the meeting with commercial fishers prior to the start of the commercial fishing season the status of the fishery and management measures are discussed.

Compliance and Enforcement

Within Manitoba, MCWS is responsible for all monitoring and enforcement activities related to fisheries. Monitoring of the commercial fishery on Waterhen Lake is through patrols on-the-ice with on-the-spot inspections of nets and catch, the review and confirmation of information submitted on FFMC reports to ensure compliance with the quota, and the revision of log books. During the winter season 4 to 5 patrols are conducted on Waterhen Lake; additional patrols are carried out if there has been a report of potential non-compliance. Non-compliance is subject to court proceedings with appropriate sanctions applied. The auditors were provided evidence that the sanctions are applied and are consistent. The main infractions are the license holder not taking part on the fishing trip, failure to mark gear and not tending nets. The sale of fish taken for subsistence or ceremonial reasons is not an issue.

The relatively small number of commercial harvesters and their willingness to work with MCWS is considered a contributing factor to the success of compliance on the lake. It appears clear that by-and-large fishermen respect the regulations in force. There anecdotal information on peer monitoring of fishing activities, with transgressions reported to MCWS. Harvesters are cooperative, they understand the situation when they are sanctioned and there is no evidence of systematic non-compliance within the fishery.

In addition to provincial regulations, the Lake Waterhen Fisheries Association has by-laws to govern the actions of members which may be enforced by the Association. For example, a member is found with spoiled fish they can be suspended from the Association, which would result in restricted access to the commercial fishery, as membership to the Association is required prior to issuance of a commercial licence (IMM 2010).

While MCWS is responsible for ensuring compliance with fishing activities, the federal Department of Fisheries and Oceans is the responsible body with respect to ensuring the sustainability and on-going productivity of commercial, recreational and aboriginal fisheries. This is done by ensuring no person can carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support that fishery. DFO has several provisions that allow for enhanced protection of important fisheries including fines and penalties for offences, inspector powers and a "duty to notify" which requires a person whose actions harm fish habitat to report it and take corrective measures.

Research Plan

To ensure that the management plan is being executed effectively and therefore achieving the desired results, monitoring of the Waterhen Lake fishery through the collection of data will be undertaken from a variety of different sources (MCWS 2013). This constitutes a formal research plan. The focus of the FMP's research strategy, subject to available resources, is to improve the quantity and quality of information pertaining to fish stock status, as well as, ecosystem structure and function, including habitat types.

- **Annual Index Netting**. Index netting is carried out each year in the month of September when water temperatures fall to between 10° and 15°c. Sites were randomly selected from a ¼ km grid according to the Fall Walleye Index Netting (FWIN) Protocol where 2.4 m on water or more was available. Single index nets are set at the same thirty sites each year. These nets are the North American standard gillnets as described in Bonar et al, 2009. Thirty repeated sets was determined to be appropriate by power analysis of the initial 2009 index data to detect a 20% decrease in catch-per-unit-effort (CPUE) (α = 0.1). Nets are soaked for approximately 16 hours covering two crepuscular periods. Weight and length are recorded for all fish caught. For Walleye, weight, length, sex, maturity and gut contents, if identifiable, are recorded annually.
- **Commercial Log Books**. Some commercial fishers complete and return log books which form one of the data collection tools used in the fishery. The log books record harvest that is either retained catch not sold through the FFMC or non-marketed catch that is either discarded by-catch or culled catch.
- **On-site (Basin Hole) Inspections**. Natural Resources Officers undertake on-site (basin hole) inspections as part of their compliance monitoring patrols during the commercial fishing season. A Commercial Fishery Patrol Report is completed to document all aspects of the patrol: date, time, weather, officers, locations and observations. Officers also record the number of fish and species of fish discarded at basin holes. Basin hole inspections started in the 2010/2011 season.

An important contributor to the effective protection of Waterhen Lake's aquatic ecosystem and sustainable management of its fishery resource is the data and knowledge obtained through a variety of past and on-going research activities. Such *ad hoc* is particularly important given the scale and the intensity of the fishery. In the last few decades, several research projects have been carried out on Waterhen Lake and / or its tributaries. These past studies focused principally on stock status, primarily Walleye, through conducting creel census surveys to determine harvest levels by recreational anglers; as well as, a Walleye tagging study to determine seasonal fish movement through the water system. In addition to these studies research, was also conducted on ecosystem health through the completion of a study that determined the level of mercury contamination in fishes from a variety of Manitoba waters, including Waterhen Lake.

Past research studies include:

- Derksen, A.J. 1979. A summary report of mercury contamination in fishes from Manitoba waters to March, 1971. Manitoba Department of Natural Resources. Fisheries Branch MS Report No. 79-55, 43 p.
- Edwards, G.A. and W. N. Howard. 1980. Little Waterhen River Fish Movement and Walleye Tagging Study, 1971-1972. Manitoba Department of Natural Resources. Fisheries Branch MS Report No. 80-8, 53 pp.
- Inland Waters Directorate, 1988. Historical Streamflow Summary Manitoba to 1987. Water Survey of Canada, Environment Canada, Ottawa.
- Valiant, H. 1978. Angler creel census in the Lake Winnipegosis, Waterhen, Lake Manitoba, and Dauphin areas in 1977 and 1978. Manitoba Department of Mines and Natural Resources, Environment MS Report No. 78-68, 88pp.
- Valiant, H. and T. I. Smith. 1979. Angler Creel Census in the Lake Winnipegosis, Waterhen, Lake Manitoba, and Dauphin Areas in 1977 and 1978. Manitoba Department of Natural Resources. Fisheries Branch MS Report No. 79-68, 88 pp.
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Other research studies include:

- A study is currently undertaken on Lake Winnipeg to determine whether different age female Walleye spawn synchronously or arrive at different times at spawning grounds.
- A study is being proposed to determine whether gillnetting through the ice has an impact on benthic invertebrate biomass and diversity.
- A study is being proposed to determine the age, growth and maturity of Moxostomos and Catostomus species to determine the sustainable stock status of these fish species in Waterhen Lake.

The availability of the research is not clear. The auditors performed a search on the key aspects of the research plan and were unable to identify a source that could be used by stakeholders interested in being informed of the results. The MCWS web site does not provide any link to the research results.

Information and analysis to support an understanding of the situation on Waterhen Lake is available. The Experimental Lakes Area (ELA) has a mandate to investigate the aquatic effects of a wide variety of stresses on lakes and their catchments. It uses the whole ecosystem approach and makes long-term, whole-lake investigations of freshwater

focusing on eutrophication. The ELA researchers have records for climatology, hydrology, and limnology based on whole-ecosystem experiments that address key issues in water management.[19] The Bayfield Institute has expertise in aquatic biology, freshwater fisheries and navigational charting. In conjunction with the Freshwater Institute in Winnipeg and the Sea Lamprey Control Centre in Sault Ste. Marie, Ontario, it serves as a focal point of scientific research in the Central and Arctic Regions of DFO.

Management Performance Evaluation

MCWS has made a number of proposals to evaluate whether or not the FMP is achieving its goals. There will be a complete post season analysis session with all pertinent resource users/stakeholders to review the previous year's fishing activities and to recommendations on improving management measures.

A variety of management, science and enforcement performance indicators will be used to review performance, the quality of data obtained from Commercial Log Books, the quality of data obtained from the Commercial Fishery Patrol Reports and the measure of population status obtained through the annual index netting program. The output will be an annual stock assessment report detailing the state of the Waterhen Lake fishery.

In addition, there will be an External Review *"conducted by fisheries professionals who possess the necessary knowledge and expertise with the sustainable management of freshwater fisheries*". The period covered by the FMP is not defined. **The audit team recommends that this external audit be completed in the third year of the MSC certification so that the results and the MCWS response are available to the team engaged in any re-certification. It is also recommended that the FMP be considered "evergreen" to reduce the need for future staff inputs.**

[19] http://en.wikipedia.org/wiki/Experimental_Lakes_Area

3. EVALUATION PROCEDURE

3.1 Harmonised Fishery Assessment

The fishery under assessment does not overlap with other MSC certifications.

3.2 Previous assessments

The fishery has not been previously assessed against the MSC standard.

3.3 Assessment Methodologies

MSC Certification Requirements Version 1.3, 14 January, 2013 was used to assess the fishery.

MSC Full Assessment Reporting Template V1.3 Date of issue: 14th January 2013 was used to produce the report.

The Default Assessment tree was used without adjustments. The RBF was used for PIs 1.1.1 for Northern Pike and PI 2.1.1 for both species.

Stakeholder comments and CAB responses are included in Appendix 3.

3.4 Evaluation Processes and Techniques

Site Visits

The site visit took place between Wednesday April 3 and Friday April 5, 2013. The audit team held initial meetings with MCWS and FFMC in Winnipeg. It then travelled to the Waterhen Lake area. Stakeholder meetings were arranged in Skownan First Nation and Mallard Hall. There were no participants in the second meeting. The audit team visited the FFMC packing shed in Winnipegosis. On their return to Winnipeg the team met with researchers at the University of Winnipeg. The scoring meeting took place in Winnipeg on Saturday, April 6, 2013. Subsequently, the team held a meeting with the client to cover issues and confirm the situation.

Consultations

The persons met and the issues covered are shown in table 5.

Table 5 Site Visit Meetings

April 3, 2013	MCWS	Ian Scott
		Peter Colby
		John Casselman
		Bill Galbraith
		Brian Parker
		Geoff Klein
		Rob Cann
		Gord Kirbyson
	FFMC	Ian Scott
		Peter Colby
		John Casselman
		Bill Galbraith
		Brian Parker
		Geoff Klein
		Rob Cann
		Gord Kirbyson
April 4, 2013	Winnipegosis	Ian Scott
		Peter Colby
		John Casselman
		Bill Galbraith
		Geoff Klein
	Waterhen	Gord Kirbyson
April 5, 2013	University	Ian Scott
		Peter Colby
		John Casselman
		Bill Galbraith
		Geoff Klein
		Scott Forbes
		Tim Pellissier
		Marianne Geisler,
April 6, 2013	Client Meeting	Ian Scott
		Peter Colby
		John Casselman
		Bill Galbraith
		Geoff Klein
		Rob Cann
		Gord Kirbyson

Evaluation Techniques

The media announcements were made according to the policy of the Moody Marine and Intertek.

The experts responsible for each Principle developed the rationale for the scoring and then presented them to other members of the team. Where there were discrepancies in opinions, the respective expert was asked to justify his scoring; on occasions this led to a change in the score and the scoring comments. Following the final drafting of the client report, individual team members confirmed their agreement with the scoring.

Scoring followed MSC guidance in CR 27.10.

RBF

The RBF was used to score PI1.1.1 for Northern Pike and PI 2.1.1 for Walleye and Northern Pike.

4. TRACEABILITY

4.1 Eligibility Date

The target eligibility date from which product suitably stored may enter MSC Chain of Custody following certification is October 31, 2013. This date is chosen so that product caught in the 2013-2014 winter fishing season may be covered by the certification.

4.2 Traceability within the Fishery

In 1969, the Freshwater Fish Marketing Corporation (FFMC) was established under the Freshwater Fish Marketing Act as a federal Crown corporation with exclusive rights to inter-provincial and export trade of freshwater fish products from Manitoba, Saskatchewan, Alberta, the Northwest Territories and North western Ontario. FFMC buys all fish offered by Manitoba fishers. While fishers may sell outside the FFMC directly to the final consumer, such activity must be authorized by the Province of Manitoba under a valid commercial fishing licence or may have a representative sell fish on their behalf under a Special Dealers Licence (issued by FFMC) or a Director`s Authorization (issued by MCWS).

The trade record system requiring fishermen to record all species sold and to whom clearly demonstrates the effectiveness of the traceability system, especially as the only sales are made to FFMC.. While FFMC may issues Special Dealer Licences to allow fishers to sell catch in local markets or Export Dealers Licences that allow fishers to sell their catch into markets outside Manitoba, both FFMC and any other buyer will need chain of custody audit to ensure that they respond to the track record system. In addition, the Fish Transportation Load-slip Regulation that controls the transport of fish within Manitoba provide an authorizing mechanism for the movement of fish and assist in the identifying fish that been harvested, transported or sold illegally.

Harvesters on Waterhen Lake deliver dressed catch to local FFMC packing stations in Winnipegosis and Skownan. The fish is dressed at the point of recovery on the ice on Waterhen Lake.

There are three potential sources of contamination with uncertified product.

i. If there is a price differential in favour of certified fish; other fishers from the area Lakes may present their fish as harvest from Waterhen Lake. The risk of this is considered to be low as this would be against the interests of the Waterhen Lake fishers as it would not be possible to market more Walleye fish than allowed under the quota. Poor information on the source of Northern Pike would also prejudice the Waterhen Lake fishers as it would provide unreliable data on resource availability in Waterhen Lake.
ii. Waterhen Lake fishers could look to market fish caught in Chitek and Inland lakes as product of Waterhen Lake. While MCWS is considering the potential for certifying these two water bodies the position is more complicated than Waterhen Lake due to their stocking with fingerlings sourced from Lake Manitoba. This risk should be alleviated by ensuring the introduction of log books that are compulsory for all licensed fishers on the Lake so to provide traceability on the source of the product.
iii. If sales of certified fish are made through agents different from the FFMC there may be more issues related to traceability. Currently the risk is low to non-existent as none of the agents will have chain of custody (CoC) certification.

4.3 Eligibility to Enter Further Chains of Custody

Walleye and Northern Pike are caught in Waterhen Lake by 96 mm gill nets in a winter fishery. They are “landed” on the ice. Fishing is restricted to the 22 license holders as approved by the Lake Waterhen Fishermen’s Association and MCWS. The traceability systems through the FFMC packing sheds are robust the auditors confirm that the established system is sufficient to allow walleye and northern pike harvested in the winter gillnet fishery of Lake Waterhen to enter into further chains of custody.

CoC certification is required from the point of transfer of ownership from the fisher to FFMC or any authorized selling agent. Northern Pike Caviar that is produced from a dedicated Northern Pike fishery is not eligible to be sold as MSC certified; any roe sold as MSC certified must be from Northern Pike taken as a by catch in the walleye gillnet winter fishery.

4.4 Eligibility of Inseparable or Practically Inseparable (IPI) stock(s) to Enter Further Chains of Custody

There are no IPI stocks involved in the certification.

5. EVALUATION RESULTS

5.1 Principle Level Scores

The results of the assessment, as provided by the principal level scores, are given in Table 6. The justification and comments are provided in the scoring table in Appendix 1.

Table 6: Final Principle Scores: All UoC

	Score	
Principle	**Walleye**	**Northern Pike**
Principle 1 – Target Species	86.9	83.8
Principle 2 – Ecosystem	82.0	82.0
Principle 3 – Management System	88.6	88.6

5.2 Summary of Scores

The scoring tables are shown in table 7.

5.3 Summary of Conditions

A summary of the 3 conditions is shown in table 9. The condition and related client action plan are in Appendix 3.

5.4 Recommendations

It is noted that the following recommendations are not mandatory but recommendations of the audit team designed to support the client in maintaining the sustainability of the two fisheries.

1. There should be some evidence to support the effectiveness of mesh size selectivity to obtain the desired results.
2. Currently the Waterhen gill net ice fishery targets walleye. The retained by-catch of Northern Pike has also been certified. While it is understood that the roe of captured eggs of female Northern Pike may be extracted to provide the specific product of Northern Pike caviar, the auditors are concerned that any increase in the market value of the roe may lead to the inception of a dedicated roe fishery which may, in turn, be detrimental to stock status and may have implications for other populations in the Lake including walleye.. On that basis it is strongly recommended that fishery managers regulate against a specific roe fishery until such time there may be science based Northern Pike TACs and quota that could take account of the potential catch in such a fishery.
3. For the future, it would be better to understand the stock structure of Northern Pike in Waterhen Lake. Commercial-catch sampling should be conducted and the index sampling effort should be increased to catch a minimum of 200 Northern Pike as part of the indexing program.
4. Water temperature and water quality, particularly winter oxygen levels, be measured routinely in Waterhen Lake. [This data should be collected to see whether they have any aspects of winterkill or local oxygen depletion, which would concentrate Pike (see Casselman 1978).], while also supporting a better understanding of the walleye resource.
5. Validated procedures of accurately interpreting age and growth of Northern Pike be used in the future, probably using the cleithral method, in routine indexing and commercial catch sampling and that size-at-age be compared with a growth standard and used to develop age-related performance indicators.
6. Various types of reproductive information be acquired and used to develop and monitor an indicator of the spawning stock of Northern Pike in Waterhen Lake. Indeed, as in Walleye, a Northern Pike index of spawning stock biomass could provide a target reference point.
7. Appropriate techniques be developed to annually determine mortality rate of the Northern Pike population of Waterhen Lake and that it be used as a reference-point performance indicator to assess Northern Pike exploitation on an ongoing basis, preferably refined for thermal conditions (GDD).
8. A carefully monitored spring live-capture trap-net commercial fishery be considered and, if necessary, used to reduce disproportionately abundant prey fish, including small Northern Pike, to maintain a sustainable, high-quality commercial Walleye and Northern Pike harvest.
9. Logbooks are made compulsory as a condition of license.Part of the logbook is used to record discards in order to ensure the completeness of information.
10. The external audit of the FMP be completed in the third year of the MSC certification so that the results and the MCWS response are available to the team engaged in any re-certification.
11. The FMP be considered “evergreen” to reduce the need for future staff inputs.
12. Given the vintage of the data we recommend that the client reviews other sources to ensure that the Lake Winnipeg findings used to estimate the LRP for walleye continue to be relevant or are the most appropriate.
13. The auditors recommend an explicit definition of a habitat strategy in the FMP.

5.5 Recommendation, Formal Conclusion and Agreement

This fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any PI.

It is therefore recommended that the Waterhen Lake Walleye and Northern Pike Winter Gillnet Commercial Fishery be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

The Units of Certification in this fishery attained a score below 80 against three PI. This has led to conditions to certification being raised (see summary in table 9 with detail and related client action plan in the appendices).

Once these conditions have been satisfied the PIs will be re-scored.

Table 7: Scoring Table Summary: Walleye

P	Component	Performance Indicator (PI)		Score	Wt Score
1	Outcome	1.1.1	Stock status	90	22.50
		1.1.2	Reference points	80	20.00
		1.1.3	Stock rebuilding	0	0.00
	Management	1.2.1	Harvest strategy	85	10.63
		1.2.2	Harvest control rules & tools	90	11.25
		1.2.3	Information & monitoring	90	11.25
		1.2.4	Assessment of stock status	90	11.25
2	Retained species	2.1.1	Outcome	80	5.33
		2.1.2	Management	80	5.33
		2.1.3	Information	85	5.67
	Bycatch	2.2.1	Outcome	80	5.33
		2.2.2	Management	80	5.33
		2.2.3	Information	80	5.33
	ETP species	2.3.1	Outcome	100	6.67
		2.3.2	Management	80	5.33
		2.3.3	Information	85	5.67
	Habitats	2.4.1	Outcome	80	5.33
		2.4.2	Management	80	5.33
		2.4.3	Information	80	5.33
	Trophic function	2.5.1	Outcome	80	5.33
		2.5.2	Management	80	5.33
		2.5.3	Information	80	5.33
3	Governance and policy	3.1.1	Legal & customary framework	100	12.50
		3.1.2	Consultation, roles & responsibilities	95	11.88
		3.1.3	Long term objectives	90	11.25
		3.1.4	Incentives for sustainable fishing	80	10.00
	Fishery specific management system	3.2.1	Fishery specific objectives	80	8.00
		3.2.2	Decision making processes	90	9.00
		3.2.3	Compliance & enforcement	100	10.00
		3.2.4	Research plan	70	7.00
		3.2.5	Management performance evaluation	90	9.00

Table 8: Scoring Summary Table: Northern Pike

P	Component	Performance Indicator (PI)		Score	Wt Score
1	Outcome	1.1.1	Stock status	100	25.00
		1.1.2	Reference points	80	20.00
		1.1.3	Stock rebuilding		0.00
	Management	1.2.1	Harvest strategy	70	8.75
		1.2.2	Harvest control rules & tools	70	8.75
		1.2.3	Information & monitoring	90	11.25
		1.2.4	Assessment of stock status	80	10.00
2	Retained species	2.1.1	Outcome	80	5.33
		2.1.2	Management	80	5.33
		2.1.3	Information	85	5.67
	Bycatch	2.2.1	Outcome	80	5.33
		2.2.2	Management	80	5.33
		2.2.3	Information	80	5.33
	ETP species	2.3.1	Outcome	100	6.67
		2.3.2	Management	80	5.33
		2.3.3	Information	85	5.67
	Habitats	2.4.1	Outcome	80	5.33
		2.4.2	Management	80	5.33
		2.4.3	Information	80	5.33
	Trophic function	2.5.1	Outcome	80	5.33
		2.5.2	Management	80	5.33
		2.5.3	Information	80	5.33
3	Governance and policy	3.1.1	Legal & customary framework	100	12.50
		3.1.2	Consultation, roles & responsibilities	95	11.88
		3.1.3	Long term objectives	90	11.25
		3.1.4	Incentives for sustainable fishing	80	10.00
	Fishery specific management system	3.2.1	Fishery specific objectives	80	8.00
		3.2.2	Decision making processes	90	9.00
		3.2.3	Compliance & enforcement	100	10.00
		3.2.4	Research plan	70	7.00
		3.2.5	Management performance evaluation	90	9.00

Table 9: Condition Summary

Condition number	Condition	PI	Related to previously raised condition?
1	The harvest strategy for Northern Pike is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	1.2.1 (Pike)	No
2	For Northern Pike, well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	1.2.2 (Pike)	No
3	Research results are disseminated to all interested parties in a timely fashion.	3.2.4 (Both)	No

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Appendix 1: Performance Indicator Scores and Rationale

Principal 1

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
A	Guidepost	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met? WE	Y	Y	N
	Met? NP	NA	NA	NA
	Justification	Walleye Analysis of the four reference indicators developed to measure the health of the Waterhen Lake Walleye stock ((i) SSB; (ii) SFDI; (iii) CPUE; and (iv) total mortality) provides evidence that the Walleye stock is being maintained around but mostly above the stock URPs (see PI 1.1.2). Only SSB and SFDI have dropped below the URP in the past four years, and it is considered highly likely that the stock is above the point where recruitment would be impaired. The most recent (2012) total annual mortality rate estimate was below the URP and 2010 and 2011 estimates were below TRP. CPUE has approached the upper stock reference point in two of the past four years; this suggests the need for caution as the adult population is at or nearing its sustainable level. Due to the short period that the performance indicators have been measured it is difficult to conclude with a high degree of certainty that the stock is above the point where recruitment would be impaired, but the data to date suggest that this is the case. Northern Pike The RBF is used to score PI 1.1.1		
B	Guidepost		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met? WE		Y	Y
	Met? NP		NA	NA
	Justification	Walleye The stock is at or fluctuating around its target reference point. Analysis of the four reference indicators (see PI1.1.2) developed to measure the health of the Waterhen Lake Walleye stock. **SSB.** The SSB measured since 2009 are associated with good harvests and an index above 40,000 kg. Only in 2011 was the upper stock reference point below 40,000 kg; thus the reference point was set at 40,000 kg. The LRP has been arbitrarily set at 50% of the URP which is expected to maintain a sustainable yield of 20,000 kg. The TRP is 50,000 kg. In 2012, the index was 46,000 kg and from 2009 ranged between 39,000 kg and 65,000 kg. **SFDI**. The TRP H=0.60 is the mean value for the stocks studied in those ten lakes. The lower threshold of the 80% confidence interval, is selected as the URP H=0.58. The LRP H=0.31 represents the average of the Red Lakes diversities before and after collapse. In 2012, H=0.80; the lowest for the four years was H=0.40 in 2010. Thus they were within URP and LRP. The H values for 2011 and 2012 were well above the TRP. **CPUE.** The relative abundance benchmarks for north western Ontario's FWIN are 10.7 for average CPUE, 5.1 for 25% quartile and 15.5 for the 75% quartile () thus the abundance of Walleye in Waterhen Lake looks very good. **Total mortality**. The 2012, total mortality was 64% and the harvest season was closed early reducing the quota from 36,300kg to 34,640kg. Previous harvest mortality rates were above the URP. The 2012 level of harvest may be nearing or exceeding sustainable yield and the performance indicator is sensitive and working. The stock has been fluctuating around or above its target reference points in recent (last four) years. Only SSB and SFDI have dropped below the URP in the four years. This suggests that the adult population is at its sustainable level. CPUE has approached the upper stock reference point in two of the past four years. The most recent total annual mortality rate estimate (2012) was below the URP and 2010 and 2011 estimates were below TRP. Northern Pike The RBF is used to score PI 1.1.1		
References		Abrosov 1969, Lester *et al.* 2000, MCWS 2013, Gangl 2001		

Stock Status relative to Reference Points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Target reference point	Walleye SSB SFDI CPUE TOTAL MORTALITY Northern Pike Not applicable	 50,000 kg H=0.60 15 0.53	 46,000 kg (2012) H=0.80 (2012) 15.5 (2012) 0.64
Limit reference point	Walleye SSB SFDI CPUE TOTAL MORTALITY Northern Pike Not applicable	 20,000 kg H=0.31 5.1 0.70	 46,000 kg (2012) H=0.80 (2012) 15.5 (2012) 0.64
OVERALL PERFORMANCE INDICATOR SCORE			Walleye 90 Northern Pike SICA SCORE 100 PSA Score 80.1 SICA score used.

PI 1.1.2		Limit and target reference points are appropriate for the stock		
Scoring Issue		SG 60	SG 80	SG 100
A	Guidepost	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.	
	Met? WE	Y	Y	
	Met? NP	NA	NA	
	Justification	<u>Walleye</u> Four indicators are used as reference points. These are considered appropriate for the stock and may be estimated. **SSB**. As limited index netting information to-date does not allow for accurate estimation of Waterhen Lake spawning stock, the total mass of gravid female Walleye caught is used as a surrogate for the standing stock of mature females. Resting females (i.e. mature females without developing eggs) are not included in the total. **SFDI**. This monitors the status of the female Walleye. There is growing evidence among a variety of fish species that larger and older females produce eggs with larger oil droplets resulting in larvae that both grow faster and survive starvation better than those from younger females, and this likely applies to Walleye. To maintain adequate age diversity among spawning females and a satisfactory recruitment relationship, the Shannon Diversity Index (H) was selected as one of the four reference indicators. The reference indicator limits were selected from a study of Minnesota's ten large Walleye lakes. The TRP H=0.60 is the mean value for the stocks studied in those ten lakes. **CPUE**. The CPUE reference point of 6 for Waterhen Lake is equivalent to 15 (6x2.5= 15) for FWIN in north-western Ontario. Ontario's index nets are 2.5 times longer. **Total Mortality**. If total annual mortality increases higher than 60%, the lake quota for WE will be reduced. The URP of 60% is derived from the Percid Community Synthesis Population and Yield Characteristics Working Group. The reference points have been set at apparent high levels because mortality is calculated by tracking individual year classes and averaging their mortalities rather than calculating mortality from catch curves. Mortalities calculated from catch curves are more erratic due to variable year class strength, but also render a lower estimate of mortality, and are thus less precautionary (Gangl 2001). The URP (60%), and TRP (53%) were calculated according to Ontario's guidance on safe fishing. Preliminary modelling using Waterhen Lake Walleye weights at age showed yield-per-recruit (with a 96 mm minimum mesh) was maximized at a total mortality (A) of 70%. Only 13% of the maximum yield-per-recruit was sacrificed at A=0.5, but the SSB more than tripled (sexes were not split for the modelling). The LRP of 70% was selected with some caution recognizing that it was also the rate of harvest that led to a contraction in the Lake Winnipeg Walleye fishery in the mid-1990s. If total mortality falls between 60% and 70% an action response is triggered. Given the vintage of the data we recommend that the client review other sources to ensure that the Lake Winnipeg findings used to estimate the LRP for walleye continue to be relevant or are the most appropriate. Given the relatively recent introduction of the four reference indicators there is insufficient experience conclude whether or not they may be con adequate and justifiable, The Walleye stock is being maintained around but mostly above the stock URP. Only two reference points, SSB and SFDI, have dropped below the URP in the four years. This suggests that the adult population is at or nearing its sustainable level. <u>Northern Pike</u> When the RBF is used to score PI1.1.1, a score of 80 is allocated to PI 1.1.2.		
b	Guidepost		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met? WE		Y	N
	Met? NP		NA	NA

	Justification	Walleye **SSB**. The LRP has been set at 50% of the URP and this is expected to maintain a sustainable yield of 20,000 kg and above the point at which the productive capacity would be impaired. However precautionary issues have not been considered. **SFDI.** The LRP H=0.31 represents the average of the Red Lakes diversities before and after collapse. As a precautionary issue the auditors recommend that the fecundity of Waterhen Lake Walleye be compared to those Minnesota stocks from which the reference points were derived. If the fecundity of Waterhen Lake Walleye is lower, more female diversity may be required and the references shifted towards H=0.70. Also the LRP may be too low; and should be confirmed on the basis of a longer time series of data. **CPUE**. The LRP is 40% of the upper reference point. While the reason for the selection of this is not explicit it is above the level at which there is an appreciable risk of impairing reproductive capacity. The lowest index value (5.0) which occurred in 2010 did not result in over fishing. However, allowing a reduction in adult density of 40% may not be precautionary if it results in a negative fish community response. **Total Mortality**. The LRP of 70% was selected with some caution recognizing that it was also the rate of harvest that led to a contraction in the Lake Winnipeg Walleye fishery in the mid-1990s. If total mortality falls between 60% and 70% an action response is triggered. The 2012, total mortality was 64% and the harvest season was closed early reducing the quota from 36,300kg to 34,640kg. Accordingly, it may be concluded that the indicators used as a proxy for the limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity. However, precautionary issues have not been considered. Northern Pike When the RBF is used to score PI1.1.1, a score of 80 is allocated to PI 1.1.2.		
c	Guidepost		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met? WE		Y	N
	Met? NP		NA	NA
	Justification	Walleye While $B_{MSY\ is}$ not available, the use of four indicators has the intent of maintaining stock at that level, with a level of productivity well above the point at which recruitment might be impaired. SSB. The SSB measured since 2009 are associated with good harvests and an index above 40 kg. Only in 2011 was the upper stock reference point below 40kg; thus the reference point was set at 40kg. The Target Reference Point (TRP) has been set at 50kg. In 2012, the index was 46 kg and the four years ranged from 39 to 65kg, close to the target and well above the URP. **SFDI.** The reference indicator limits were selected from Gangl & Pereira's (2003) study of Minnesota's ten large Walleye lakes. The TRP H=0.60 is the mean value for the stocks studied in those ten lakes. The lower threshold of the 80% confidence interval, is selected as the URP H=0.58. As a precautionary issue the auditors recommend that the fecundity of Waterhen Lake Walleye be compared to those Minnesota stocks from which the reference points were derived. If the fecundity of Waterhen Lake Walleye is lower, more female diversity may be required and the references shifted towards H=0.70. **CPUE.** The TRP, 5.8 fish per net night, was selected because harvests associated with values around 5.8 were pretty good. The reasoning is sound and relates to indices developed for north western Ontario. **Total Mortality**. One historic estimate of total mortality for Walleye in Waterhen Lake was about 46% as a result of a tagging study in the 1970s. The URP (60%), and TRP (53%) were calculated according to Ontario's guidance on safe fishing (Lester *et al*. 2000). Preliminary modelling using Waterhen Lake Walleye weights at age showed yield-per- recruit (with a 96 mm minimum mesh) was maximized at a total mortality (A) of 70%. Only 13% of the maximum yield-per-recruit was sacrificed at A=0.5, but the SSB more than tripled (sexes were not split for the modelling). Northern Pike When the RBF is used to score PI1.1.1, a score of 80 is allocated to PI 1.1.2.		
d	Guidepost		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met? WE		NA	

	Met? NP		NA	
	Justification	Walleye This issue is not scored as Walleye is not a low trophic level species. Northern Pike Northern Pike is not a low trophic species. When the RBF is used to score PI1.1.1, a score of 80 is allocated to PI 1.1.2.		
References		Lester *et al.* 2000; CWS 2013; Frances *et al*. 2007; Gangl & Pereira's (2003); Morgan *et al*. 2003		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye 80 Northern Pike 80

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Where stocks are depleted rebuilding strategies, which have a reasonable expectation of success, are in place.		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the specified timeframe.
	Met? WE	NA		NA
	Met? NP	NA		NA
	Justification	Walleye Walleye in Waterhen Lake is not considered to be depleted. PI1.1.3 is not scored. Northern Pike When the RBF is used to score PI1.1.1, PI 1.1.3 is not scored		
b	Guidepost	A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the depleted stock.
	Met? WE	NA	NA	NA
	Met? NP	NA	NA	NA
	Justification	Walleye Walleye in Waterhen Lake is not considered to be depleted. PI1.1.3 is not scored. Northern Pike When the RBF is used to score PI1.1.1, PI 1.1.3 is not scored		
c	Guidepost	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within a specified timeframe.	There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe.	
	Met? WE	NA	NA	NA
	Met? NP	NA	NA	NA
	Justification	Walleye Walleye in Waterhen Lake is not considered to be depleted. PI1.1.3 is not scored. Northern Pike When the RBF is used to score PI1.1.1, PI 1.1.3 is not scored		
References				
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike NA

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met? WE	Y	Y	Y
	Met? NP	Y	N	N
	Justification	Walleye The strategy for the Waterhen Lake fishery is based on the need to sustain Walleye that is the species most susceptible to over-fishing due its late maturation. Four reference indicators have been selected with fishers' guidance for the commercial Walleye harvest in Waterhen Lake to provide LRP, TRP and URP. Monitoring, stock evaluation and harvest control rules work together to maintain a healthy stock. A second element of the harvest strategy is based the alternative fishery in the vicinity (Chitek and Inland Lakes) and the potential to reduce effort on Waterhen Lake if required. The reduced quota and early season closure of the fishery in 2011 demonstrates that the harvest strategy is responsive to the state of the stock. Northern Pike Assessment of data-deficient fisheries against this indicator consider how elements of the harvest strategy combine to manage impact, such that susceptibility is maintained at or below acceptable levels given the productivity of the species. The harvest strategy is based on Walleye as the targeted species with Northern Pike taken as a retained by-catch. While the approach has differed over the years, the choice of the 96 mm gill net mesh size protects smaller Northern Pike and it is too small to catch larger Northern Pike. Thus it may be considered that the fishery meets SG60. As the harvest strategy has been designed to respond to walleye management it cannot be said that it is responsive to the state of the Northern Pike stock. The fishery does not meet SG80.		
b	Guidepost	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met? WE	Y	Y	N
	Met? NP	Y	Y	N
	Justification	Walleye The harvest strategy has not been fully evaluated so the fishery does not meet the second issue at SG100. The status of the stock in relation to the four indicators and evidence from Walleye fisheries in similar water bodies supports the conclusion that the harvest strategy is being implemented successfully and is achieving its objectives. Northern Pike Evidence suggests that the harvest strategy is achieving its objectives. Detailed study of partitioning overall potential yield from the morphoedaphic index permits an examination of allowable yield for Northern Pike in relation to Walleye. In that review, it was suggested that commercial yields as a per cent of potential yield were 20% for Walleye compared with 10–20% for Northern Pike. This range for Northern Pike suggests that a harvest of 1.0 kg/ha/yr would be sustainable but that it might, indeed, be half that if the strategy was to maintain the population needed to target large Pike. Annual rate of exploitation from 1991 to 2008 was 0.51 kg/ha/yr for Northern Pike. During the 4-yr period from 2009 to 2012, harvest was considerably higher at 0.87 kg/ha/yr for Northern Pike. It was similar for the Walleye harvest. The reason for the increase is unknown. Fish production and abundance are known to correlate with water level, particularly for Northern Pike. There is cursory evidence that flooding was prevalent during the period and that high water levels might have led to the increase. Nevertheless, all evidence is that harvest rates of Pike are well within limits that would maintain a sustainable, high-quality predator population.		

c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met? WE	Y		
	Met? NP	Y		
	Justification	Walleye Three parts of the monitoring of the Waterhen Lake fishery gauge whether or not the harvest strategy is being implemented successfully and indicate where changes may be needed. (i) Index netting is carried out in September each year when water temperatures fall to between 10° and 15°c. Single index nets are set at the same thirty sites each year. The sites were randomly selected from a ¼ km grid according to the FWIN Protocol where 2.4 m on water or more was available. The nets are the North American standard gillnets. Thirty repeated sets was determined to be appropriate by power analysis of the initial 2009 index data to detect a 20% decrease in CPUE (α = 0.1). Nets are soaked for approximately 16 hours covering two crepuscular periods. Weight and length are recorded for all fish caught. For Walleye, weight, length, sex, maturity and gut contents, if identifiable, are recorded annually. (ii) Some commercial fishers complete and return log books which form one of the data collection tools used in the fishery. The log books record harvest that is either retained catch not sold through the FFMC or non-marketed catch that is either discarded by-catch or culled catch. (iii) On-site (Basin Hole) Inspections are part of the compliance monitoring patrols during the commercial fishing season. A Commercial Fishery Patrol Report is completed to document all aspects of the patrol: date, time, weather, officers, locations and observations. Officers also record the number of fish and species of fish discarded at basin holes. Basin hole inspections started in the 2010/2011 season. Northern Pike Monitoring is covered as the Walleye fishery above.		
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met? WE			Y
	Met? NP			N
	Justification	Walleye On the basis of the findings in the previous fishing year, the harvest strategy for Walleye on Waterhen Lake is reviewed prior to the start of each new season. MCWS with the input of the fishery license holders review and the need for changes in order to achieve management objectives. There are a number of examples when the harvest strategy has been changed. Northern Pike The harvest strategy for Northern Pike is not explicit.		
e	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met? WE	NA	NA	NA
	Met? NP	NA	NA	NA
	Justification	Walleye NA Northern Pike NA		
References		Bonar *et al*, 2009; Pellissier (2012), Casselman & Lewis 1996, OMNR SPOF Working Group 12 (1982) (Ryder 1965, 1978) MCWS 2013 Casselman 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye 85 Northern Pike 70
CONDITION				1

PI 1.2.2		There are well defined and effective harvest control rules in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met? WE	Y	Y	
	Met? NP	Y	N	
	Justification	<u>Walleye</u> A number of well-defined HCRs are in place. (i) The limit on the number of licenses (22). (ii) Quota: if total mortality increases more than 60% the lake quota for Walleye will be reduced to allow the stock to rebuild; (iii) a control on the number of days fished with the opening and closing of the fishery dependent on the presence of ice; (iv) the possibility of closing the fishery early. In 2012, 34.6 mt of Walleye was harvested and the 2012/2013 fishing season was closed on January 12, 2013 as the fishers approached the quota (MCWS 2013); (v) A minimum mesh size of the gill nets (96 mm); When SSB falls below the TRP of 40 kg, the level expected to maintain a sustained walleye of at least 20,000 kg, the minimum mesh size will be increased to reduce the capture of some immature females. If the SSB falls below 40 kg, the minimum allowable mesh size would be increased to 102mm; if the SSB falls to 30kg the minimum allowable mesh size would be increased to 108mm; and if the SSB drops to 20 kg the minimum allowable mesh size would be 114mm. When H is above 0.58, no maximum gillnet will be implemented. However, when values of "H" fall below 0.58 into the "medium risk" zone a maximum size regulation of 114mm will be put in place to conserve and enhance age diversity among spawning females. If the LRP of 0.31 is reached a maximum gillnet size of 108mm will be imposed to allow for a number of larger fish (generally larger mature females) to escape the fishery. if the HCRs for SSB and H were both in the critical zone a minimum mesh size of 114mm would be imposed. The fishers are capable of making rapid conversion to mesh size changes. (vi) The potential to reduce the yardage of net that may be fished by individual license holders. A drop in CPUE from the ULR would result in a decrease in the net yardage allowed for each fisher. If the Index CPUE was to decrease, maximum yardage would also reduce until the LRP of 2 walleye per index net was reached. 2,100 m. of net will be allowed at CPUE values below the LRP to provide some income for the fishers. The fishery has remained strong (over 20 mt annually) since indexing began and there has been no need to shorten yardage; and (vii) close areas to protect juvenile fish. It is concluded that well-defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. <u>Northern Pike</u> As Northern Pike is not directly managed there is a need to assess the extent to which there are management tools and measures in place that are consistent with ensuring that susceptibility of the target species to removal is no higher than that which would cause the risk to the target species to be above an acceptable risk range. Given the distribution of the species in Waterhen Lake, mesh size, limited season, limit on gill net length and close areas, it may be concluded that the harvest control rules achieve the aim of limiting the risk, but as they are not well defined for Northern Pike they do not ensure that exploitation rates for Northern Pike may be adjusted if required.		
b	Guidepost		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met? WE		Y	N
	Met? NP		Y	N
	Justification	<u>Walleye</u> The harvest controls take into consideration the main uncertainties; however the justification of the reference limits introduces an additional factor and as such the fishery does not meet the PI at SG100 . Although such factors as climate change are not taken into consideration, there is no evidence that these are impacting the population at the present time. <u>Northern Pike</u> As for Walleye.		

c	Guidepost	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	Met? WE	Y	Y	Y
	Met? NP	Y	Y	Y
	Justification	Walleye The harvest control rules for Walleye are robust and are considered to be adequate although other factors might be considered, and recommendations may be made. This is considered appropriate given the scale and intensity of the fishery in the context of the small size of Waterhen Lake and the focused winter gill-net fishery. Quite appropriately, assessment is done just prior to the fishery in the fall and used to adjust the harvest control rules.The stability of the catch and the results of the index netting provides clear evidence that the tools in use effective in achieving the exploitation levels required under the harvest control rules. Northern Pike As above. The stability of the catch, the results of the index netting and the limited vulnerability of Northern Pike to the 96 mm net provide clear evidence that the tools in use effective in achieving the exploitation levels required under the harvest control rules.		
References		MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye 90 Northern Pike 70
CONDITION				2

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met? WE	Y	Y	Y
	Met? NP	Y	Y	Y
	Justification	Walleye A comprehensive range of information is available from a number of sources: over-arching understanding of the Walleye stock based on research in a large number of fisheries; fishers local knowledge; index netting; fish catches (log book data and FFMC records); data on fleet and fishing effort; and general information on such as water temperature. <u>Northern Pike</u> A wide range of information is available on Northern Pike due to the amount of research that has been undertaken in other water bodies allied with specific information on the fishery in Waterhen Lake.		
b	Guidepost	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met? WE	Y	Y	N
	Met? NP	Y	Y	N
	Justification	Walleye Through the index netting stock abundance is monitored on an annual basis. Fishery removals are monitored consistently over the season due to the position of FFMC as the sole buyer. This provides data to support the HCR. The fishery does not meet the SG100 issue as there is not a good understanding of the inherent uncertainties i.e. the specific situation in Waterhen Lake. <u>Northern Pike</u> Through the index netting stock abundance is monitored on an annual basis. Fishery removals are monitored consistently over the season due to the position of FFMC as the sole buyer. This provides data to support the HCR. The fishery does not meet the SG100 issue as there is not a good understanding of the inherent uncertainties i.e. the specific situation in Waterhen Lake.		
c	Guide post		There is good information on all other fishery removals from the stock.	
	Met? WE		Y	
	Met? NP		Y	
	Justification	Walleye There is good information on the removals in the recreational fishery. There are limited other removals. <u>Northern Pike</u> There is good information on the removals in the recreational fishery. There are limited other removals.		
References				
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye</u> 90 <u>Northern Pike</u> 90

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met? WE		Y	Y
	Met? NP		NA	NA
	Justification	Walleye The assessment is considered appropriate to the stock and provides the information required to support the harvest control rule, taking into account the major features relevant to the biology of the species and the nature of the fishery. Northern Pike When the RBF is used to score PI1.1.1, PI 1.2.4 is allocated a score of 80.		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met? WE	Y		
	Met? NP	NA		
	Justification	Walleye The assessment estimates stock status in relation to 4 defined performance indicators. Northern Pike When the RBF is used to score PI1.1.1, PI 1.2.4 is allocated a score of 80.		
c	Guidepost	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met? WE	Y	Y	N
	Met? NP	NA	NA	NA
	Justification	Walleye The four performance indicators on which the stock status report is based take into account uncertainty. This is not done in a probabilistic way. Northern Pike When the RBF is used to score PI1.1.1, PI 1.2.4 is allocated a score of 80.		
d	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met? WE			N
	Met? NP			NA
	Justification	Walleye The assessment has not been tested. Northern Pike When the RBF is used to score PI1.1.1, PI 1.2.4 is allocated a score of 80.		
e	Guidepost		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met? WE		Y	Y
	Met? NP		NA	NA
	Justification	Walleye There is an external review process to determine if the management plan meets the goals/objectives. This independent third party review is conducted by fisheries professionals (from outside Manitoba) whom possess the necessary knowledge and expertise in managing sustainable freshwater fisheries. Northern Pike When the RBF is used to score PI1.1.1, PI 1.2.4 is allocated a score of 80.		
References				
OVERALL PERFORMANCE INDICATOR SCORE				Walleye 90 Northern Pike 80

Principal 2

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
Scoring Issue		SG 60	SG 80	SG 100
A	Guidepost	Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).	Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).	There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.
	Met?			
	Justification	<u>Walleye & Northern Pike</u> Northern Pike is considered for certification according to the MSC standard and is thus not taken into account in retained species. About 31 % of the total catch in the fishery consists of mullet, that In Manitoba is the common name for any combination of species in the genera *Catostomus* and *Moxostoma*. In Waterhen, mullet refers to White Sucker (*Catostomus commersoni*) and Shorthead Redhorse (*Moxostoma macrolepidotum*) ("red fin mullet"). While there is no fishery dependent data on the breakdown between of the catch between the two species, the index data that indicates a proportional breakdown between the two of roughly 7:1 (white to red fin) can be used as a proxy. Accordingly, White Sucker is the only main retained species (i.e. it comprises more than 5 % of the total catch). There is a small retained catch of Yellow Perch (*Perca flavescens*) which comprised > 5 % of the harvest in the 76 mm fishery and is no longer considered as a main species. In addition, there are small amounts of Lake Whitefish (*Coregonus clupeaformis*) and Sauger (*Sander canadensis*). The RBF was used to score PI 2.1.1 for white sucker as the lack of biological data means that the impact of the fishery on it cannot be determined quantitatively (see below).		
B	Guidepost			Target reference points are defined for retained species.
	Met?			
	Justification	<u>Walleye & Northern Pike</u> The RBF is used.		
C	Guidepost	If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.	If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?			
	Justification	<u>Walleye & Northern Pike</u> The RBF is used.		
D	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.		
	Met?			
	Justification	<u>Walleye & Northern Pike</u> The RBF is used		
References				
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> SICA score 80. PSA not used.

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
Scoring Issue		SG 60	SG 80	SG 100
A	Guidepost	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing retained species.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> A partial strategy represents a cohesive arrangement that may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically. The management of all retained species including the single main retained species, white sucker, is achieved through a partial strategy that consists of a number of measures related to the management of the direct Walleye fishery. The partial strategy is: the use of a gill net with a mesh size of 96 cm. to which many species are not vulnerable; the short fishing season; and lake areas closed to fishing. Given the stability in landings of white sucker in recent years it is concluded that the stock is being maintained within biologically based limits. A strategy represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically. As the existing approach is not designed specifically to manage retained species, it cannot be considered a strategy.		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> The objective basis for confidence that the partial strategy will work is based on: the finding of the index netting with a stable trend of catches in recent years; an understanding of the size and nature of the main retained species and thus its vulnerability to a gill net of 95 mm; and annual data on the level of retained catch. There is not a strategy in place to manage all retained species.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	<u>Walleye & Northern Pike</u> The continued apparent good health of the white sucker provides evidence that the partial strategy is being implemented successfully. There is not a strategy in place to manage all retained species.		
d	Guide post			There is some evidence that the strategy is achieving its overall objective.
	Met?			N
	Justification	<u>Walleye & Northern Pike</u> There is not a strategy in place to manage all retained species.		
e	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	NA	NA	NA
	Justification	<u>Walleye & Northern Pike</u> NA		
References				
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 80

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Fishers and enforcement officers provide qualitative data on the catch of retained species. Quantitative information is provided by: log books; FFMC purchase & production records; and the MCWS index netting survey. There is no verifiable information on the catch of all retained species. Accordingly, **it is recommended that logbooks are made compulsory as a condition of license.**		
b	Guidepost	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Given the scale and intensity of the fishery allied with limited local consumption and low demand, it is considered that the available qualitative and quantitative data are sufficient to assess the outcome status of white sucker. The level of information prevents the quantitatively estimate of outcome status of all species with a high degree of certainty.		
c	Guidepost	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Knowledge of the white sucker (log books; FFMC purchase and production records; and the MCWS index netting survey) is considered adequate to support measures and a partial strategy to support management. Information on all species is not adequate to support a comprehensive management strategy.		
D	Guidepost		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.
	Met?		Y	Y
	Justification	Walleye & Northern Pike Log books, net index and FFMC data together with information on vessel activity continue to provide information that is sufficient to detect an increase in the risk level. As the majority of all retained catch is marketed through FFMC, sufficient information is available to assess the on-going mortalities to all retained species.		
References				
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 85

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike By-catch in the fishery is exceptionally low and has negligible impact on the status of the involved species. Occasionally some white sucker may be discarded if the market is weak; apart from that there is the potential for small amounts of brown bullhead, *Ameiurus nebulosus* and burbot (*Lota lota*). Accordingly, there are no main by-catch species under the MSC definition (>5 % of the total catch, valuable or vulnerable). There is insufficient information on the populations of all by-catch species to provide a high degree of certainty that they are within biologically based limits.		
b	Guidepost	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.	
	Met?	Y	Y	
	Justification	Walleye & Northern Pike As there are no main by-catch species neither mitigation measures nor a partial strategy are required.		
c	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.		
	Met?	Y		
	Justification	Walleye & Northern Pike There are no main by-catch species.		
References				
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimizing bycatch.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike As there are no main by-catch species neither measures nor a partial strategy are needed. However, there is a partial strategy with many species not vulnerable to the mesh size which is designed to harvest Walleye, there is a short season, the number of licenses is limited and parts of Waterhen Lake are closed to fishing. There is not a strategy in place to manage all by-catch species		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Plausible argument (type and use of gear, fish species and fisher knowledge) provides an objective basis for confidence that the partial strategy will work. There is not a strategy in place to manage all by-catch species		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	Walleye & Northern Pike The lack of by-catch provides the evidence that the partial strategy is being implemented successfully. There is not a strategy in place to manage all by-catch species		
d	Guide post			There is some evidence that the strategy is achieving its overall objective.
	Met?			N
	Justification	Walleye & Northern Pike There is not a strategy in place to manage all by-catch species		
References				
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Qualitative information is available on the amount of main bycatch species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.	Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Fisher reports and observation by fishery officers provides qualitative information that there are no main by-catch species. Quantitative information from the index netting shows the potential for by-catch of those species that could be discarded. The price of mullet provides an indicator of when market conditions may lead to discards of White Sucker. There is no verifiable information on the actual amount of discards.		
b	Guidepost	Information is adequate to broadly understand outcome status with respect to biologically based limits	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Information that indicates limited discards is sufficient to estimate outcome status with respect to biologically based limits. There is insufficient quantitative information to estimate the outcome status of all discard species with a high degree of confidence.		
c	Guidepost	Information is adequate to support measures to manage bycatch.	Information is adequate to support a partial strategy to manage main bycatch species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The lack of by-catch provides the information required to conclude that no measures or a partial strategy are required. If it was felt that one was required, specific programs would have to be established in order to support a strategy.		
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectively of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.
	Met?		Y	N
	Justification	Walleye & Northern Pike Index netting, market data and a detailed understanding of the fishery are sufficient to detect any increase in risk to by catch species and the potential for greater catch and / or discard. **There is limited monitoring of by-catch. It is recommended that part of the logbook is used to record discards in order to ensure the completeness of information.**		
References		http://en.wikipedia.org/wiki/Brown_bullhead; http://en.wikipedia.org/wiki/Burbot; http://en.wikipedia.org/wiki/Burbot		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species. The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike Limits of national and international requirements for protection of ETP species are based on the requirement that mortalities caused by the fishery should not jeopardize survival or recovery of the species. Based on the available information, it is clear that the effects of the fishery are negligible / non-existent. Given the lack of interaction between the fishery and ETP species, it may be concluded that the winter gill net fishery does not jeopardize their survival or recovery. The only possibility for effects to be outside limits would be for some undocumented major impact to be occurring. Given the scale and intensity of the fishery this does not seem plausible. Accordingly, it may be concluded with a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.		
b	Guidepost	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike Direct effects would arise from the fishing operation (catch and landing). As no ETP species are found in and around Waterhen Lake it may be concluded that the direct effects of the fishery are not creating unacceptable impacts on ETP species. As the Waterhen Lake gill net fishery does not have direct effects on ETP species, the fisheries meet the second issue at SG100.		
c	Guidepost		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike The distribution of ETP species in Manitoba is well understood; their presence in the Waterhen area is limited. The potential for indirect effects is understood. It relates to the discard of fish waste and the movement of the vehicles and working tools on the ice and in the area of Waterhen Lake There have been no reports of any interactions with ETP species; indeed the fish discard provides sustenance for birds and animals in the winter months. Accordingly, it is concluded that it is unlikely that indirect effects are creating unacceptable impacts; and there is a high degree of confidence that there are no significant detrimental indirect effects of the Waterhen gill net fishery on ETP species.		
References		http://www.manitoba.ca/conservation/wildlife/sar/sarlist.html; Manitoba Conservation (2002); MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 100

PI 2.3.2		The fishery has in place precautionary management strategies designed to: Meet national and international requirements; Ensure the fishery does not pose a risk of serious harm to ETP species; Ensure the fishery does not hinder recovery of ETP species; and Minimise mortality of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place that minimise mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The fisheries are characterized by a short season and low scale and intensity and this greatly limits the potential for interactions with ETP species, especially in the context of the distribution of ETP species in Manitoba. Accordingly, it is found that the fishery does not compromise national and international requirements for the protection of ETP species. There are SARA-compliant recovery strategies for ETP species in Manitoba. Should there be a need a specific strategy would be developed for any ETP species impacted by the Waterhen winter fishery. There is not a comprehensive strategy in the MSC sense (MSC Guidance GCB 3.3.1) – *"a complete and tested strategy made up of linked monitoring, analyses, and management measures and responses*" as they have not been designed to manage impacts on habitats specifically.		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the strategy will work, based on information directly about the fishery and/or the species involved.	The strategy is mainly based on information directly about the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The objective basis for confidence that the strategy will work is the nature of the fishing operation, the scale and intensity of the activity, the distribution of ETP species in Manitoba and the lack of interaction with ETP species. The existing strategy is not comprehensive in the MSC sense (MSC Guidance GCB 3.3.1).		
c	Guidepost		There is evidence that the strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	Walleye & Northern Pike The lack of documented interaction with ETP species provides the evidence that the strategy is being implemented successfully. The existing strategy is not comprehensive in the MSC sense (MSC Guidance GCB 3.3.1).		
d	Guidepost			There is evidence that the strategy is achieving its objective.
	Met?			N
	Justification	Walleye & Northern Pike There is not a formal study to provides evidence that the strategy is achieving ETP objectives		
References		http://www.manitoba.ca/conservation/wildlife/sar/sarlist.html; Manitoba Conservation (2002); MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.3.3		Relevant information is collected to support the management of fishery impacts on ETP species, including: Information for the development of the management strategy; Information to assess the effectiveness of the management strategy; and Information to determine the outcome status of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.	Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike The information available (data on SARA species, the known distribution of ETP species in Manitoba and knowledge of the fishery) is sufficient to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species. There is a high degree of certainty in estimating the outcome status as there are no known interactions between the fishery and ETP species and no fishery related mortality.		
b	Guidepost	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Given data on the scale, intensity and geographical location of the fishery, together with the results of index netting, the available information is considered sufficient to identify if the fishery poses a threat to the protection and recovery of ETP species. Although good quantitative information is available on interactions of the fishery with ETP species, verifiable information is not available on all impacts, mortalities and injuries. It is recommended that the fishers' log book contains a section to record any sighting of ETP species.		
c	Guidepost	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The information available (nature, scale and intensity of the fishery) is adequate to support measures to manage the potential impacts. As the fishery is small scale with a fairly homogenous character and a stable trend in effort and capture, if needed measures could be identified to implement a full strategy to manage impacts on ETP species. Given the lack of formal information, it would not be possible to evaluate with a high degree of certainty whether a comprehensive strategy was achieving its objectives.		
References		http://www.manitoba.ca/conservation/wildlife/sar/sarlist.html; Manitoba Conservation (2002); MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 85

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> The profundal areas of Waterhen Lake have soft, organic and clay sediments; near-shore there is limestone cobble and gravel over sand and clay with emergent Phragmites and then bulrush to about 1 m. Sparse beds of Potamogeton and denser clumps of Myriophyllum occur to depths of more than 2 m. As indicated above, this water body offers excellent Walleye and Northern Pike habitat. Rocky sediments surrounding islands with cormorant rookeries are carpeted with attached, filamentous algae. Secchi depth was close to 1.5 m in 2012 and shallower in 2011, when much less macrophyte growth was apparent. Such habitat is considered to have low vulnerability to passive fishing gear, especially as much of the disturbance (vehicle movement etc.) takes place on the ice. The surroundings of the lake are covered in snow in the fishing season. The fishing gear has limited potential to adversely affect the habitat; be it from the weights on lead lines or the anchor “stones”. Due to the seasonal nature of the fishery, if slight damage occurs, habitats have time to recover during the remainder of the year. Given the low vulnerability of the habitats in which the fishery and the low impact of the fishing gear, it is considered to be highly unlikely that the fishery would reduce habitat structure and function to a point where there would be serious or irreversible harm. Given the time of year and the limited footprint of the fishing method, habitat structure and function will be maintained and not irreversibly harmed. However, due to the lack of direct evidence the fishery does not meet SG100. .		
References		MCWS 2013; Park (2010)		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 80

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
A	Guidepost	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of the fishery on habitat types.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The mode of operation of the fishery constitutes the measures needed to ensure that the fishery does not cause serious or irreversible harm to habitats (information from DFO staff and FFAW staff). The fishery operates on habitats of relatively low vulnerability that are not characterized by complex benthic fauna. The fishing gear has relatively limited contact with the habitat. The fishing season is short so reducing the potential for impacts and allowing time for recovery. Although a suite of measures that would constitute a partial strategy is not explicitly described in the FMP, fishers and MCWS recognize that the operation of the fishery minimizes damage to habitats. The MCWS local enforcement officer monitors the operations of the fishery and would be aware of changes to fishing practices that might increase risks to habitat. The ability to react to issues in the fishery has been demonstrated by the requirement to respond to lost fishing gear. Accordingly, the suite of measures in place is considered equivalent to a partial strategy. The existing measures do not constitute a strategy in the MSC sense (MSC Guidance GCB 3.3.1). **The auditors recommend an explicit definition of a habitat strategy in the FMP.**		
B	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Plausible argument that the measures are considered likely to work is based on knowledge of the size of Waterhen Lake, the scale and intensity of the fishery, the operation of the static gear, an understanding of the habitat types and complementary analysis of the situation in similar water bodies. Information about habitats (mud and mud/sand) is available from observation (it is a shallow lake) and from the biology of the target species and their preferred habitats. This together with information on gear design, fishing methods and fishing seasons provides an objective basis for confidence that the partial strategy will work. The existing measures do not constitute a strategy in the MSC sense (MSC Guidance GCB 3.3.1) as they have not been designed to manage impacts on habitats specifically.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	N
	Justification	Walleye & Northern Pike Evidence on gear types, fishing methods, fishing seasons, and any changes or variations that is available from the fishery enforcement officer and the Fishery Association indicate that the partial strategy is working. There is not a strategy.		
d	Guidepost			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	Walleye & Northern Pike There is not a strategy in place are achieving habitat objectives.		
References		MCWS 2013; Park (2010)		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike From experience and observation, there is a good understanding of the nature of the habitat in Waterhen Lake and the distribution of habitat types. Habitat vulnerability is known form studies on other water bodies. However, there is insufficient detail for the fishery to meet the single scoring issue at SG100.		
b	Guidepost	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The distribution of the main habitat type in the fishery is known; essentially it governs the distribution of the fishery activity. The Waterhen Lake habitat can be considered of relatively low vulnerability to the impacts of the fishing gear in a short fishing season. It is well understood that there is a limited impact of the gear with habitat. There is good information on the type and nature of fishing gear, how it is used (soak times), where it is used and the potential to interact with habitat. The nature of the impacts on the lake habitat can be inferred by considering the area affected by the gear and the potential to disturb sediment. The gear has little to no penetration depth; the greatest interaction is with the ice. Anchors are small and of limited weight. There is limited dragging on the lake bottom. It would be possible to estimate the total "footprint" of the fishery. While there is pending research on whether gillnetting through the ice has an impact on benthic invertebrate biomass and diversity, as yet the physical impacts of the fishing gear have not been quantified fully.		
c	Guidepost		Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Changes in habitat distributions over time are measured.
	Met?		Y	N
	Justification	Walleye & Northern Pike A large amount of data continues to be collected by the enforcement officer and MCWS conversations with the stakeholders on the operation of the fishery. This provides information that can be used to detect any increase in the risk level. Changes in habitat distributions over time are not measured in the Lake.		
References		MCWS 2013; Park (2010)		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.5.1		The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> Due to the level of catch, the seasonality, the various management measures and the nature of the ecosystem it is considered to be highly unlikely that the managed fishery would disrupt underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. Where there is risk from any fishing activity, the scale and intensity of the fishery is considered compatible with the nature of Waterhen Lake and its surrounds.		
References		MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 80

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The FMP notes the need to maintain the ecosystem. The two potential impacts of the fishery on ecosystem structure and function are (a) impact on trophic relationships from removal of the target species and (b) impact on biodiversity and community structure from non-catch mortality due to operation of the fishing gear. A partial strategy does not have to be specifically designed to manage the impact on the ecosystem component. In Waterhen Lake the partial strategy is based on the mesh size in the directed fishery for Walleye. Very small and very large Northern Pike and potential retained and by-catch species are not vulnerable to the fishing gear with that size of mesh. Walleye and Northern Pike prey on a wide range of species and would be able to switch preys in response to any changes in their abundance. Walleye may be a prey for other species but this is not considered significant. The relatively low impact of the gear and the relatively short fishing season allow the recovery of benthic communities between seasons. There are no identified non-catch mortality impacts on biodiversity and community structure. The partial strategy is complemented by the investigation of issues on an *ad hoc* basis to determine the extent of risk of damage to the ecosystem structure and function. The existing measures do not constitute a strategy in the MSC sense (MSC Guidance GCB 3.3.1).		
b	Guidepost	The measures take into account potential impacts of the fishery on key elements of the ecosystem.	The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The mesh size and the vulnerability of species other than Walleye means that the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. The net size is based on information on the vulnerability of different species and the need to maintain an ecological equilibrium in the Waterhen Lake. Specific information on Waterhen Lake is complemented by the findings of research on other water bodies; especially the ELA. The existing measures do not constitute a strategy in the MSC sense. There is no consideration of all impacts of the fishery on the ecosystem.		
c	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Specific measures are not considered necessary to manage ecosystem impacts as the mesh size and other fishery regulations and practices maintain ecosystem balance. Plausible argument indicates that these measures comprise a partial strategy and are working and on the basis of prior experience it is considered that this will continue to be the case. As there isn't a strategic plan the fishery does not meet issue c at SG100.		

d	Guidepost		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike The partial strategy of a watching brief is being implemented successfully. This has led to the identification of research topics. Specific measures to manage ecosystem impacts are not considered necessary as the implemented mesh size and other fishery regulations and practices have the impact of maintaining ecosystem balance. As there isn't a strategic plan the fishery does not meet issue d at SG100.		
References		MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	Walleye & Northern Pike The potential impacts of the fishery on key elements of ecosystem structure and function are: impact on trophic relationships from removing the target species from the ecosystem; and impact of the fishing gear on biodiversity and community structure, from non-catch mortality and ghost fishing. The impacts of the fishery on trophic patterns and on biodiversity and community structure can be inferred. Any impacts on trophic patterns would result from removal of substantial amounts of Walleye and Northern Pike from the ecosystem. There is no indication that the current harvest pattern has any significant disruptive effects on the ecosystem. Information is adequate to identify key elements of the ecosystem. Biodiversity and composition of lake communities is known from work by the ELA. Where sensitive areas in Waterhen were identified they were closed to fishing. Trophic structure and function are known from a number of studies on similar lakes in North America. There is information on predator prey relationships. Productivity patterns are generally known based on community structure.		
b	Guidepost	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Non-catch impacts on biodiversity and community structure would result from the impact of the gear. The areas that make contact with the lake bottom are light and unlikely to result in crushing or other damage to benthic species. The fishery has a short season providing opportunity for soft-bottom communities to recover between seasons. As noted above, the main impacts of the fishery on key ecosystem elements can be inferred from existing information and some have been investigated in detail, albeit not specifically in relation to Waterhen. To date main interactions have not been studied in detail although there is a research proposal on whether gillnetting through the ice has an impact on benthic invertebrate biomass and diversity. The interactions between the winter fishery on Waterhen and biodiversity and community structure have not been investigated.		
c	Guidepost		The main functions of the Components (i.e., target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known.	The impacts of the fishery on target, Bycatch, Retained and ETP species are identified and the main functions of these Components in the ecosystem are understood.
	Met?		Y	N
	Justification	Walleye & Northern Pike Due to a wide range of research on Canadian lake ecosystems, the main functions of the components are known. Through the work of a number of agencies and specific activities in Waterhen, the various impacts of the fishery on P1 and P2 components have been identified but without further consideration of the impact on lake ecosystem structure the fishery does not meet SG100.		
d	Guidepost		Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		Y	N

	Justification	Walleye & Northern Pike The information available on lake ecosystems and the impact of gill net fisheries is sufficient to infer the main consequences for the ecosystem to be inferred. Hence the importance of a harvest strategy based on mesh size. The on-going monitoring environmental changes (water temperature and water level) and the impact of the Lake's natural productivity allows adaptive management of the fishery. However the lack of sufficient ecosystem information on the potential impact of all activities on the ecosystem means that the fishery does not meet SG100.		
e	Guidepost		Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?		Y	N
	Justification	Walleye & Northern Pike Data continue to be collected on the distribution of the fishery and the fishing method, retained by-catch (from observers) and the identification of SARA species. These would be adequate to detect any increase in risk level. Given the information available, it does not appear that strategies to manage ecosystem impacts are necessary. However, the currently available information is not considered sufficient to support their development should such strategies become necessary.		
References		MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 80

Principal 3

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and Incorporates an appropriate dispute resolution framework.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike The fishery meets scoring issue (a) for all SGs. Under the NRTA Fisheries management in Manitoba's lakes is devolved to the Province thus Manitoba's freshwater fisheries are subject to a mixed federal and provincial jurisdiction, with the former mainly relating to habitat and ETP species and the overarching legal framework. Manitoban Fisheries policy is based on the Federal legal framework as supported by Provincial laws and regulations. Together, these explicitly aim at achieving sustainable fisheries in accordance with MSC Principles 1 and 2. The Canadian fisheries management system conforms to the main principles of the 1995 United Nations Code of Conduct for Responsible Fishing through: Canadian fishery legislation; limited entry licensing; and the FMPs that include fishery management and ecosystem objectives. A large body of regulation covers the fishery and related environmental aspects. FMPs must respond to the Canadian Code of Conduct for Responsible Fishing Operations that outlines general principles and guidelines for all commercial fishing operations that take place in Canadian waters and are based on the FAO Code of Conduct for Responsible Fisheries. The Sustainable Fisheries Framework introduces conservation and sustainable use policies that guide the approach to the principles of ecosystem-based fisheries management. SARA provides a framework for actions across Canada to promote the survival of wildlife species and the protection of the natural heritage. The defined approaches are binding on management agencies.		
b	Guidepost	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the fishery.	The management system incorporates or subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike The fishery meets scoring issue (b) for all SGs. The management system at a Federal and Provincial is well defined by the legislation and FMPs. Disputes can be proactively resolved through stakeholder consultation. The Minister of MCWS and the DFO Minister of Fisheries are the final authorities under Canadian legislation. There are mechanisms for resolving legal disputes within the management system. Where parties are not satisfied with the decision of the Minister they have the right to redress through the respective Court and Appeal system. These are considered to be transparent. Case law indicates shows that they have been tested and proven to be effective and this is indicated by the limited number of court cases. While the Ministers hold discretionary power, the management and consultation process is proactive in aiming to avoid legal disputes. In Manitoba the work of the Fisheries Science Group includes review of development proposals. A comprehensive and rigorous stakeholder consultation process also acts to proactively avoid legal disputes. The auditors are not aware of any legal disputes specific to Waterhen Lake; it is understood that issues in the past in terms of Manitoban fisheries have largely related to the issue of licenses. In aboriginal issues the Crown has the duty to consult with First nations. Constitutional duties to First Nations have to be fulfilled (see Ross River Dena Council *v* Government of Yukon). As shown by the Marshall and Sparrow decisions, cases may go as far as the Federal Supreme Court for resolution.		

d	Guidepost	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe_the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike Note – issue c has been removed from 3.1.2 and is contained in 3.2.1. The fishery meets scoring issue (d) for all SGs. Treaty and Aboriginal rights relating to hunting, fishing and gathering are recognized and affirmed as part of the Constitution of Canada by Section 35 of the Constitution Act, 1982. DFO is committed to providing Aboriginal people with reasonable opportunities to fish for food, social and ceremonial fishing purposes and to providing such fishing with priority over commercial and recreational fishing. The legal rights are implemented through the allocation of fishing rights that are associated with policy initiatives such as the AFS, the Marshall Response Initiative and the Integrated Aboriginal Policy Framework. The NRTA, which forms part of the Constitution Act, 1930, provides that Indian people "*have the right, which the Province hereby assures to them, of hunting, trapping and fishing game and fish for food at all seasons of the year on all unoccupied Crown lands and on any other lands to which (they) may have a right of access*." The Waterhen Lake fishery is largely prosecuted by First Nation fishers. In common with the Manitoban approach that explicitly protects First Nation rights, the FMP recognizes existing constitutionally protected Aboriginal fishing rights to domestic / subsistence fishing. The First Nations have food and ceremonial fishing rights on Waterhen Lake. The local fishers are protected from competition on Waterhen Lake from non-local fishers. One of the explicit goals of the Aboriginal Relations Branch of MCWS is to "*Lead or coordinate initiatives to manage natural resources in cooperation with Aboriginal communities*" Others are "*Develop and participate on inter-departmental and intra-departmental working groups to integrate the interests of the Aboriginal community in the development of legislation, policies and programs; Evaluate new and existing resource programs, projects and policies and where required, integrate the legal, cultural, social and economic requirements of the Aboriginal community; and … participate on departmental processes to ensure Aboriginal peoples' participation and role in managing natural resources*".		
References		http://manitobawildlands.org/lands_aborig_court.htm; http://www.gov.mb.ca/conservation/firstnations/index.html; Adkins & Paul; MCWS 2012a; DFO 2003; Aboriginal Fisheries Strategy; Species at Risk Act (SARA) (2003); Sustainable Fisheries Framework (2009); DFO 1998; Manitoba (ND), Lawseth.		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 100

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties; The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood.	Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organizations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike A wide range of organizations and individuals are engaged in the fishery management process in Canada, ranging from the DFO, to the scientific community to the fishery stakeholders. At the Provincial level the main role lies with MCWS; marketing (including an element of production recording) is the responsibility of the FFMC. At the local level there are fisher representative committees. The functions of these are explicitly defined and well understood and there is an established process for reporting and consultation. While there is explicit definition of the functions, roles and responsibilities of organizations and individuals in the management process, this does not cover all areas as there is not full co-management of the resources. Hence some fishers do not complete log books; the need for stakeholder input into compliance is informal.		
b	Guidepost	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike In Manitoba, *ad hoc* meetings with stakeholders provide the forum for the main affected parties to inform the management system. Local knowledge is used in designing and implementing management strategy. The fishery meets issue b at SG60. Local fishery management planning clearly involves wide bearing consultation with user groups including commercial and recreational fishers. In the past the management process has shown consideration of the information provided by stakeholders (e.g. closed areas on Waterhen Lake and mesh sizes). Thus the fishery meets issue (b) at SG80 and SG100.		
c	Guidepost		The consultation process provides opportunity for all interested and affected parties to be involved.	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.
	Met?		Y	Y
	Justification	Walleye & Northern Pike Any interested stakeholder has the opportunity to attend meetings and/or have direct meetings with the fishery managers. Regular consultation by the MCWS is considered to provide opportunity and encouragement for all interested and affected parties to be involved in the process; the meetings are held in fishing communities so facilitating the effective engagement of stakeholders.		
References		MCWS 2012a; DFO 2012a; DFO 1999		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 95

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	Partial
	Justification	<u>Walleye & Northern Pike</u> A substantial body of laws and related policy implicitly and explicitly requires approaches consistent to the precautionary approach in relation to criteria linked to both Principle 1 and Principle 2. The SFF "*provides the basis for ensuring Canadian fisheries are conducted in a manner which support conservation and sustainable use*" and "*the foundation of an ecosystem based and precautionary approach to fisheries management in Canada with new tools and policies being developed and implemented progressively over time*." DFO's freshwater activities adhere to the department's sustainable development principles as stated in *Sustainable Development – A Framework for Action*: shared stewardship, integrated management, an ecosystems approach, continuous improvement, the precautionary approach, and pollution prevention. Freshwater fisheries management activities include some or all of: fisheries policy, planning and legislation; integrated fishery management plans; fiduciary responsibilities; allocation; licensing; harvest monitoring; compliance monitoring and enforcement; fishing industry analysis; and fisheries management administration. MCWS specifically considers the precautionary principle. "Management decisions and actions, whose impacts are not entirely certain but which, on reasonable and well informed grounds appear to pose serious threats to either the economy, the environment, human health or social well-being will be anticipated, mitigated and prevented as avoidance of serious threats to the fishery is less costly than rehabilitating a collapsed fish stock". The objectives noted above are considered to be clear and explicit. The 2012 DFO analysis of the Integrated Fisheries Resource Management Program Activity concluded that the development of implementation of the precautionary approach is a work in progress. On that basis the auditors find that while clear explicit long-term objectives guide decision-making and are consistent with MSC Principles and Criteria and the precautionary approach, they are not required by management policy. In contrast the wording in MCWS (2013) (*will be anticipated, mitigated and prevented*) is considered as a requirement.		
References		DFO 1999; MCWS 2013; DFO 2012a		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 90

PI 3.1.4		The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> The quota for Walleye and a limited entry scheme for vessels provide incentives to fish on a sustainable basis. The maintenance of the *status quo* of the low take of retained and by-catch species, with limited gear interactions with ETP species, habitat and ecosystem is consistent with the First Nation ethic of maintaining a healthy environment and forms an indirect incentive. The research programme carried out by MCWS provides information and reduces uncertainty for fishers who harvest available resources as part of their annual income earning strategy. Collective action is encouraged through the management system and has led to the adoption of initiatives on the part of fishers to achieve outcomes related to sustainability. The empowerment of fishers within the management decision making process engenders a sense of ownership. The emphasis on shared stewardship provides the incentive to maintain a sustainable fishery consistent with MSC principles 1 & 2. The protection of small Northern Pike and limiting the catch of immature Walleye provides the incentive of future earnings for the license holders. The availability of Inland and Chitek lakes as alternative fisheries provides a realistic option to fishers and reduces the risk of overfishing Waterhen Lake. While the level of subsidies is reviewed on a regular basis, this is not in the context of an evaluation of their potential impact on fishing effort and the potential for unsustainable fishing practices. The fishery does not meet the SG100 issue.		
References		Site visit meetings; Commercial Net Fishing Program Plan; MCWS 2013		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 80

PI 3.2.1		The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's management system	Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.	Well defined and measurable short and long-term objectives, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery's management system.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> The objectives for management of the fishery are explicit in the 2013 FMP that provides the basis of management measures. Given the scale and intensity of the Waterhen Lake fishery it may be concluded that the defined objectives are relevant to the short and the long term. The second objective (the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) covers P2 aspects. The FMP has limited measurability with no definition of targets, indicators and sources of verification. The fishery meets the issue at SG60 and SG80 but does not meet the SG100 issue.		
References		MCWS 2013.		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 80

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Y	Y	
	Justification	Walleye & Northern Pike There is a clearly established decision making process for the Waterhen Lake fishery. The starting point is the resource assessment work that identifies the issues that may need to be taken into consideration in the up-coming season. The results of the previous season and the outcome of the research are reported by MCWS to stakeholders in a pre-season meeting to define the harvest strategy and related harvest control rules for the new season. A recognition of the need to provide alternative fishing opportunities led to the incorporation of Chitek and Inland lakes in the harvest strategy for Waterhen Lake. The decision making process is now formalized in the FMP that may be up-dated annually.		
b	Guidepost	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike Decisions taken over the years and related changes to management approach reflect that the processes respond to serious issues and these are adaptive. This has led to a limit on the season, maximum catches of Walleye in the summer fishery, lake zoning and changes in the mesh size regulations. The wider implication of decisions for socio-economic and long-term conservation consequences are taken into account e.g. the setting of a mesh size that reduces the risk of harvesting juvenile Northern Pike. The fishery specific objectives defined in the FMP are wide bearing in nature and illustrate that the decision-making process take into account serious and other important issues whenever these may arise. The frequency of contact between the managers and the fishers provides transparency to the decision-making process relating to all issues.		
c	Guidepost		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	Walleye & Northern Pike Precaution is required by the FMP. The annual research plan is designed to provide data and information relevant to the decision making process for the up-coming seasons harvest control rules ensuring that the best available information is used.		
d	Guidepost	Some information on fishery performance and management action is generally available on request to stakeholders.	Information on fishery performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders provides comprehensive information on fishery performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Y	Y	N

	Justification	Walleye & Northern Pike Information on fishery performance and management action is available at the regular meetings held in the Waterhen area. At these meetings, the available information and related decision making process is discussed. There is no formal reporting. The fishery meets the issue at SG60 and SG80 but not at SG100.		
e	Guidepost	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Y	Y	Y
	Justification	Walleye & Northern Pike The auditors are not aware of any court challenges. MCWS managers adopt a proactive approach in avoiding legal disputes by working closely with the stakeholders. The fishery meets the issue at all three SGs.		
References		MCWS 2013, Galbraith 2012.		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 90

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	<u>Walleye & Northern Pike</u> The MCS system fits with the scale and intensity of the fishery. Mechanisms implemented in the Waterhen Lake fishery include regular inspection; log books, FFMC sales slips, and close contact with the fishing community. The number of infringements detected is low and relate to "minor" transgressions (non-presence license holder in fishing operations; improper marking of the nets). These can be regarded as being within acceptable limits and that the system is effective. An important part of the system in the monopsony of the FRCC in the market for the harvest and the level of traceability. Given the location, scale and intensity of the fishery it is considered that the current approach to MSC is as comprehensive as may be expected and practicable. The number of court cases and the interaction of the local MCWS officer are ample evidence of the consistent enforcement ability. A large part of the system relies on informal peer pressure; non-compliance is unlikely to be acceptable to the group of fishers as a whole.		
b	Guidepost	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	Y	Y	Y
	Justification	<u>Walleye & Northern Pike</u> There are sanctions. A review by the auditors of the level of fines indicates that these are consistently applied. The limited number of legal cases provides evidence that they demonstrably provide effective deterrence.		
c	Guidepost	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Y	Y	Y
	Justification	<u>Walleye & Northern Pike</u> While there are limited examples of non-compliance, the majority of fishers and other agents working within the fishery comply with the laws and regulations. Through engagement with MCWS team, the completion of log books and recommending management measures, fishers collaborate with MCWS to provide information of importance to the management of the fishery. Fishers participate in the Association and attend the meetings with MCWS. Discussions with MCWS and the fishers together with the monopsonistic position of FRCC provide a high degree of confidence that the fishers comply with the management system.		
d	Guide post		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	<u>Walleye & Northern Pike</u> Although there are occasional transgressions (e.g. the license holder not being present on a fishing trip), the auditors have not been presented with any evidence of systematic non-compliance.		
References		IMM 2010; Fish Inspector Reports		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 100

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Y	Y	N
	Justification	Walleye & Northern Pike Research is under taken over a wide range of issues relevant to P1 and P2 activities, either directly for Waterhen Lake or for lakes with similar ecosystems and habitats. This research is consistent with the need to advise fishery managers of the status of the commercial fish stocks and thus the effectiveness of the management planning. The timing of the main activities contained in the research plan of the FMP is to inform the decision making process prior to confirmation of the harvest control rules of the up-coming season. This can be considered as a strategic approach that provides reliable and timely information relevant to P1. Given that the main P2 issues relate to retained and by-catch species, the research programme also provides data on other species. Concerning ETP species, habitat and ecosystem, the decision making process is informed by consideration of the maintenance of the *status quo* (i.e. there is no detectable increase in risk) and non-direct research (e.g. into gear issues and the food web). The research plan cannot be considered comprehensive as it does not identify non-direct research taking place that may have a bearing on the three principles, nor identify the areas that may need research but that are outside the possibilities for funding of activities related to a fishery of the scale and intensity of Waterhen Lake.		
b	Guidepost	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Y	N	N
	Justification	Walleye & Northern Pike The research results are available to fishery managers and through them the results are made known to stakeholders. Similarly, researchers have access to the data base and the information. The auditors have not seen any evidence to indicate that the results of the research are disseminated or that they are available to all interested parties. There is no evidence to show how the research results are disseminated and it appears clear that they are not widely and publically available. The fishery meets the issue at SG60 but not SG80 and SG100. This has led to the raising of a condition to certification.		
References		MSC 2013 (i); MSC 2013 (ii); MCWS (2013); Pellissier, Geisler		
OVERALL PERFORMANCE INDICATOR SCORE				Walleye & Northern Pike 70
CONDITION				3

PI 3.2.5		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives; There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Y	Y	Y
	Justification	<u>Walleye & Northern Pike</u> Prior to the development of the formal FMP (MCWS 2013) there were mechanisms to evaluate key parts the management system and these led to a number of adjustments in the regulations. MCWS (2013) records changes back to 1972. These related to limiting access, season dates for the winter fishery, mesh sizes and quotas. Changes were introduced due to the results of research undertaken and at the request of the fishers. In addition, there is permanent revision of the catches to ensure compliance with quotas. This is supported by rigorous compliance activities to reduce the risk of fishers failing to respect regulations. Catch data is supported by traceability through the FFMC purchase slips. MSC Guidance GCB4.11 that concerns informal approaches i.e. "Assessments against this PI may consider whether there are opportunities and/or forums for decision-makers to receive feedback on the management system. It should also consider other practices such as exchange of information between the community and the management institution. The regularity of such opportunities should be considered in scoring fisheries against this PI". Informal approaches are facilitated by the small size of the fishery and the number of fishers and the continuity of their communications with the MCWS compliance officer. The FMP is considered to be in place and this is a mechanism that will evaluate all parts of the management system.		
b	Guidepost	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	Y	Y	N
	Justification	<u>Walleye & Northern Pike</u> Under the MSC approach the periodicity of review should be considered according to the "*cultural context, scale and intensity of the fishery*". (MSC Guidance GCB4.11). The fishery is small – scale with a limited catch and a small number of fishermen. On that basis it may be considered that the degree of attention given to the fishery by MCWS far outweighs its commercial value, and there has been a continuous rather than occasional internal review. As noted above the fishery specific management system is subject to continual and regular internal review. While the FMP (MCWS) defines the process for external review, the auditors would like to see a completed report before considering that part of the scoring issue is met. This may not be available for some years. It is noted that the FMP defines the action but the period which the FMP covers is not defined. The audit team recommends that this external audit be completed in the third year of the MSC certification so that the results and the MCWS response are available to the team engaged in any re-certification. It is also recommended that the FMP be considered "evergreen" to reduce the need for future staff inputs.		
References		MCWS (2013); IMM 2009; IMM 2011; MSC 2013 (i); MSC 2013 (ii).		
OVERALL PERFORMANCE INDICATOR SCORE				<u>Walleye & Northern Pike</u> 90

Appendix 2: Risk Based Analysis

Table 10 Northern Pike PI 1.1.1 SICA Scoring Template Target Species

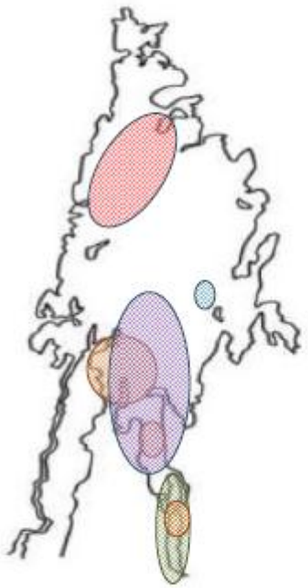
Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
Target species outcome Northern Pike	Fishing activities from all fisheries including: • Direct capture • Unobserved mortality (e.g. gear loss) • Capture as bycatch in other fisheries • Other identified risk-causing activities (please specify)	3	4	3	**Population size**	1	100
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario	Northern Pike is not caught as a directed fishery; rather it is a by-catch in the Walleye fishery. As there is limited gear loss and very small and very large Northern Pike are not susceptible to the mesh size, the catch in the Walleye directed fishery is considered to be the main source of non-natural mortality in the fishery.						
Rationale for Spatial scale of activity	Waterhen Lake is a small sized water body approximately 34 km long and at its widest 8 km. Fishing is not undertaken in all parts of Waterhen Lake. While Walleye is more prolific to the south where there is inflow and outflow from rivers and Northern Pike is found more to the north. The winter gill net fishery may be considered to take place up to 60 % of the lake taking into consideration depth and no fishing areas, but more in the south. Given the distribution of Pike and the area of the lake fished in the winter gill-net fishery, the spatial scale of the fishery on the overall Pike population is relatively small. This provides for a score of 3.						
Rationale for Temporal scale of activity	Under Manitoba's Commercial Harvest Schedule, the fishing season runs from when ice makes after November 1st to, and including, March 31. The 2012-2013 commercial fishing season ended on January 12th, 2013 in response to existing fisheries management rules and regulations governing the commercial fishery operating of Waterhen Lake. This resulted in a ten week long commercial fishing season on Waterhen Lake for the 2012-2013 commercial fishing season. If the Walleye quota is not met, the fishing season will typically run about 130 days. All fishermen begin the season in November on Waterhen Lake. It appears credible to conclude that gill nets are set in Waterhen Lake on every day that the fishery is open. On the basis of the foregoing, rational argument would indicate that the target fishery occurs between 100 and 200 days a year and the SICA score is 4.						
Rationale for Intensity of activity	Given the seasonal nature of the fishery and the limited number of fishers, it may be considered that there is a moderate detection of activity at broader spatial scale, or obvious but local detection. This attracts a SICA score of 3.						

Rationale for choosing most vulnerable sub-component	Given mesh size, the by-catch fishery of Northern Pike does not selectively harvest very small or very large individuals. Accordingly, neither productive capacity nor age / size / sex is considered as the most vulnerable sub-component. Geographic range is a function of the habitat and water movement and the fishery not considered a factor. On that basis, the selected most vulnerable sub-component was population size.
Rationale for Consequence score	Juvenile and large mature Northern Pike are not susceptible to the 96 mm mesh, the minimum size allowed in the Waterhen Lake fishery. This has the effect of maintaining the Northern Pike population. Under current regulations, the sustainability of Northern Pike is not considered to be under any threat from the Waterhen Lake fishery. On that basis, all the evidence is that Insignificant change to population size/growth rate (r). and it is unlikely to be detectable against background variability for this population. As a consequence score of 1 is allocated. This translates into an MSC score of 100.

	1	2	3
Population size	Insignificant change to population size/growth rate (r). Unlikely to be detectable against background variability for this population.	Possible detectable change in size/growth rate (r) but minimal impact on population size and none on dynamics.	Full exploitation rate but long-term recruitment dynamics not adversely damaged.

Table 11 White Sucker PI 2.1.1 SICA Scoring Template Target Species

Performance Indicator	Risk Causing Activities from Fishery Under Assessment	Spatial Scale of Activity	Temporal Sale of Activity	Intensity of Activities	Relevant Sub-Components	Consequence Score	MSC Score
PRINCIPLE TWO: Retained Species Outcome	• Fishing • Gear loss • Bait collection • Other identified risk-causing activities ……	4	4	3	Population Size	2	80
Species					Reproductive Capacity		
White Sucker					Age/Size/Sex Structure		
					Geographic Range		
Rationale for selecting worst plausible case scenario	At the workshop, stakeholders identified that the two species most often retained are White Sucker (*Catostomus commersoni*) and Shorthead Redhorse (*Moxostoma macrolepidotum*). The MCWS index netting showed that red fin comprised 7.4 % of the total mullet catch and these figures may be taken as a proxy for the commercial fishery. Together they comprise an annual average of about 31% of the catch. In addition, there are a limited number of other species taken (Yellow Perch; Sauger; Cisco (*Coregonus artedi*), marketed as "tullibee"; and Common Carp. The latter is an introduced species that is not native to Waterhen Lake. None of these three species comprises more than 5 % of the total catch; none are relatively valuable; and none are considered vulnerable. Stakeholders identified the commercial fishery for White Sucker was the worst plausible case scenario as its size overlaps significantly with the mesh size of the fishery and it is the most abundant "non-target" species. There is limited ghost fishing as fishers remove any abandoned gill nets found during the winter fishing season through the Lost Gear Retrieval Program. Commercial Fishers during the winter season will mark their net stakes "frozen" if they intend to return to retrieve. In addition, MB Conservation removes any lost nets from water during regular open water patrols. Typically Officers will remove fewer than 10 At the close of the season MB Conservation will remove any frozen nets encountered that are not marked "frozen" through an agreement with fishers assoc. There is no bait fishing.						
Rationale for Spatial scale of activity	The fishery is undertaken in Waterhen Lake which is a small sized water body approximately 34 km long and at its widest 8 km. Fishing is not undertaken in all parts of Waterhen Lake. Subsistence fishing during open water in the areas marked by orange ovals on the map and under ice in the blue oval. Recreational fishing is carried out in the green oval on the outflowing Waterhen River.						

	 On the basis of the information available, it is estimated that the overlap of the stock with the fishing activity of the unit of certification is between 31 % and 45 % leading to a SICA score of 4.
Rationale for Temporal scale of activity	Under Manitoba's Commercial Harvest Schedule, the fishing season runs from when ice makes after November 1st to, and including, March 31. The 2012-2013 commercial fishing season ended on January 12th, 2013 in response to existing fisheries management rules and regulations governing the commercial fishery operating of Waterhen Lake. This resulted in a ten week long commercial fishing season on Waterhen Lake for the 2012-2013 commercial fishing season. If the Walleye quota is not met, the fishing season will typically run about 130 days. All fishermen begin the season in November on Waterhen Lake. While the Waterhen Lake license provides access to a group of winterkill lakes to the north and some fishers will shift effort to those, it appears credible to conclude that gill nets are set in Waterhen Lake on every day that the fishery is open. On the basis of the foregoing, rational argument would indicate that the target fishery occurs between 100 and 200 days a year and the SICA score is 4.
Rationale for Intensity of activity	Given the seasonal nature of the fishery and the limited number of fishers, it may be considered that there is a moderate detection of activity at broader spatial scale, or obvious but local detection. This attracts a SICA score of 3.
Rationale for choosing most vulnerable sub-component	The fishery does not selectively fish females or males, nor, due to the size of the net, juvenile White Sucker; thus neither reproductive capacity nor age / size / sex were considered as the most vulnerable sub-component. The Geographic range is a function of the habitat and water movement and is not considered a factor. On that basis, the most vulnerable sub-component was considered to be population size, although predation by the target species was considered to be the biggest source of mortality.

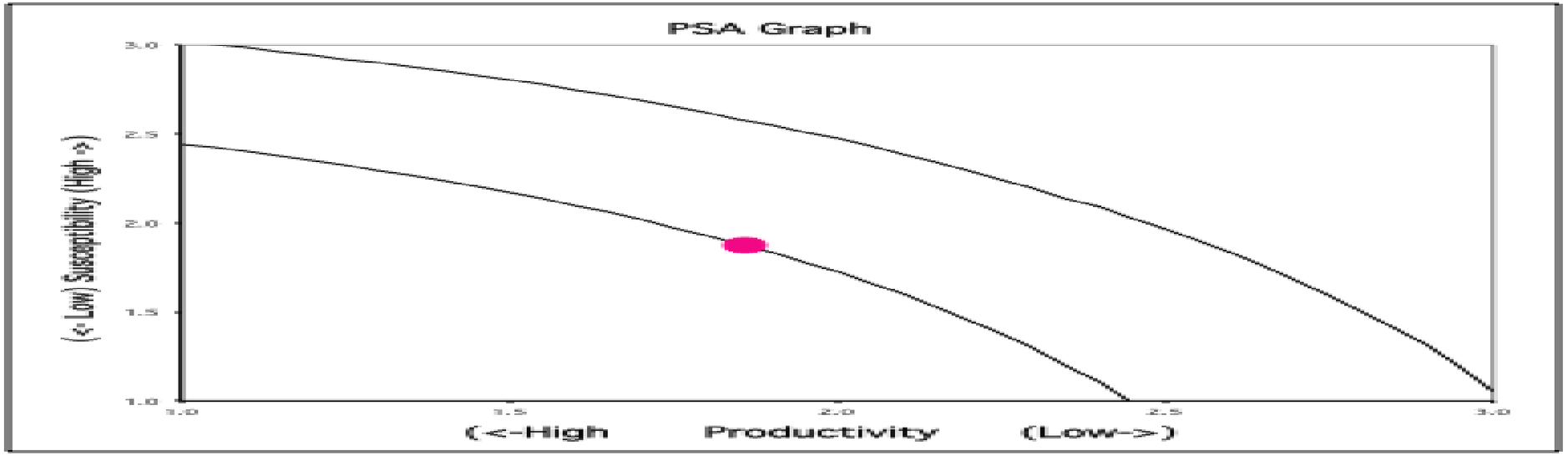
Rationale for Consequence score	Female White Sucker reach maturity at a length of 421 mm in Waterhen Lake, which is also the size at which they are susceptible to a 96 mm mesh, the minimum allowed in the Waterhen Lake fishery, and yet they persist in the lake. It is considered that the White Sucker population is maintained due to their being less vulnerable to gill nets than Walleye; observation shows them to almost always being gilled by the net rather than entangled. The sustainability of White Sucker is not considered to be under any threat from the Waterhen Lake fishery. On that basis, it is considered plausible to conclude that there is a minimal impact on population size and none on dynamics and a consequence score of 2 is allocated. This translates into an MSC score of 80. Given that only one species is considered, this is the maximum score. (CR PARA CC 2.4.4.5)

	1	2	3
Population size	Insignificant change to population size/growth rate (r). Unlikely to be detectable against background variability for this population.	Possible detectable change in size/growth rate (r) but minimal impact on population size and none on dynamics.	Full exploitation rate but long-term recruitment dynamics not adversely damaged.

Table 12: Principle 1: Northern Pike - PSA

PI number	1.1.1	Northern Pike	
Productivity	**Rationale**		**Score**
Average age at maturity.	2 years		1 (<5 years)
Average maximum age	15- 20 years		2 (10 – 25 years)
Fecundity	32,000 – 64,000 eggs		1 (>20,000 eggs)
Average maximum size	137 cm		2 (100 -300 cm)
Average size at maturity	376 mm		3 (>200 cm)
Reproductive strategy	Broadcast spawner		1
Trophic level	4.4		3
Fishery	**Waterhen Winter Commercial**		
Susceptibility	**Rationale**		**Score**
Areal Overlap	The directed Walleye fishery is concentrated in the south of the Waterhen Lake around the outflow and inflow channels, while it is know that in Waterhen Lake the Northern Pike is mainly found in the north of the lake in shallower waters. On that basis it is considered that the overlap (in the context of area closures) between the static gear and the Northern Pike is 10 % to 30 %.		2
Vertical Overlap	Given the depth of Waterhen Lake and the characters of the net, where gear is set it is considered that Northern Pike is highly susceptible.		3
Selectivity	Selectivity does not depend on the average size at maturity, rather the size of the mesh used means that small and large Northern Pike are not vulnerable to the gear. It is considered that a score of 2 is appropriate (SEE RESPONSE TO PEER REVIEWER 2).		2
Post capture mortality	All landed fish is dead.		3

				Productivity Scores [1 3]								Susceptibility Scores [1 3]						PSA scores (automatic)			
TAXA_NAME	FAMILY_NAME	SCIENTIFIC_NAME	COMMON_NAME	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level (fishbase)	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	Color on PSA plot	PSA Score	MSC Score	Risk Category Name	MSC scoring guidepost
Esociformes	Esocidae	Esox Lucius	Northern Pike	1	2	1	2	3	1	3	1.86	2	3	2	3	1.88		2.64	80.1	Low	>80



Appendix 3: <u>Conditions</u>

Condition 1	Northern Pike: There is a robust and precautionary harvest strategy in place
Performance Indicator	PI 1.2.1 The fishery has a research plan that addresses the information needs of management <u>Issues at Scoring Guideline 80</u> a. The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points. b. The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.
Score	70
Rationale	Issue b. As the harvest strategy has been designed to respond to walleye management it cannot be said that it is responsive to the state of the Northern Pike stock. The fishery does not meet Scoring Guideline 80.
Condition	By the fourth annual audit, the following Scoring Guideline 80 scoring issues must be met: The harvest strategy for Northern Pike is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.
Milestones	At the first annual audit the client will present the Certification Assessment Body with evidence that there has been formal consideration of a harvest strategy for Northern Pike. At the second annual audit the client will present the Certification Assessment Body with evidence that the defined harvest strategy has been formally accepted by Manitoba Conservation and Water Stewardship and data and analysis are underway to provide the basis for development of biological reference points to support the strategy. At the third annual audit the client will present the Certification Assessment Body with the analytically determined biological reference points. At the fourth annual audit the harvest strategy for Northern Pike will reflect findings on the stock status in relation to the defined reference points.
Client action plan	In the first year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will undertake the following activities: • Expand the effort to increase the sample size of Northern Pike as part of the Branch's on-going annual indexing program. • Start an annual commercial catch sampling program for Northern Pike as part of the Branch's data collection activities in support of effective monitoring and analysis that is part of a formal harvest strategy for sustainable management of the Northern Pike fishery. • Discuss with the Waterhen Lake commercial fishers a precautionary approach to fishery management of Northern Pike. In the second year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will draft a harvest strategy in full consultation with the Waterhen Lake Fishermen's Association including related associated specific harvest control rules & other management actions for Northern Pike. Manitoba Conservation and Water Stewardship (Fisheries Branch) will analyze data and information from Waterhen Lake and other sources to identify potential limit and upper stock reference points for Northern Pike together with related stock performance indicators. In the third year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will provide the Certification Assessment Body with the outcome and results of discussions with Waterhen Lake commercial fishers and other stakeholders on potential harvest control rules, biological reference points and performance indicators. In the fourth year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will provide the Certification Assessment Body with evidence of the use of biological reference points to inform the management decision making process as part of a formal harvest strategy, together with evidence of the defined harvest control rules.
Consultation on condition	No consultation is required on meeting this condition as the client is solely responsible for meeting this requirement of certification.

Condition 2	**There are well defined and effective harvest control rules in place**
Performance Indicator	PI 1.2.2 <u>Issues at SG80</u> Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. The selection of the harvest control rules takes into account the main uncertainties. Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.
Score	70
Rationale	Issue a. As harvest control rules are not well defined for Northern Pike they do not ensure that exploitation rates for Northern Pike may be adjusted if required.
Condition	By the fourth annual audit, the following Scoring Guideline 80 scoring issues must be met: For Northern Pike, well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.
Milestones	At the first annual audit the client will present the Certification Assessment Body with evidence that there has been consideration of the appropriateness of existing Harvest Control Rules for Northern Pike and, that options have been identified. At the second annual audit the client will present the Certification Assessment Body with evidence that the identified options have been discussed with stakeholders and may be implemented according to the status of the stock in the context of the harvest strategy. At the fourth annual audit there will be evidence that the harvest control rules required by the strategy have been implemented as required and in accordance with the stock status.
Client action plan	In the first year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will undertake the following activities: • Expand the effort to increase the sample size of Northern Pike as part of the Branch's on-going annual indexing program. • Start an annual commercial catch sampling program for Northern Pike as part of the Branch's data collection activities in support of effective monitoring and analysis that is part of a formal harvest strategy for sustainable management of the Northern Pike fishery. • Discuss with the Waterhen Lake commercial fishers a precautionary approach to fishery management of Northern Pike. In the second year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will draft a harvest strategy in full consultation with the Waterhen Lake Fishermen's Association including related associated specific harvest control rules & other management options/actions for Northern Pike. Manitoba Conservation and Water Stewardship (Fisheries Branch) will also analyze data and information from Waterhen Lake and other sources to identify potential limit and upper stock reference points for Northern Pike together with related stock performance indicators. In the fourth year of certification, Manitoba Conservation and Water Stewardship (Fisheries Branch) will provide the Certification Assessment Body with evidence of the use of biological reference points to inform the management decision making process as part of a formal harvest strategy, together with evidence of the defined harvest control rules.
Consultation on condition	No consultation is required on meeting this condition as the client is solely responsible for meeting this requirement of certification.

Condition 3	**The fishery has a research plan that addresses the information needs of management**
Performance Indicator	PI 3.2.4 Issues at Scoring Guideline 80 A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. Research results are disseminated to all interested parties in a timely fashion.
Score	70
Rationale	Issue b. Research results are disseminated to all interested parties in a timely fashion. The auditors have not seen any evidence to indicate that the results of the research are disseminated or that they are available to all interested parties.
Condition	By the second annual audit, the following Scoring Guideline 80 scoring issues must be met: Research results are disseminated to all interested parties in a timely fashion.
Milestones	At the first annual audit the client will present the Certification Assessment Body with evidence that there has been consideration of how to disseminate research results in a formal established approach. At the second annual audit the client will present the Certification Assessment Body with evidence that research results are being disseminated in a formal established way. By the third audit the required minimum score for PI 3.2.4 is 80.
Client Action Plan	Monitoring and research results will be disseminated to the general public through the Manitoba Conservation and Water Stewardship, Fisheries Branch website, which, within one year of Waterhen Lake becoming certified, will include a section dedicated to Waterhen Lake eco-certification. This website will include, in addition, materials related to certification efforts on Waterhen Lake including the management plan, the action plan, the certification assessment report and annual audit reports. Where University research is involved, theses and peer-reviewed publications will be prepared by the home organization and be available through normal University channels. In addition, these documents, links to these documents or citations for these documents (depending on copyright restrictions) will be made available to the public on the Conservation and Water Stewardship, Fisheries Branch website. For directly involved stakeholders and interested parties, all monitoring and research results and associated materials, including University based research projects, will be presented, discussed and distributed at the annual Waterhen Lake commercial fisher association meeting, which will be followed by a general public meeting to be held in the Waterhen Lake area. These materials will also be made available upon request to the Department of Manitoba Conservation and Water Stewardship, Fisheries Branch or to interested parties that attend the Fisheries Branch head office in person. The approach stated above will provide the venue to disseminate and share information to all involved stakeholders and interested parties in a timely fashion and ensure the materials are widely and publicly available.
Consultation on condition	There is no consultation required on meeting this condition since Manitoba Conservation and Water Stewardship, Fisheries Branch is solely responsible for meeting this requirement of certification.

Appendix 4: Peer Review Reports

Peer Review 1

Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes**	**Conformity Assessment Body Response**
Justification: The assessment has sufficient level of detail to be confident in this opinion. There are elements of the report that could have been clearer to help with the interpretation of this assessor. Some comments on this are provided below. However, this clarity issue does not alter the conclusions present it only requires some further specification to ensure the assessment scoring is fully justified.		WE HAVE RESPONDED TO THE VARIOUS POINTS MADE BY THE PEER REVIEWER AS DETAILED BELOW.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	**Yes**	**Conformity Assessment Body Response**
Justification: The conditions raised are entirely appropriate and important to ensure that the fishery maintains its status through time. Again the conditions would have benefitted from some more defined actions to meet the condition. This is of greater relevance to the client and considering how they will meet the condition. Some further comments are provided below.		IN DRAFTING THE CONDITION WE TOOK ACCOUNT OF THE NEED FOR THE AUDITORS NOT TO BE PRESCRIPTIVE. WE CONSIDER THAT THE CLIENT ACTION PLAN IS APPROPRIATE AND IT IDENTIFIES HOW THE RESEARCH RESULTS WILL BE DISSEMINATED AND THE WAY IN WHICH THE FINDINGS WILL BE PRESENTED TO A BROAD RANGE OF STAKEHOLDERS. ON THAT BASIS, WE HAVE NOT CHANGED THE CONDITION FROM VERSION 2 OF THE REPORT.

Do you think the client action plan is sufficient to close the conditions raised?	**No**	**Conformity Assessment Body Response**
Justification: The condition raised is important for the future of the fishery. The current client action plan is relatively standard and would benefit from identifying all the stakeholders that should have the research results disseminated to them. There should also be a clear action for each stakeholder that is most appropriate for them rather than just relying on passive dissemination via a website.		THE CLIENT ACTION PLAN IDENTIFIES HOW THE RESEARCH FINDINGS WILL BE DISSEMINATED TO VARIOUS GROUPS – INTERESTED STAKEHOLDERS WILL BE ABLE TO VISIT THE WEB SITE OR VISIT THE CLIENT'S OFFICES; RESEARCH WILL BE PUBLISHED AND IT IS EXPECTED THAT IT WILL BE AVAILABLE THROUGH A WEB SEARCH; DIRECTLY CONCERNED STAKEHOLDERS (THOSE CLOSE TO THE FISHERY INCLUDING FISHERS) WILL BE ABLE TO ATTEND THE MEETINGS. ON THAT BASIS WE CONSIDER THE CLIENT ACTION PLAN TO BE APPROPRIATE AND PROVIDE A BASIS FOR REVIEW AT THE ANNUAL SURVEILLANCE AUDIT.

General Comments on the Assessment Report

[Note: Comments in page number order] NOTE THAT DUE TO A CHANGE IN THE FORMATTING THE PAGE NUMBERING IN VERSION 3 IS DIFFERENT FROM THAT IN VERSION 2.

Executive summary – overall provides an honest and objective assessment of the key strengths and weaknesses.

One aspect that appeared unbalanced was the results were heavily focused on the Northern Pike even though the principal species of the fishery is the Walleye and the scores for Pike fishery are either the same or better. Whilst the 11 recommendations for Pike are valid and appropriate some may also apply to the Walleye although that was not clear. For example recommendation 1 suggests potential detriment to stock status but this may also have consequences for the Walleye.

CAB RESPONSE. THE CONCENTRATION ON NORTHERN PIKE LARGELY REFLECTS ADVICE ON WHERE ACTIVITIES MAY BE CONCENTRATED IN MAKING PROGRESS IN DEVELOPING A FORMAL APPROACH TO AN EVALUATION OF THE STATUS OF THE STOCK ON THE LAKE. HOWEVER, WE HAVE SLIGHTLY REDRAFTED THE ORIGINAL TEXT TO REFLECT THE COMMENT OF THE PEER REVIEWER.

2. is an important recommendation and this reviewer concurs with the need for greater sampling effort, however the choice of at least 200 pike is not clearly argued.

CAB RESPONSE. WE HAVE SLIGHTLY REDRAFTED THE TEXT. BIOLOGICAL DATA ON PIKE IN THE WATERHEN LAKE POPULATION ARE PRESENTLY INADEQUATE. THE PRIMARY CONCERN WAS THAT AN UNDERGRADUATE THESIS WAS CONDUCTED WITH FAR TOO FEW SAMPLES. FOR A NUMBER OF REASONS, IT WAS SUGGESTED THAT THE INDEX SAMPLE OF PIKE BE INCREASED. THE SPECIES HAS NOT BEEN ADEQUATELY INDEXED IN THE PAST. SUGGESTIONS HAVE BEEN MADE TO INDICATE HOW THIS MIGHT BE IMPROVED. IN A COMPANION STUDY CONDUCTED AS AN UNDERGRADUATE THESIS ON WALLEYE, AN APPROPRIATE NUMBER OF WALLEYE WERE USED. THE SAME SHOULD BE DONE FOR PIKE. A MINIMUM OF 200 PIKE IS BEING SUGGESTED BECAUSE ONE OF THE PRIMARY PROBLEMS IN DETERMINING MORTALITY RATE IS ACQUIRING ADEQUATE AGE DATA TO OBTAIN AN APPROPRIATE FIT ON THE DESCENDING ARM OF FREQUENCY WITH AGE. THERE ARE STATISTICAL WAYS TO DETERMINE HOW MANY PIKE SHOULD BE SAMPLED TO APPROPRIATELY ASSESS SUCH IMPORTANT BIOLOGICAL AND MANAGEMENT PARAMETERS. UNTIL ADEQUATE DATA HAVE BEEN COLLECTED TO STATISTICALLY JUSTIFY A SMALLER SAMPLE SIZE, THIS SAMPLE SIZE IS RECOMMENDED BECAUSE WE KNOW, FROM EXTENSIVE WORK ON PIKE POPULATIONS, THAT A SAMPLE OF 200 PIKE WILL PROVIDE ADEQUATE AND RELIABLE BIOLOGICAL DATA.

3. Again an important aspect is collecting correlated data such as water temperature, however there is an element of detail here about the depth and location of water quality samples. This is particularly important for the link to oxygen depletion. Some further detail would be very useful to fully consider the effectiveness of the proposed monitoring programme.

CAB RESPONSE. RECOMMENDATIONS ARE NON-BINDING. IT WILL BE FOR THE CLIENT TO BEST DESIGN AN APPROPRIATE SAMPLING PROGRAMME. THE EFFECTIVENESS OF THE PROGRAMME MAY BE SUBJECT FOR AUDIT AT SOME LATER STAGE. SPECIFIC RECOMMENDATIONS COULD BE MADE TO DIRECT SAMPLING EFFORT. HOWEVER, A PRELIMINARY SURVEY IS REQUIRED TO UNDERSTAND THE DEGREE OF VARIABILITY IN THE SYSTEM. SUCH A RECOMMENDATION WOULD BE EXTENSIVE, AND THE AUDITORS FEEL THAT IT IS INAPPROPRIATE IN THE CONTEXT OF THE PRESENT REVIEW. OXYGEN DEPLETION IS QUITE LAKE-SPECIFIC, AND THE AUDITORS ENCOURAGE THAT THIS ASPECT BE EXAMINED. THE DISCUSSION OF THE EFFECTS OF LOW WINTER OXYGEN ON A NORTHERN PIKE POPULATION DESCRIBES REFERENCES THAT WOULD HELP GUIDE A MONITORING PROGRAMME.

Description of the fishery – a very thorough presentation of the fishery. There are some presentational issues that could cause confusion or increase uncertainty in the reader as on p6 the ordering of tables is incorrect and there is some mistake in the labelling of the tables 1 and 2.

CAB RESPONSE. THE CONFUSION DERIVED FROM THE INCLUSION OF THE TABLE NUMBERS AND TITLE OF THE SOURCE IN VERSION 2 OF THE REPORT. THIS HAS BEEN CHANGED.

In addition, any table or figure showing average values should always provide an indication of the variability of that average estimate. Otherwise uncertainty increases.

CAB RESPONSE. NOTED. THIS IS AN IMPORTANT POINT. THROUGHOUT THE AUDIT EXERCISE, VARIABILITY WAS EMPHASIZED. INDEED, THE SAMPLE SIZE OF 200 FOR PIKE WAS RECOMMENDED TO ENSURE THAT, FOR THE COLLECTION OF BIOLOGICAL DATA FOR THIS SPECIES, VARIABILITY WOULD BE APPROPRIATELY ADDRESSED.

On p9 it would have been better to include some explanation of how the management operation is able to enforce the regulations. As with any fishery management there will be some limitations and constraints on the enforcement so if provided here, this would add to the assessment.

CAB RESPONSE. THIS IS COVERED UNDER PRINCIPLE 3.

It was not clear of the three lake closed areas why the western one was delineated as it is. The north and eastern areas have natural geographical features that create some degree of isolation and would be easily designated and observable in the field. However the western most area has two straight-line boundaries. It would have helped understanding of the effectiveness the closed areas if their designation and delineation were explained. Also for all three area how much of them are used by the fish. Are they fully used or is there some sort of buffer of protection?

CAB RESPONSE. THE REASON FOR THE CLOSED AREAS IS AS DESCRIBED; TO PROTECT CRITICAL SPAWNING AND CRITICAL HABITAT. THE WESTERN AREA IN FACT ENCLOSES TWO SEPARATE SMALL BAYS.

Later in the text it would have been useful to link the reproductive habitat extent to the closed areas to help with the determination of whether the closed areas are adequate or at their limit. If the latter then the argument for extending the closed areas for the fishery maintenance can be made.

CAB RESPONSE: THE INFORMATION IS NOT AVAILABLE TO DO THIS. THE CLOSED AREAS ARE BASED ON THE RECOMMENDATIONS OF FISHERS, GIVEN THIS REGULATION FOLLOWED FROM THEIR INITIATIVE IT IS ANTICIPATED THAT IF THE SITUATION WAS TO MERIT THEY WOULD PRESENT THE REQUIRED ARGUMENTS.

P13. The reference points are a useful management tool however the setting of LRP arbitrarily, for example, needs better justification. As the reference points are in effect used to make black and white judgements the setting of the points need to be robust and defendable. It would be expected that some further justification could be provided.

CAB RESPONSE: WE CONSIDER THAT THE FOUR PERFORMANCE INDICATORS AND THEIR REFERENCE POINTS DEVELOPED FOR THE WATERHEN FISHERY ARE ADEQUATE AND WILL PROVIDE GOOD TOOLS TO REFLECT CHANGES IN STOCK STATUS AS A RESULT OF CHANGING HARVEST RATES. WHILE WE WOULD EXPECT THE INDICATORS TO BECOME MORE ROBUST, WE DO NOT HAVE AN ISSUE WITH THE METHOD USED BY MCWS METHOD TO SET LRPS FOR THEIR PERFORMANCE INDICATORS. FOR EXAMPLE, THE LRP VALUE OF 2 CPUE BRING THE WATERHEN WALLEYE POPULATION DENSITY DOWN TO THE 25 PERCENTILE OF NORTH-WESTERN ONTARIO'S WALLEYE LAKES. ALTHOUGH THIS MAY BE CONSIDERED LIBERAL, THE POPULATION REMAINS VIABLE AND SHOULD RECOVER MORE RAPIDLY IN WATERHEN LAKE AS IT IS MORE PRODUCTIVE THAN MOST NW

ONTARIO WALLEYE LAKES AND HAS A LONGER GROWING SEASON. ACCORDINGLY THE VALUE IS NOT UNREASONABLE AND MAY BE REVISED IN THE FUTURE. THE SAME CAN BE STATED FOR THE SSB LRP WITH AN UPPER STOCK REFERENCE POINT OF 50% THAT IS EXPECTED TO MAINTAIN A SUSTAINABLE YIELD OF 20,000KG. THIS YIELD IS REASONABLE; THUS THE LRP IS NOT UNREASONABLE. WE HAVE SUGGESTED ADDITIONAL PERFORMANCE INDICATORS FOR THE CLIENT TO CONSIDER.

P13 and 14. There is little reference to understanding male fish in the fishery even though some of the later text discussed the importance of understanding sex ratio for any fish stock (p17 and 19). Again some further justification and explanation would be beneficial here.

CAB RESPONSE: THE TEXT ON WALLEYE COVERS CONCERN ABOUT PROTECTING WALLEYE POPULATION FECUNDITY AND RECRUITMENT SUSTAINABILITY, HENCE CONSIDERATION OF THE FEMALES STOCK. IN MANY WALLEYE POPULATIONS THERE ARE SEVERAL MALES PER FEMALE WHEN SPAWNING; ANY TARGETING OF MALES MAY HAVE A NEGATIVE IMPACT ON RECRUITMENT, BUT THERE IS NO HARD DATA TO SUPPORT THIS CONCERN. A REVIEW OF WALLEYE LITERATURE SUMMARIES (INCLUDING COLBY ET AL. (1979) AND BARTON (2011) SHOWS NO EVIDENCE TO SUGGEST WHAT WOULD CONSTITUTE A DESIRED OR DETRIMENTAL SEX RATIO FOR WALLEYE. WHILE SEX RATIO CHANGES MAY BECOME A FUTURE PERFORMANCE INDICATOR; CURRENTLY THERE ARE NO GROUNDS TO CONSIDER THAT SEX RATIOS ARE A CONCERN FOR THE WATERHEN LAKE WALLEYE FISHERY.

P14. The restricted licencing is important for the sustenance of the fishery. It appears that all licences are fully used, however that is assumed by the reviewer. A clear statement reflecting the use of the licences would provide the required confirmation.

CAB RESPONSE. CLARIFICATION ADDED TO THE TEXT – "ALL OF WHICH ARE UTILISED WITH A WAITING LIST SHOULD ANY BECOME AVAILABLE"

In terms of the existing fishers, it would be useful to understand what the consequences are for the fishers in terms of their ability to adapt to changes to mesh sizes in response to management regulation. There is no indication if they all have the required different mesh sized nets and the appropriate lengths.

CAB RESPONSE. CLARIFICATION ADDED TO THE TEXT "SUBJECT TO AGREEMENT FROM FISHERMEN WHO MUST INVEST IN THE NEW NETS"

P15, the statement of H being above 0.58 leading to no implementation of maximum gillnet does not specify mesh size or yardage. Presumably this relates to mesh size.

CAB RESPONSE. CLARIFICATION HAS BEEN ADDED TO THE TEXT.

In terms of the mesh size selectivity the auditors raised a concern about the changing mesh size. The evidence to support the effectiveness of mesh size selectivity should be a requirement in the opinion of this reviewer.

CAB RESPONSE. THE STATEMENT HAS BEEN INCORPORATED INTO THE RECOMMENDATIONS. IN VARIOUS PARTS OF THE REPORT, THE AUDITORS EMPHASIZED A NEED TO EXAMINE GILL-NET SELECTIVITY. THIS PERTAINS NOT JUST TO SIZE BUT TO SEX RATIO. INDEED, A RECENT REPORT ON SELECTIVITY WAS REFERENCED IN ORDER TO PROVIDE MANAGEMENT WITH A BETTER WAY OF DETERMINING SELECTIVITY OF THE INDEXING GILL NETS. THE COMMERCIAL NETS ARE, INDEED, SOMEWHAT DIFFERENT IN TWINE TYPE AND HANGING RATIO. THE REPORT EMPHASIZES THAT THIS NEEDS TO BE EXAMINED AND COULD BE DONE IN A COMPARATIVE STUDY USING A SMALL GANG OF THE COMMERCIAL GEAR IN CONJUNCTION WITH THE INDEX GILL NET SERIES. THE PEER REVIEWERS EMPHASIZED A VERY IMPORTANT POINT THAT NEEDS TO BE TAKEN INTO CONSIDERATION, BUT FROM THIS AUDITOR'S POINT OF VIEW, THAT DOES NOT NEGATIVELY AFFECT THE CERTIFICATION PROCESS.

P21. The section on prey and predators refers to cool and warm water fish communities of North America but this is not qualified to enable the reader to understand what is cool or warm water in this region.

CAB RESPONSE. THE TEXT HAS BEEN EDITED WITH THE INCLUSION OF "QUITE GENERALLY, FRESHWATER FISH CAN BE DIVIDED INTO THREE THERMAL GUILDS, DEPENDING UPON TEMPERATURE PREFERENCE AND OPTIMUM TEMPERATURE FOR GROWTH. THE THREE THERMAL GUILDS ARE AS FOLLOWS: WARM-WATER FISH HAVE VERY HIGH TEMPERATURE PREFERENCES AND OPTIMA (> APPROX. 25^{O}C), COOL-WATER FISH DO BEST AT INTERMEDIATE TEMPERATURES (APPROX. 15-25^{O}C), AND COLD-WATER FISH AT THE LOWEST TEMPERATURES (< APPROX. 15^{O}C)."

TO PUT THE THERMAL CONDITIONS IN CONTEXT, THE AUDITORS RECOMMENDED THAT TEMPERATURE DATA BE COLLECTED, BUT FROM THEIR EXPERIENCE BOTH LOCALLY AND REGIONALLY, WATERHEN LAKE WOULD NO DOUBT ESSENTIALLY CONTAIN A COOL-WATER FISH COMMUNITY AND BE PRIMARILY A COOL-WATER ECOSYSTEM. THE FISH COMMUNITY, IN FACT, SUBSTANTIATES THIS ASSUMPTION. MOST ARE PRIMARILY COOL-WATER SPECIES. LAKE WHITEFISH ARE NOT ABUNDANT, INDICATING THAT THEIR RECRUITMENT AND PRODUCTIVITY ARE NO DOUBT NEGATIVELY AFFECTED BY THERMAL CONDITIONS. HOWEVER, IN COLD AUTUMNS AND WINTERS, THIS SPECIES WOULD NATURALLY RECRUIT (PUBLISHED REFERENCES EXIST FOR THIS, IF NEED BE; E.G., *CASSELMAN, J.M. 1995. SURVIVAL AND DEVELOPMENT OF LAKE TROUT AND EGGS IN EASTERN LAKE ONTARIO—IN SITU INCUBATION, YORKSHIRE BAR, 1989-1993. JOURNAL OF GREAT LAKES RESEARCH 21(SUPPLEMENT 1): 384-399.* ONLY BY A GOOD COLLECTION OF TEMPERATURE DATA, PRIMARILY ASSOCIATED WITH MIDSUMMER AND ACQUIRED ON AN ANNUAL BASIS, CAN THERMAL CONDITIONS BE ASSESSED PROPERLY AND CHANGE DETECTED. ALL EVIDENCE IS THAT WATER TEMPERATURES ARE INCREASING ACROSS THE AREA, AS EVIDENCED BY CHANGES IN THE GREAT LAKES BASIN, AS WELL AS THE WESTERN CANADIAN ARCTIC (REFERENCES EXIST TO CONFIRM THIS). SO IT CAN BE ASSUMED THAT, OVER TIME, WATER TEMPERATURE HAS BEEN INCREASING IN WATERHEN LAKE AND, AS ELSEWHERE, IS PROJECTED TO INCREASE IN THE FUTURE. LOCAL MONITORING IS ESSENTIAL TO DOCUMENT THIS AND IS ONE OF THE IMPORTANT ENVIRONMENTAL ATTRIBUTES THAT THE AUDITORS SUGGESTED BE COLLECTED, ALONG WITH PRECIPITATION AND WATER LEVEL, AS WELL AS OXYGEN CONCENTRATION (BOTH SUMMER AND WINTER).

P22. There is an assumption (in part) about pike being opportunistic. Whilst this may be true it will depend on food availability and their need for food. There are published studies from Europe (particularly Sweden) on northern pike feeding selectivity that would help with this interpretation.

CAB RESPONSE. WE CONSIDER THAT THE TEXT PROVIDED IS SUFFICIENT. FOR ALL INTENTS AND PURPOSES, PIKE ARE OPPORTUNISTIC PREDATORS. THERE HAS BEEN CONSIDERABLE DISCUSSION ABOUT THEIR PREFERENCE; E.G., SOFT-RAYED FISH. AND AGREED, UNDER CERTAIN CIRCUMSTANCES, THEY CAN FEED SELECTIVELY, BUT THIS IS NOT THE NORM FOR THE SPECIES AND CERTAINLY DOES NOT APPLY TO THE PREY-FISH COMMUNITY OF WATERHEN LAKE. SO ALTHOUGH THE POINT IS WELL MADE THAT THEY CAN BE SELECTIVE, IT IS AN INTERESTING BUT SOMEWHAT MOOT POINT HERE.

P24. Stock status mentions the water temperature being close to ideal but somewhat above optimum. This is confusing as the ideal and optimum should be the same in terms of water temperature for metabolism of the fish. In addition the aspect of climate change is mentioned but there is little context behind this. What are the predictions for the area, as this will determine whether it is something that does need to be taken into account for this fishery in relation to the normal temperature range experienced.

CAB RESPONSE: GOOD POINT. CLARIFICATION. WHAT WAS REALLY MEANT WAS THAT WATER TEMPERATURE IN WATERHEN LAKE IN MIDSUMMER IS NO DOUBT CLOSE TO THE OPTIMUM BUT PROBABLY SOMEWHAT ABOVE IT. SO IT IS THE RELATIVE ASPECT THAT IS BEING ADDRESSED HERE, THAT WITHOUT DATA, IT IS EXPECTED TO BE SOMEWHAT ABOVE OPTIMUM. IF TEMPERATURE IS MONITORED, AS RECOMMENDED, IT WILL SOON BECOME APPARENT IF TEMPERATURE IS A PROBLEM AND IF THERE IS ANY EVIDENCE OF ITS INCREASING OVER TIME. PRODUCTIVITY OF FISH IS DIRECTLY RELATED TO OPTIMUM TEMPERATURE. IF TEMPERATURE GOES ABOVE OPTIMUM FOR NORTHERN PIKE, PRODUCTIVITY WILL DECREASE SOMEWHAT AND OTHER SPECIES WITH A SLIGHTLY HIGHER OPTIMUM TEMPERATURE, SUCH AS WHITE SUCKERS AND SHORTHEAD REDHORSE, WILL NO DOUBT SHOW INCREASED PRODUCTION. ACQUIRING TEMPERATURE DATA OVER TIME WILL CERTAINLY HELP IN UNDERSTANDING SUBTLE FISH-COMMUNITY CHANGES THAT CAN BE COMPENSATED FOR THROUGH APPROPRIATE MANAGEMENT CHANGES (E.G., UTILIZING SPRING TRAP NETTING AND REMOVAL TO ADJUST FOR UNDESIRABLE FISH-COMMUNITY CHANGES).

P27. The recommendation for a spring live trap fishery for pike is reasonable but it would require careful monitoring to determine the effect on larger fish through time.

CAB RESPONSE. THIS HAS BEEN NOTED IN THE TEXT. GUIDELINES HAVE BEEN PROVIDED TO THE CLIENT FOR MONITORING PIKE SIZE IN RELATION TO A SELECTIVE SPRING TRAP-NET FISHERY TO BETTER BALANCE THE FISH COMMUNITY BY REDUCING THE ABUNDANCE OF SMALL PIKE AND PREY SPECIES IF LARGE PIKE DECREASED IN ABUNDANCE AND THEIR PREDATION WAS NOT ADEQUATE TO MAINTAIN A HIGHLY PRODUCTIVE, WELL-BALANCED FISH COMMUNITY.

P28. The reference to substantially temperature increase needs qualified in terms of what substantial means and how likely it is to occur.

CAB RESPONSE: IF WATER TEMPERATURE IS MONITORED, CHANGES CAN BE RELATED TO FISH-COMMUNITY DYNAMICS IN WATERHEN LAKE. TAKING THERMAL REQUIREMENTS AND TEMPERATURE CHANGE INTO CONSIDERATION, IT WILL BE POSSIBLE TO DETERMINE WHETHER RECRUITMENT AND GROWTH OF SPECIES WITH A HIGHER THERMAL OPTIMUM ARE INCREASING. IF THEY ARE, THEN TEMPERATURE INCREASES ARE SUBSTANTIAL. SO THIS REQUIRES A COMPARATIVE STUDY OF TEMPERATURE AND RECRUITMENT DYNAMICS. THIS IS WHY AGE ASSESSMENT IS IMPORTANT. YEAR CLASS SHOULD, IN FACT, BE CALCULATED ON A SAMPLE OF FISH FROM THE INDEXING PROGRAM TO EXAMINE RECRUITMENT DYNAMICS ON A SPECIES BASIS. THIS WOULD BE THE MOST APPROPRIATE WAY TO MONITOR CONDITIONS AND CHANGES IN WATERHEN LAKE AND THE FISH COMMUNITY. FOR REFERENCE PURPOSES, THE PEER-REVIEW REPORT DETAILS THE EFFECTS OF TEMPERATURE ON RECRUITMENT ON A NUMBER OF SPECIES AND THE VARIOUS THERMAL GUILDS. THIS WOULD PROVIDE INSIGHTS CONCERNING WHAT IS MEANT BY "SUBSTANTIAL" (SEE *CASSELMAN, J.M. 2002. EFFECTS OF TEMPERATURE, GLOBAL EXTREMES, AND CLIMATE CHANGE ON YEAR-CLASS PRODUCTION OF WARMWATER, COOLWATER, AND COLDWATER FISHES IN THE GREAT LAKES BASIN. PAGES 39-59 IN N.A. MCGINN, PROCEEDINGS OF AMERICAN FISHERIES SOCIETY SYMPOSIUM 32, FISHERIES IN A CHANGING CLIMATE. 295 PAGES*). A MIDSUMMER TEMPERATURE INCREASE OF 1, 2, AND 3 DEGREES C IS DOCUMENTED AS BEING SUBSTANTIAL IN ITS EFFECT ON RECRUITMENT DYNAMICS.

P28 Ecosystem aspect.

This is an important aspect for the fishery but some parts of the background are more detailed than others hence the full picture across the ecosystem is not provided. It is very much focused, unsurprisingly, on the fish community. However, it would have been useful to have an overview of the local ecosystem factors that could affect the species differently. For example, the link of the lakes to the rivers in terms of connectivity could be important for the fishery and other species but it is difficult to ascertain whether this is an important potential influence on the stock. In addition the water quality and the functional habitat aspects would have benefitted from being more explicitly linked to the main fish species under consideration. It would have also provided a more justified basis on which to compare Waterhen Lake with other similar lakes and the ELA. By providing a clear compare and contrast of the ecosystem factors in the different lakes the reader could have been given the required justification for using the other lakes as good comparator fisheries and lakes.

CAB RESPONSE: THERE ARE CONSIDERABLE QUANTITATIVE DATA FOR WATERHEN LAKE. WE CONSIDER THAT COMPARISON WITH OTHER LAKES CONFUSES THE ISSUE AND, IN A NUMBER OF WAYS, DIMINISHES REQUIREDEMPHASIS ON THE WATERHEN LAKE DATA. THERE ARE ADEQUATE DATA TO THOROUGHLY ADDRESS SUSTAINABILITY AND CERTIFICATION FOR THE WATERHEN LAKE FISHERY. THE REFERENCE TO THE ELA HAS BEEN DELETED AS A CONSIDERABLE AMOUNT OF ECOSYSTEM INFORMATION WOULD NEED TO BE PROVIDED TO

FULLY EXPLAIN DIFFERENCES THAT INEVITABLY WOULD EXIST. AS THEY ARE NOT CONDSIDERED TO BE CHANGING WE HAVE NOT DEVELOPED ANALYSISON WATER-QUALITY AND FUNCTIONAL-HABITAT ASPECTS. THE NEED TO COLLECT ENVIRONMENTAL DATA IS NOTED. IF THESE ENVIRONMENTAL DATA ARE MONITORED, THEY WILL PROVIDE VALUABLE INSIGHTS CONCERNING POSSIBLE ECOSYSTEM AND FISH-COMMUNITY CHANGES. THIS DIRECTLY RELATES TO CLIMATE CHANGE MEASURED THROUGH TEMPERATURE AND WATER-LEVEL CHANGE AND DYNAMICS. INDEED, THE AUDITORS HAVE EMPHASIZED THAT THE POTENTIAL EFFECTS OF CLIMATE CHANGE ON THE FISH COMMUNITY OF WATERHEN LAKE ARE QUITE REAL AND NEED TO BE MONITORED.

P32- onwards. Management system

It is not clear why so much of this section was given in quotations direct from the policy and legislation. It is important to understand the legal and management context and it is apparent in this comprehensive review that the lake has significant regulations to draw upon to ensure the fishery is conducted in an appropriately sustainable manner. However the generality of the quoting meant that the elements of most relevance for the fishery and its management were a bit lost. For example the 9 principles on p33 are all of some relevance but which ones are potentially the biggest hurdle for the Waterhen lake fishery and which ones are fully covered?

It is not until p37 where the application to the lake itself is clearly provided. The preceding pages could have been much reduced to summarise the primary legislation and policy that the fishery operates within and then highlight those aspect of most importance for the sustenance of the fishery.

P38. The management system has all the elements for success but how each aspect will be achieved is not always clear. For example principle 7 concerns fairness – how will that be determined and managed would have been useful detail to provide.

CAB RESPONSE. THE ABOVE HAS BEEN COVERED BY A SUBSTANTIAL REDRAFT.

P40. Research has been identified as of importance and in particular the dissemination of the outputs. The research is essential but how it is to be coordinated and how the dissemination will ensure that it reaches all stakeholders needed more explanation to determine the effectiveness of the research programme.

CAB RESPONSE. THIS ISSUE IS THE SUBJECT OF THE CONDITION.

A few minor edits: There are a small number of typos and expressions that need checked

CAB RESPONSE. THE REPORT HAS BEEN EDITED.

P11 micrograms of phosphorous needs to use the correct symbol, mu.

CAB RESPONSE: NOTED

Performance Indicator Review

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
1.1.1	Yes	Yes	NA	There is no contention with the PI however the lack of specifically collecting data on the Walleye males would appear an oversight if the fishery begins to show signs of significant change. However given the other reference points and the fact that the fishery is highly restricted the importance of considering the males specifically is reduced.	NO COMMENT
1.1.2	Yes	Yes	NA	Again the information available is good and rationale appropriate. The mortality estimates are however based on studies from the 1970's and it would be better to consider some updating.	WE HAVE ADDED A RECOMMENDATION - GIVEN THE VINTAGE OF THE DATA WE RECOMMEND THAT THE CLIENT REVIEWS OTHER SOURCES TO ENSURE THAT THE LAKE WINNIPEG FINDINGS USED TO ESTIMATE THE LRP FOR WALLEYE CONTINUE TO BE RELEVANT OR ARE THE MOST APPROPRIATE.
1.1.3	Yes	Yes	NA	As shown there is no reason to consider the stock depleted	NO COMMENT
1.2.1	Yes	Yes	NA	The fishery is clearly well managed and the harvest strategy appears to operate well. There is even the option for alternative fishery harvest elsewhere, which is unlikely to be required given current conditions but it useful back up.	NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
1.2.2	Yes	No	NA	There is a lot of confidence placed in the harvest control rules leading to the 100 score. The basis of the reference limits is set arbitrarily and should be better justified. For this reason this reviewer would reduce the score because of uncertainty. However this would only mean a reduction to 90 or 95 to reflect the uncertainty.	ON REVIEW WE HAVE REDRAFTED THE JUSTIFICATION FOR ISSUE b AND WE AGREE WITH THE PEER REVIEWERS OPINION THAT THE FISHERY DOES NOT MEET SG100. AS A RESULT THE SCORE FOR PI 1.2.2 HAS BEEN REDUCED FROM 100 TO 90 FOR BOTH UOC.
1.2.3	Yes	Yes	NA	Some important information is already collected but the assessment identifies correctly the need for better information.	NO COMMENT
1.2.4	Yes	Yes	NA	Again there is a lot of information already collected to meet this PI for the Walleye, although more up to data methods of dealing with the uncertainty would improve the stock evaluation process. For pike the RBF is used and is justified.	NO COMMENT
2.1.1	Yes	Yes	NA	The PI is assessed using the RBF which uses reasonable argument for the score given (as highlighted in the RBF section below)	NO COMMENT
2.1.2	Yes	Yes	NA	The PI is based on a partial strategy which on the evidence provided does not suggest any problem. Close assessment in the future will be required to understand whether this PI remains at the current score (or better) or if it deteriorates. But at present there is not evidence that this is likely.	NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
2.1.3	Yes	Yes	NA	Again the evidence base is reasonable to support this score. The recommendation for compulsory logbooks is important to ensure that the required data are available in the future.	NO COMMENT
2.2.1	Yes	Yes	NA	Owing to the very low by-catch in the fishery this PI is appropriate. The score could be higher but whether data on the other species will become available is questionable unless some requirement for the data arises. Hence this PI is unlikely to ever meet the 100 score, but more importantly it is not necessary that it should.	NO COMMENT
2.2.2	Yes	Yes	NA	As the by catch is very low and the fishery is unlikely to become problematic for bycatcH populations the score is appropriate. Again there is not necessarily a need to have a full strategy in place for the non-target fush species owing to the current features of the fishery for Walleye and Pike.	NO COMMENT
2.2.3	Yes	Yes	NA	There appears no issue because of the low by-catch. However the recommendation for logbook recording of by-catch will be a useful addition to the certainty of the score.	NO COMMENT
2.3.1	Yes	No	NA	The score is high based on the high plausibility of no effects on ETP. However there must remain some uncertainty here therefore the score of 100 is questioned. A suggested score of 90 or 95 would acknowledge this potential uncertainty that relates to unknown effects that could be manifest at some time in the future for reasons not fully apparent at the moment, perhaps in combination effects that link to the fishery.	GIVEN THE LACK OF INTERCATION IN OUR OPINION IT MAY BE CONCLUDED THAT There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species. SHOULD THE SITUATION CHANGE IN THE FUTURE WITH EVIDENCE TO SHOW THE CHANGE THIS MAY BE TAKEN INTO CONSIDERATION IN FUTURE ANNUAL SURVEILLANCE AUDITS.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
2.3.2	Yes	Yes	NA	The score is realistic given the lack of potential reason or information on any interaction effects on ETP.	NO COMMENT
2.3.3	Yes	Yes	NA	Same as 2.3.2	NO COMMENT
2.4.1	Yes	Yes	NA	The nature of the fishery and the seasonality in relation to the habitat type support the high score of this PI. However one aspect that is missing is the detail on the extent of the functional habitat with regards to the fishery active areas. Also direct evidence of how the fishery activity interacts with the habitat is not collected hence a slightly lower score (e.g. 95) would have been expected.	ON REVIEW WE AGREE WITH THE TWO PEER REVIEWER AND THE SCORING COMMENT HAS BEEN REDRFATED WITH THE CONCLUSION THAT THE FISHERY DOES NOT MEET SG100 AND THE ALLOCATED SCORE IS 80.
2.4.2	Yes	Yes	NA	The scoring is appropriate and in fact it is unlikely that the SG100 category would ever be met as the nature of the fishery and the type of habitat suggest that there is no likely impact or harm.	NO COMMENT
2.4.3	Yes	Yes	NA	The information on habitat type appears appropriate for this fishery impact consideration. However it may prove useful for understanding potential variability in the stock if further habitat data were collected.	ON CONSIDERATION WE CONSIDER THAT THE SCORE OF 80 IS APPROPRIATE.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
2.5.1	Yes	Yes	NA	No evidence is apparent that the fishery will cause any harm to the key ecosystem elements. However this is based on a fish community assessment of the ecosystem in the lake. A better coverage of the main elements within the ecosystem would provide more confidence in this assessment. This would be more important if any change to the Northern Pike fishery occurs because of the caviar interest. Hence the fishery needs to be clear what ecosystem elements (not just fish) may be affected to properly consider this aspect.	GIVEN OUR CONCLUSION THAT THERE IS NO EVIDENCE TO ALLOW THE FISHERY TO MEET SG100 WE CONSIDER THAT THE ALLOCATED SCORE OF 80 IS APPROPRIATE.
2.5.2	Yes	No	NA	The available information has been used but there is a bias towards the fish community, hence there should be wider consideration of the lake ecosystem structure and function to fully assess this PI. So the score of 90 is justified from the fish community basis but there should be wider consideration to support this score.	SCORING COMMENTS HAVE BEEN REDRAFTED TO JUSTIFY A SCORE OF 80.
2.5.3	Yes	No	NA	Similar to 2.5.1 and 2.5.2 the focus is on the fish community. Hence estimates of changes to biodviersity are based on the fish. Further ecosystem consideration should be integrated with the fish assessment for this PI score to be fully supported. However there is no current suggestion that the score would go below 80	SCORING COMMENTS HAVE BEEN REDRAFTED AND THE SCORE REDUCED TO 80.
3.1.1	Yes	Yes	NA	A very comprehensive legal framework is apparent.	NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
3.1.2	Yes	Yes	NA	The management system appears effective and accessible to parties involved. Whether they are fully understood by all parties is not clear.	WE INTERPRET THIS COMMENT TO RELATE TO THE NOT ALL FISHERS COMPLETING LOG BOOKS AND THUS IMPLYING A LACK OF UNDERSTANDING ON THEIR PART. GIVEN THE MAIN CATCH DATA IS AVAILABLE FROM THE FMCC RECORDS WE DO NOT CONSIDER THIS OMISSION TO BE KEY; HENCE THE FISHERY MEETS THE FIRST ISSUE AT SG80 BUT NOT AT SG100.
3.1.3	Yes	Yes	NA	The comprehensive legal and policy framework is wel aligned with the MSC principles and criteria	NO COMMENT
3.1.4	Yes	Yes	NA	The incentives available in the contect of the fishing activities on the lake are appropriate with maintaining a sustainable fishery.	NO COMMENT
3.2.1	Yes	Yes	NA	Objectives for the fishery are well defined and explicit and are well aligned with the MSC principles 1 and 2.	NO COMMENT
3.2.2	Yes	Yes	NA	The fishery has a well developed management system that enables the decision making to be effective and reactive within an appropriate time scale. The FMP can be updated and as such operates in an adaptive manner.	NO COMMENT
3.2.3	Yes	Yes	NA	The fishery appears to work very effectively in self regulation which requires close surveillance and monitoring.	NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
3.2.4	Yes	Yes	Yes (with reservation)	The research and dissemination are crucial for the future of the fishery.There appears a lack of research coordination and this has consequences for the dissemination. Whilst the identification of this as an issue is important the recommendation to ensure availability via the website does not go far enough to address the situation, in the opinion of this reviewer. There is an assumption that the passive mode of making information available via a website will be effective. This is not guaranteed and the management of the fishery should implement other more active modes of dissemination and engagement with all the stakeholders.	WE AGREE WITH THE PEER REVIEWIER BUT ON REVIEW WE HAVE MAINTAINED THE PREVIOUSLY ALLOCATED SCORE AND THE CONDITION. RESEARCH COORDINATUION WOULD BE REQUIRED TO ACHIEVE ISSUE a AT SG100. THE APPROACH TO THE CONDITION WILL BE AUDITED. .
3.2.5	Yes	Yes	NA	The systems in place appear to be well developed however the specification of external review to be completed is important for the continued promotion of this fishery as having an effective management system that meets the objectives as set out.	NO COMMENT

Any Other Comments

Comments	Conformity Assessment Body Response
Comments made on the report are provided above in the section prior to the PI scoring. Some of these have relevance to the PI assessment and were the basis for parts of the justification text used in the table above.	NO COMMENT

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well referenced? Yes/No	Justification:	Conformity Assessment Body Response:
1.1.1	Yes	Yes	The northern pike risk based analysis for this PI have clear rationale and appear appropriate given the limited knowledge on this species in the lake. There could be greater certainty attached to some aspects given the knowledge in Europe as well as North American on this species. Nevertheless the current assessment of risk to this species appears justified. The potential issue of the caviar market increasing requires a close and regular updating of the risk to be incorporated into the management guidance.	NO COMMENT
2.1.1	Yes	Yes and No	The white sucker is potentially vulnerable in terms of the size that the females become mature and potentially caught in the net. However there is justification for the scores presented. The only exception is the intensity of activity that is a bit subjective, although the accompanying statements are not unreasonable. The rationale would however be improved with some reference to examples from other seasonal fisheries with limited fishing activity that support the risk based assessment.	ON REVIEW WE CONCLUDE THAT THE RATIONAL IS OBJECTIVE AND REFLECTS THE SITUATION ON WATERHEN.

Peer Review 2

Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	**Yes**	**Conformity Assessment Body Response**
Justification: Overall the answer is yes, but there are some questions over the scoring, particularly of Northern pike in P1 (including the RBF score), that should be resolved before confirming the assessment team recommendation.		SEE RESPONSE BELOW

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	**Yes**	**Conformity Assessment Body Response**
Justification: The condition is clear and straightforward and should achieve the SG80 outcome within the specified timeframe.		NO COMMENT

Do you think the client action plan is sufficient to close the conditions raised?	**Yes**	**Conformity Assessment Body Response**
Justification: The action plan is clear and achievable and would meet the requirements of the condition and PI		NO COMMENT

General Comments on the Assessment Report

Walleye and pike are considered together in the assessment report, and so, likewise, both are considered in this single peer review – where comments relate to one or the other (principally in P1) these are specified.

CAB RESPONSE: NO COMMENT

The recommendations are useful. However, these are very prominent, especially in the Summary. It may be appropriate to clarify that these are not mandatory conditions, but personal recommendations of the assessment team.

CAB RESPONSE: CLARIFIED IN THE MAIN TEXT AND EXCLUDED FROM THE EXECUTIVE SUMMARY.

A more complete justification as to why the walleye is not an enhanced species – including reference to MSC scope criteria may be appropriate.

CAB RESPONSE: CLARIFIED

The assessment team should confirm that there is a separate population (most importantly for walleye) in Lake Waterhen and that this lake is not a sink for recruitment in Winnipegosis – i.e. that there is a separate self-sustaining population in Waterhen.

CAB RESPONSE: CONFIRMED

It would be very helpful to show trends in reference indicators over recent years (e.g. by a 'traffic light' system); also to clarify the degree of confidence in each reference indicator with respect to stock status (e.g. why is it recommended that they be reviewed over time?)

CAB RESPONSE: THE INDICATORS ARE NEW AND THRE IS INSUFFICENT INFORMATION TO IDENTIFY TRENDS.

Traceability text (section 4) should more clearly demonstrate that the traceability processes and records allowing catches to be tracked from the buyers to one or more of the 22 licence holders and to confirm that the catch is from Waterhen. Section 4.3 should unequivocally confirm that systems are sufficient to allow product to enter into CoC.

CAB RESPONSE: THE SECTION HAS BEEN REDRAFTED.

Performance Indicator Review

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
1.1.1	Yes	partly	n/a	For walleye, the key evidence is clearly provided by the reference indicators, and these are referenced accordingly (although as noted above, a diagram showing the time series of the indicators ('traffic lights') against their reference levels would be helpful). For SIa the point is well made. For SIb, given the number of occasions that indicators have fallen below TRPs in recent years, and the short time period of the indicators, it is not clear that there is a high degree of certainty (95th percentile) that the true status of the stock has been fluctuating around its TRPs over recent years. See comments in RBF for pike.	AFTER CONSIDERATION WE HAVE MAINTAINED THE TEXT AS IN VERSION 2.
1.1.2	Yes	yes	n/a	For walleye, the scoring is adequately justified, although it should include clarification on how the RPs provide a similar intent or outcome to Bmsy.	TEXT AMENDED
1.1.3	n/a	n/a	n/a		NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
1.2.1	Yes	Partially	n/a	SIa: The text in the main body of the report supports a score of 100 for walleye, but the wording in the scoring commentary is more confused and could better reflect the situation in the fishery. For pike, the text does not support a score of 80, unless a clear linkage between walleye and pike populations can be established such that the same strategy would work equally well for both. SId appears to meet the SG100 requirements – the SI asks for a review to take place, not that the indicators are appropriate; the latter is accounted for elsewhere.	THE SCORING RATIONAL HAS BEEN REDRAFTED. THE SCORE HAS BEEN REDUCED TO 70 WITH THE SETTING OF A NEW CONDITION. THE TEXT HAS BEEN AMENDED AND WALLEYE MEETS ISSUE d AT SG100.
1.2.2	Yes	partially	n/a	SIa: It is not clear that pike meets the SG80 level; SG60 appears appropriate for pike – the exploitation rate may be adjusted, but this do not 'ensure' that exploitation rates can be adjusted for pike if required. SIb: The HCRs are not designed for pike, or for a mixed fishery of the two species; the SG100 may not, therefore, be met.	THE SCORE HAS BEEN REDUCED TO 70 WITH THE SETTING OF A NEW CONDITION.

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
1.2.3	Yes	partially	n/a	SIa: while information could always be improved, that available for the walleye and pike fisheries appears to meet the SG100 level, especially given the established relationships with environmental variables such as GDDs. SIb; as above, SG100 appears to be met for walleye, although not for pike.	ON REVIEW WE HAVE CONCLUDED THAT BOTH WALLEYE AND NORTHERN PIKE MEET ISSUE a AT SG100 OF PI1.2.3. THE TEXT HAS BEEN REDRAFTED AND THERE IS A REVISED SCORE FOR BOTH SPECIES (90). ON REVIEW WE HAVE MAINTAINED THE SCORE DUE TO THE INHERENT UNCERTAINTY OF THE SITUATION ON WATERHEN.
1.2.4	Yes	partially	n/a	SIa: at SG100, the walleye fishery is not awarded 100 because of a lack of consideration of environmental factors – this is not, however, a requirement here and SG100 appears to be met.	ON REVIEW WE HAVE CONCLUDED THAT WALLEYE MEETS SCORING ISSUE a AT SG100 FOR PI1.2.4. THE TEXT HAS BEEN EDITED AND THERE IS A REVISED SCORE (90) FOR WALLEYE.
2.1.1	Yes	yes	n/a	RBF used	NO COMMENT
2.1.2	Yes	yes	n/a		NO COMMENT
2.1.3	Yes	yes	n/a		NO COMMENT
2.2.1	Yes	yes	n/a		NO COMMENT
2.2.2	Yes	yes	n/a		NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
2.2.3	Yes	yes	n/a		NO COMMENT
2.3.1	Yes	yes	n/a		NO COMMENT
2.3.2	Yes	yes	n/a	The scoring is appropriate, although an argument for SG100 could be made if SARA recovery strategies are shown to be 'comprehensive' in Manitoba.	ON REVIEW WE DISAGREE; WE HAVE MAINTAINED THE SCORE OF 80 FOR BOTH SPECIES FOR THE REASONS STATED.
2.3.3	Yes	yes	n/a		NO COMMENT
2.4.1	Yes	no	n/a	The text supports a score of 80, not 100; the key factor being the lack of evidence.	ON REVIEW WE AGREE AND THE SCORE HAS BEEN REDUCED TO 80 FOR PI 2.4.1.
2.4.2	Yes	yes	n/a	It is also noted that there are important closed areas within the lake?	NOTED
2.4.3	Yes	yes	n/a		NO COMMENT
2.5.1	Yes	yes	n/a		NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
2.5.2	Yes	partially	n/a	For SIs c and d, measures are those which are part of a strategy/plan. As such a strategy does not appear to exist for these fisheries, a score of 80 appears more appropriate here.	ON REVIEW WE AGREE AND THE SCORE HAS BEEN REDUCED TO 80 FOR PI 2.5.2
2.5.3	Yes	yes	n/a		NO COMMENT
3.1.1	Yes	yes	n/a		NO COMMENT
3.1.2	Yes	partially	n/a	The text records that SIa does not meet the SG100 requirement on the basis of an incomplete co-management arrangement; this does not appear to be a requirement of SG100 for this SI; the score may be better at 100. SIb: the commentary should make clear that consultation with fishers/stakeholders is regular – the report appears to mention that this is annual?	LOG BOOKS ARE NOT COMPLETED BY ALL FISHERS IMPLYING A LACK OF UNDERSTANDING OF THEIR ROLE. ON REVIEW WE CONSIDER THAT THE FISHERY DOES NOT MEET ISSUE a AT AT SG100.
3.1.3	Yes	yes	n/a		NO COMMENT
3.1.4	Yes	yes	n/a		NO COMMENT

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification	Conformity Assessment Body Response
3.2.1	Yes	partially	n/a	It appears that objectives for the stock are measurable (P1), but those for the ecosystem are not (P2). An intermediate score between 80 and 100 may be appropriate here.	WE MAINTAIN THE VIEW THAT THE MEASURES ARE NOT MEASURABLE.
3.2.2	Yes	yes	n/a		NO COMMENT
3.2.3	Yes	yes	n/a		NO COMMENT
3.2.4	Yes	partially	n/a	SIa: it is not clear at SG80 that a research plan exists in the form of a written document setting out research priorities for the fishery; this should be clarified.	CLARIFIED
3.2.5	Yes	partially	n/a	For SIa, the report mentioned an annual review of the fishery management – should this be referenced here as a review mechanism? For SIb it is not considered appropriate to include an MSC review as an 'external review' – this creates a circular argument that misses the point of this requirement. On this basis SG80 is not met.	WE HAVE REVIEWED THE JUSTIFICATION OF ISSUE a AND BELIEVE IT IS CONSISTENT WITH THE FISHERY MEETING SG100. THE REFERENCE TO MSC HAS BEEN DELETED BUT WE FIND THAT THE FISHERY STLL MEETS ISSUE b AT SG80.

Any Other Comments

Comments	Conformity Assessment Body Response
None	NO COMMENT

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1	Yes	No	The PSA for pike has a mesh size of 96mm and a size at maturity of 376mm; this is >2 times the mesh size and so selectivity should score 3. The areal overlap of the gill nets within the total area of the lake may, however, merit reconsideration.	MSC CR PARA 2.4.2.2.4 NOTES *"A. THE TEAM SHALL GENERATE SELECTIVITY SCORES AFTER CONSIDERATION OF THE POTENTIAL OF GEAR TO CAPTURE OR RETAIN THE SPECIES THAT DO ENCOUNTER FISHING GEAR. I. THE TEAM SHALL CONSIDER FACTORS INCLUDING LENGTH, OVERALL SHAPE, FIN SPINES, SWIMMING SPEED RELATIVE TO SPEED OF THE GEAR WHEN CONSIDERING SELECTIVITY OF NETS. A. RECOGNISING THAT AMONG THESE FACTORS ONLY LENGTH IS AVAILABLE FOR MOST OF THE SPECIES BEING ASSESSED, SIZE AT MATURITY SHALL BE USED RATHER THAN MAXIMUM SIZE"*. THERE IS CONSIDERABLE EVIDENCE THAT BECAUSE OF ADDITIONAL INFORMATION ON NORTHERN PIKE, A SCORE OF 2 IS APPROPRAITE. SUBSTANTIAL EVIDENCE IN THE PUBLISHED LITERATURE SUGGESTS THAT WITH INCREASED EXPLOITATION BY GILL NETS, NORTHERN PIKE SIZE AND MATURITY DECREASE SUBSTANTIALLY. INDEED, IN ONE OF THE BEST STUDIES CONDUCTED ON EXPLOITATION (HEMING LAKE IN NORTHERN MANITOBA) IT WAS CONFIRMED THAT WITH INCREASED GILL-NETTING EFFORT IN AN ATTEMPT TO REMOVE THE SPECIES FROM THE LAKE

				TO BREAK THE CYCLE OF A TAPEWORM AFFECTING WHITEFISH, IT WAS IMPOSSIBLE TO OVEREXPLOIT THE SPECIES. INDEED, UNDER EXTREME EXPLOITATION, MOST OF THE NORTHERN PIKE MATURED IN LESS THAN 2 YEARS. A YEARLING NORTHERN PIKE FROM THAT POPULATION HAD A MODAL SIZE OF APPROXIMATELY 22 CM, AND FEMALES WERE MATURE. THIS IS JUST SLIGHTLY LARGER THAN 2X THE COMMERCIAL MESH SIZE USED IN THE COMMERCIAL FISHERY OF WATERHEN LAKE, 96 MM. SO EVEN IF NO OTHER DATA EXIST FOR WATERHEN LAKE NORTHERN PIKE (AND THERE ARE CONSIDERABLE), IT ESSENTIALLY CONFORMS TO THE ABOVE-MENTIONED RULE OF THUMB AS TOTAL LENGTH AT EXTREME EXPLOITATION AND MATURITY IS NOT APPRECIABLY DIFFERENT FROM 2X THE MESH SIZE. HOWEVER, GILL-NET SELECTIVITY COLLECTED ON NORTHERN PIKE OF WATERHEN LAKE AND SEVERAL OTHER SIMILAR MANITOBA LAKES CONFIRM THAT IT IS NOT COMMON FOR A MESH SIZE OF 96 MM TO CATCH PIKE <500 MM IN LENGTH AND THAT THESE FISH WOULD HAVE SPAWNED FOR AT LEAST 2 YEARS. FROM THE HEMING LAKE EXPERIENCE AND FROM OTHER EXPLOITATION STUDIES, IT IS KNOWN THAT UNDER INCREASED FISHING PRESSURE, NORTHERN PIKE MATURE YOUNGER AND AT A SMALLER SIZE. THIS MEANS THAT UNDER CONDITIONS OF HEAVY EXPLOITATION, NORTHERN PIKE WOULD MATURE EVEN YOUNGER AND, IF CAUGHT IN COMMERCIAL NETS OF THE SIZE USED IN WATERHEN LAKE, WOULD HAVE SPAWNED FOR EVEN MORE YEARS. THIS SUBSTANTIATES THAT SUSTAINABILITY OF THE NORTHERN PIKE POPULATION OF WATERHEN LAKE IS NOT UNDER QUESTION IF FISHED WITH COMMERCIAL NETS OF 96 MM AND COARSER. IF OVERFISHED, THEY WOULD SIMPLY BECOME MORE ABUNDANT AND SMALLER, HENCE THE RECOMMENDATION OF THE USE OF A SPRING LIVE-TRAP FISHERY IF NECESSARY. HOWEVER, SELECTIVE HARVEST OF LARGE NORTHERN PIKE IS CONSIDERED TO BE A MORE

				VALID CONCERN ; THIS IS ADDRESSED IN DETAIL IN THE REPORT. THIS ANALYSIS SUPPORTS THE TEXT *"NORTHERN PIKE CAUGHT IN MULTI-MESH INDEX GILL NETS USED IN WATERHEN LAKE AND TWO OTHER MANITOBA LAKES (ST. ANDREWS AND ST. MARTIN) PROVIDE EVIDENCE THAT NORTHERN PIKE CAUGHT IN GILL NETS OF A COMMERCIAL MESH SIZE OF 96 MM WOULD, ON AVERAGE, PROBABLY BE LARGER THAN 500 MM (PELLISSIER 2012). IT CAN BE ESTIMATED THAT NORTHERN PIKE OF THIS SIZE WOULD BE AT LEAST 4 YEARS OF AGE, PROVIDING INDIRECT EVIDENCE THAT NORTHERN PIKE CAUGHT IN COMMERCIAL NETS OF THIS SIZE WOULD HAVE SPAWNED SEVERAL TIMES"*. ACCORDINGLY, AS ALLOWED FOR BY MSC CR 2.4.2.2.6 WE HAVE CHANGED THE SCORE FROM THAT INDICATED IN MSC CR TABLE CC16 AND CONCLUDE THAT THE MESH SIZE POSES AN INTERMEDIATE RISK TO THE SUSTAINABILITY OF NORTHERN PIKE IN WATERHEN, AND THE SELECTIVITY SCORE OF 2 IS APPROPRIATE. AS BOTH SICA AND PSA SCORE >80 THE FORMER IS USED TO SCORE THE PI FOR NORTHERN PIKE. WE DO NOT CONSIDER THAT IT IS APPROPRIATE TO REVIEW THE SCORE FOR AREAL OVERLAP.
2.1.1	Yes	Yes		NO COMMENT

Appendix 5: Stakeholder Submissions

Appendix 6: <u>Surveillance Frequency</u>

A surveillance audit may be conducted as either an “on-site” or “offsite audit”. This is determined by using criteria set out by the MSC. There will be on-site surveillance of the fishery under assessment.

Criteria	Surveillance Score	PNA Western & Central Pacific Skipjack Tuna
1. Default Assessment Tree		
Yes	0	0
No	2	
2. Number of Conditions		
Zero Conditions	0	
1-5 Conditions	1	1
>5 Conditions	2	
3. Principle Level Scores		
≥ 85	0	
<85	2	2
4. Conditions on outcome PIs?		
Yes	2	2
No	0	
Total		5

			Years after certification or recertification			
Surveillance score (from Table C3)	**Surveillance level**		**Year 1**	**Year 2**	**Year 3**	**Year 4**
2 or more	Normal Surveillance		On-site surveillance audit	On-site surveillance audit	On-site surveillance audit	On-site surveillance audit & recertification site visit
1	Remote Surveillance	Option 1	Off-site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & recertification site visit
		Option 2	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit	
0	Reduced Surveillance		Review of new information	On-site surveillance audit	Review of new information	On-site surveillance audit & recertification site visit

Accordingly there will be the normal surveillance level with the report following from the first annual surveillance report to be published on the MSC web site before the anniversary date of the certification.

Appendix 7: Client Agreement

Manitoba

Conservation and Water Stewardship

Fisheries Branch Box 20

200 Saulteaux Crescent Winnipeg, Manitoba
R3J 3W3

December 4th, 2013

Mr. Paul Knapman General Manager Intertek
Moody Marine 1801 Hollis Street

Suite 1220

Halifax, Nova Scotia B3J 3N4

Dear Mr. Knapman:

On November 21st, 2013 we received the preliminary client draft of the main assessment report of the Waterhen Lake Walleye and Northern Pike Gillnet Commercial Fishery.

Following a detailed review of the draft report I am pleased to inform you that Manitoba Conservation and Water Stewardship, Fisheries Branch, concurs with the contents of the draft report and will comply with the condition for continuing certification as identified in the aforementioned draft report.

Manitoba Conservation and Water Stewardship, Fisheries Branch, has prepared the attached Action Plan to address the condition for continued certification. Manitoba Conservation and Water Stewardship, Fisheries Branch, is also in the process of taking into consideration all of the recommendations identified in the draft report.

If you have any questions and / or concerns regarding the attached Action Plan please contact either myself at Brian.Parker@gov.mb.ca or (204) 945-7814; or Bill Galbraith, Commercial Fishing Program Manager, at Bill.Galbraith@gov.mb.ca or (204) 945-7811.

Yours truly,

Original Signed: Brian R. Parker

Dr. Brian Parker Director of Fisheries

Intertek

Manitoba

Conservation and Water Stewardship

Fisheries Branch

Box 20, 200 Saulteaux Crescent Winnipeg MB R3J 3W3

January 27, 2014

Mr. Paul Knapman General Manager
Intertek Moody Marine

1801 Hollis Street, Suite 1220 Halifax, Nova Scotia
B3J 3N4

Dear Mr. Knapman:

On January 13th, 2014 we received the public comment draft report of the main assessment report of the Waterhen Lake Walleye and Northern Pike Gillnet Commercial Fishery. Following a detailed review of the draft report I am pleased to inform you that Manitoba Conservation and Water Stewardship, Fisheries Branch, concurs with the contents of the draft report and will comply with the conditions for continuing certification as identified in the aforementioned draft report.

Manitoba Conservation and Water Stewardship, Fisheries Branch, has prepared the attached Action Plan to address the conditions for continued certification. Manitoba Conservation and Water Stewardship, Fisheries Branch, is also in the process of taking into consideration all of the recommendations identified in the draft report.

If you have any questions and / or concerns regarding the attached Action Plan please contact either myself at Brian.Parker@gov.mb.ca or (204) 945-7814; or Bill Galbraith, Commercial Fishing Program Manager, at Bill.Galbraith@gov.mb.ca or (204) 945-7811.

Yours truly,

Original Signed: Brian R. Parker

cc. Ian Scott

Bill Galbraith Geoff Klein Rob Cann Gord Kirbyson

Dr. Brian Parker Director of Fisheries

Appendix 8: Objections Process