Saskatchewan River Sturgeon Management Board

Ten-Year Management Plan

DECEMBER 2014

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Prepared for the

Saskatchewan River Sturgeon Management Board

by

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EXECUTIVE SUMMARY

BACKGROUND

The Saskatchewan River Lake Sturgeon Management Board (SRSMB) was formed in 1998 in response to concerns over the decline of the Lake Sturgeon population between E.B. Campbell Dam and Grand Rapids Dam on the lower Saskatchewan River. The Board is comprised of representatives from Cumberland House Cree Nation, Cumberland House Fishermen's Cooperative, Manitoba Conservation and Water Stewardship – Fisheries Branch, Manitoba Hydro, Opaskwayak Cree Nation, Opaskwayak Commercial Fishermen's Co-op Association, Saskatchewan Environment, and SaskPower. Its mission is to prevent further decline of the sturgeon population and to develop and co-ordinate a recovery plan.

In 2011, the SRSMB undertook a review of their 2002 Ten-Year Management Plan for the purpose of assessing progress toward achieving the goals and objectives of the Plan. The review concluded that the Board had been successful in achieving some objectives, but that it was still inconclusive whether the first Plan Objective of stabilizing the existing spawning population had been met. Given that the term of the Management Plan had expired, it was necessary to prepare another ten-year plan that could guide the Board through 2023. The review also recommended revising the Board Terms of Reference.

PROCESS

The process for developing a second Ten-Year Management Plan (the Plan) commenced in January 2014. Three 1-day meetings were conducted (January 28, March 6, and October 23, 2014) to discuss the current population status and trends, threats to the population, limits to recovery, and recovery objectives, targets, and priorities. A Ten-Year Plan was developed and is presented here. The Plan provides a revised Terms of Reference for operation of the Board, an overview of information that must be considered in developing a long-term recovery plan for sturgeon in the Saskatchewan River (with particular emphasis on information generated since October 2011 after completion of the Ten Year Review), an outline of the SRSMB's objectives for recovery, the strategies and management options that will be implemented from 2014-2023 to achieve the objectives, and an implementation plan for the strategies and management options selected.

TERMS OF REFERENCE

After review, the SRSMB Terms of Reference, as adopted when the Board was formed, remained largely unchanged. Modifications included: redefining Board Membership to include only those organizations that are currently participating; redefining the selection and terms of the Chairpersons; redefining how Board decisions will be recorded; and, allocating upkeep of the website to the Chairpersons. The revised Terms of Reference are attached to this Plan.

CURRENT POPULATION STATUS

Monitoring data presented to 2005 in the Ten-Year Management Plan Review was considered insufficient to conclude that the Lake Sturgeon population (of fish > 8.2 kg in weight) within the Saskatchewan River between E.B. Campbell and Grand Rapids dams had reached a stable, non-declining, population level (Goal #1 of the 2002 Management Plan). A more recent analysis of capture-recapture data collected from 1994-2014 shows a relatively low adult population of 1000-2000 fish from 1996 to 2010, and a relatively low annual survival estimate of 0.81 from 1994-2004. The more recent data shows an increase in abundance to between 3000 and 4000 Lake Sturgeon from 2011 to 2014, and an increase in annual survival to 0.87 for 2005-2014. The increased population estimates are the product of an increase in recruitment of young small adults (800-899 mm in fork length) into the monitoring catches in recent years. Whether this is due to adaptive sampling in Manitoba or to true recruitment of new adult Lake Sturgeon is uncertain. However, the increase in young fish appears to have occurred on both sides of the provincial border. Based on these most recent results, the Saskatchewan River Lake Sturgeon population between E.B. Campbell Dam and Cedar Lake appears to have stabilized over the last 10 years. The increased numbers of young fish entering the adult population may be a product of increased juvenile recruitment occurring more than a decade ago as a result of the decreased fishing mortality following closure of the commercial fishery and/or possibly as a result of the public education program of the Board.

THE MANAGEMENT PLAN

GOALS

The goals of this ten-year plan will remain consistent with the goals (Objectives) from the previous plan and are fundamental to the mission of the Board. As with the previous ten-year plan there is an expectation that the long-term goal will take several generations to be achieved. Implementation will occur over a ten-year period, but the Plan will be reviewed and, if

necessary, revised after five years. A complete re-evaluation of the Plan will occur at the end of the ten-year period. An adaptive management approach will be used to review information as it becomes available and revise management strategies as appropriate.

The **Short-Term Goal** of the Plan is to prevent decline of the Saskatchewan River Lake Sturgeon population between the E.B. Campbell Dam and Grand Rapids Dam. Recent monitoring data suggests that the population has been relatively stable over the past ten years and may be increasing. The Board is committed to further efforts to ensure that this trend is maintained.

The **Long-Term Goal** of the Plan is to have a Saskatchewan River Lake Sturgeon population between E.B. Campbell Dam and Grand Rapids Dam that is self-sustaining; and capable of supporting the traditional uses of local Aboriginal people. This goal is directed toward a long-term recovery of the stock such that it can regain its traditional role in local communities.

OBJECTIVES

Objectives set to measure progress toward accomplishing the short- and long-term goals include:

Objective 1: Achieve a measureable increase in the Lake Sturgeon population between E.B. Campbell Dam and Grand Rapids Dam within 10 years.

The Board recognizes that to protect the sturgeon population, further declines in abundance must be prevented. It also recognizes that the current population remains relatively low and is vulnerable to any changes in mortality or recruitment. Consequently, the Board is committed to achieving a measureable increase in the Lake Sturgeon population over the next ten years.

Objective 2: Achieve a sustainable harvest level that allows population growth.

It is generally accepted that most Lake Sturgeon populations cannot support a harvest of greater than 5% of the adult population. Thus, the smaller the population, the smaller the harvest it can support. If harvests remain constant in a declining population, it is likely that, in the absence of a change in recruitment, the population will continue to decline at an ever increasing rate.

To grow the population at the fastest rate possible, annual survival should be maximized. Based on the most recent population analysis, survival (0.87) is still relatively low compared to other "healthy" Lake Sturgeon populations (where survival is generally over 0.90). At present,

controlling harvest is the simplest and most effective method of decreasing mortality. Consequently, to meet the short-term and long-term goals, the Board will strive to decrease harvest and increase survival during the ten-year planning period.

Objective 3: Conduct programs to identify and understand factors limiting population growth and sustainability.

At present it is known that some natural recruitment is occurring to the Saskatchewan River Lake Sturgeon population and that some mortality is occurring that is not related to fishing (e.g., turbine mortality). What is not understood is how these factors can be practically mitigated in order to increase the adult population. The third objective of the SRSMB Ten-Year Management Plan is to promote and facilitate studies that will provide information to understand factors that are currently limiting the population and to mitigate and offset those limitations. This may include conducting studies to understand how spawning habitat is used, where nursery habitats are located and the suitability of foraging habitats.

Objective 4: Based on results generated by achieving Objective 3, undertake or facilitate management actions that will reduce mortality or increase recruitment.

Undertaking measures to offset factors currently limiting the Saskatchewan River Lake Sturgeon population could play a fundamental role in achieving the Long-Term Goal of the Board. However, until studies undertaken as part of Objective 3 are completed, it would be imprudent to implement strategies that lack the necessary background information against which achievements can be measured. Strategies that may be effective in achieving this objective include physical habitat manipulation, flow management, habitat protection and providing safe fish passage.

MANAGEMENT STRATEGIES

The objectives of the Management Plan will be achieved by implementing the following management strategies over the short term. Additional strategies may be undertaken over the longer term pending the achievement of management objectives. During this management term, the Board will focus on monitoring, education, and facilitating studies to understand limiting factors.

Strategy 1 – Monitoring

Monitoring is essential to any management plan as it provides the information necessary to make management decisions, and to measure the success or failure of those decisions.

Monitoring the Lake Sturgeon Population

The current index-fishing program will be conducted at a minimum of once triennially (once every three years) or more frequently if the Board decides that more effort is required. The program will focus on providing data that will allow the Board to estimate the number of sturgeon in the river between E.B. Campbell Dam and Grand Rapids Dam. The Board will work toward standardizing methodologies in Saskatchewan and Manitoba.

Current monitoring data only allow for population estimates of fish ≥800 mm in length. Because up to 60% of the current domestic harvest could be comprised of fish less than 800 mm in length, the monitoring program should be expanded to provide information on the sizes of fish most heavily exploited. Increasing the amount of information on smaller (sub-adult) fish in the population will allow the Board to make more timely decisions with regard to achieving Objectives 1 and 2.

Restoring self-sustaining populations of fish requires an understanding of recruitment because populations can only sustain themselves if successful reproduction, followed by survival to maturation, occurs. The Board continues to recognize a need to broaden the current monitoring program to gain a better understanding of recruitment of young fish into the population. The Board will continue to pursue potential options for monitoring young of the year and juvenile sturgeon.

Monitoring Harvest

To have an understanding of whether the current Lake Sturgeon harvest is sustainable and to direct management efforts, it is important to have an understanding of the number of fish that are being removed from the population. The Board recognizes that implementation of such programs is difficult, time consuming and expensive. Consequently, while the Board will continue to examine the feasibility of conducting harvest surveys, it will direct effort at educational and outreach programs to encourage voluntary harvest reductions (see Strategy 3 below).

Strategy 2 – Decrease Mortality

Decreasing mortality (the number of fish that die) is one of two management strategies (see Strategy 4) that can be employed to actively increase the population and achieve Objective 1 of the Ten-Year Management Plan. This strategy can also be directed at achieving a sustainable harvest that will allow for population growth (Objective 2).

Decreasing mortality will help to maintain or increase the current population, maximize the number of fish spawning now, increase the chances of survival of the stock, and increase the speed of recovery. To decrease mortality over the next five years, the Board will focus effort on decreasing both legal and illegal harvests.

First Nations and Métis have the right to harvest fish for their own consumption at any time of the year without the need for fishing licenses. The Board understands the importance of these harvests and recognizes this in the long-term objective of this management plan. The Board also recognizes that to protect the Saskatchewan River Lake Sturgeon population it is essential that harvest levels are sustainable. A reduction in harvest is the most effective method of protecting the population in the short term and in stimulating population growth. The Board will direct effort at encouraging community members to voluntarily reduce harvests, or to keep only certain numbers or sizes of fish. Effort also will be directed at encouraging community members to report poachers to the responsible authorities and increasing regulatory patrols on the river.

Strategy 3 – Communication and Education

To achieve the overall objective of establishing a self-sustaining sturgeon population that meets the needs of local people, it will be necessary to achieve community support for sturgeon conservation. The communication and education programs will focus on fostering interest in Lake Surgeon through the following actions:

- Community meetings/band council meetings;
- Producing communication material and newsletters;
- Supporting a Sturgeon in Schools Program;
- Documenting traditional knowledge; and
- Maintaining a website

Strategy 4 – Increase Recruitment

Increasing recruitment (the number of fish coming into the population) is the second strategy that can be employed to actively increase the population within 10 years. Increasing recruitment will enhance the chances of population survival, help to maintain or increase the current population size into the future, and help support the domestic harvest. However, the benefits of increasing recruitment through stocking would not be evident in the adult population for approximately 15-20 years.

The number of sturgeon that hatch each year may currently be limited by the size of the spawning population or by habitat limitations. Increasing natural recruitment requires an understanding of the habitat factors currently limiting the population. This understanding will be provided through habitat assessment studies which are discussed under Strategy 5 and are specifically directed at achieving objectives 3 and 4 of the Plan. Introducing sturgeon into the system is an immediate method of increasing recruitment and will continue to be considered by the Board over the short term.

Strategy 5 – Habitat Assessment

The Board recognizes that habitat within the Saskatchewan River is unique and has been irreversibly changed. At least two sets of rapids (Iskwao and Tobin) have been permanently de-watered or inundated, and the suitability of the remaining habitat for spawning remains in question. The location of young of the year and juvenile habitats also remain uncertain. While the carrying capacity of the habitat may be less than it was historically (i.e., in 1958), the extent of the decrease, if any, is unknown.

Habitat assessment will provide information on limiting factors and critical habitat, identify opportunities for habitat improvement and protection, and increase interest in sturgeon, fostering community participation in management initiatives.

Habitat assessment priorities include investigations of spawning site utilization, investigations of juvenile habitat utilization, and habitat modeling and instream flow needs. Over the course of this management plan, the Board will examine the need for, and feasibility of, conducting such investigations, and develop plans as required.

Strategy 6 – Habitat Improvement/Restoration/Protection

Pending results from implementation of programs under Strategy 5, the SRSMB will examine the feasibility of habitat manipulation and/or habitat protection that will maintain or increase current recruitment or decrease current mortality rates. However, until studies pursuant to Objective 3 are undertaken, it would be imprudent to implement strategies that lack the necessary background information against which achievements can be measured.

IMPLEMENTATION PLAN

The SRSMB will operate as outlined in its Terms of Reference for the duration of the Ten-Year Management Plan. Management strategies identified within the Ten-Year Management Plan will be implemented through the following three processes:

Planning Activities

The SRSMB will meet at least two times per year, and additionally as required.

Assessment Meeting

An Assessment Meeting will be held in October or November each year to review results of activities from the previous year, and assess progress toward meeting Management Plan objectives. The meeting agenda will include a presentation of results from the previous year, a sustainability assessment, a review of management strategies and progress toward meeting objectives and prioritization, and development of a preliminary budget.

Subsequent to the Assessment Meeting, Board members will conduct research and planning activities required to undertake the proposed Board initiatives for the coming year. Board members will be responsible for securing the necessary project funding during this period such that a commitment for implementation of proposed Board initiatives can be made at the Planning Meeting in February.

Planning Meeting

A Planning Meeting will be held near the end of February each year to commit to activities, and conduct detailed planning for the coming year. The Planning Meeting agenda will include implementation plans for monitoring (including index fishing, recruitment monitoring, and

monitoring of the domestic harvest), communication and education initiatives, habitat assessments, potential stocking activities, and habitat enhancement/protection. Responsibilities for reporting, population estimates, and further research will also be assigned at the meeting. Budgets to conduct the planned activities will be finalized.

Funding

Funding for Board activities will be sourced by participating members on an annual basis. Source funding will be identified at the annual Assessment Meeting and committed to at the Planning meeting.

Field Programs

The Board will facilitate implementation of field programs to achieve and measure progress toward management plan objectives and goals. Annual field activities will be undertaken as determined during the assessment and planning meetings. Field programs will include, but may not be limited to, the following activities: population monitoring; harvest surveys; stocking; habitat assessment; and other field programs as required.

Community Liaison

The SRSMB will conduct a community liaison program which will be developed on an annual basis. The program may consist of the following components:

- Community/Band Council Meetings
- Community Newsletters
- Schools Program
- Website
- Collection and Documentation of Traditional Knowledge
- A Sustainable Harvest Goal

Based on annual planning activities and results of field and community liaison programs, the Board may also undertake other activities to increase public awareness of, and garner support for, Board activities and recommendations.

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1.0 INTRODUCTION

The Saskatchewan River Lake Sturgeon Management Board (SRSMB) was formed in 1998 in response to concerns over the decline of the Lake Sturgeon population between Grand Rapids Dam and E.B. Campbell Dam on the lower Saskatchewan River. The Board is comprised of representatives from government agencies, local First Nations, crown utilities, and Fishermen's Cooperatives (including Métis representatives). Its mission statement is:

To prevent further decline of the sturgeon population; and to develop and co-ordinate a recovery plan.

The role of the SRSMB is to collaborate in acting in an advisory role on sturgeon management, including making recommendations on the following matters: harvest levels; population monitoring; habitat assessment; enhancement and protection; fish culture activities; community education; water management with respect to sturgeon requirements; and other research. (Compensation for the impacts of hydroelectric facilities is beyond the scope of the Board.) Board decisions are to be made by a consensus of its members. In its original Terms of Reference, the Board was to develop a long-range sturgeon recovery plan no later than December 31, 2003.

The SRSMB initiated the process for developing a ten-year management plan in January, 2002 and a Plan was completed in December 2002 (SRSMB 2002). The Plan provided a summary of historical information on the Saskatchewan River Lake Sturgeon population and an overview of information that was to be considered in developing a long-term recovery plan for sturgeon in the Saskatchewan River. The Plan outlined the SRSMB's objectives for recovery, and the strategies and management options that were to be implemented to achieve the objectives. It also prescribed an implementation plan for the strategies and management options selected. It was recognized that that the long-term goal of sturgeon recovery in the region may not be achieved for at least 20 years.

As its name suggests, the Ten-Year Management Plan was implemented over a ten-year period, but was to be reviewed and, if necessary, revised after five years. An adaptive management approach was used to review information as it became available, and management strategies were revised as appropriate. The Plan acted as the road map for SRSMB activities from 2003 to 2012. The Board implemented the Management Plan through regular planning activities, field programs, and community liaison activities.

In 2011, the SRSMB undertook a review of the Ten-Year Management Plan for the purpose of assessing progress toward achieving the goals and objectives (North/South Consultants Inc. 2011). The review summarized Board activities over the previous nine years and evaluated the effectiveness of those activities in achieving the Management Plan objectives. The review concluded that the Board had been successful in achieving some of the objectives of the Plan, but that it was still inconclusive whether the first Plan Objective (i.e., stabilizing the existing spawning population) had been met. Given that the term of the Plan was expiring, it was now necessary to prepare another ten-year plan that could guide the Board through 2023. The review also recommended revising the Board Terms of Reference.

The process for developing a second Ten-Year Management Plan commenced in January 2014. Two 1-day meetings were conducted to discuss the current population status and trends, threats to the population, limits to recovery, and recovery objectives, targets, and priorities. Based on discussions at the meetings, management plan priorities were identified and an implementation plan was developed. The proposed Plan was reviewed by the Board at a meeting on October 23, 2014 and was subsequently finalized.

This document provides:

- A revised Terms of Reference for operation of the Board as amended at the March 7 and October 23, 2014 meetings in Prince Albert, SK;
- An overview of information that must be considered in developing a long-term recovery plan for sturgeon in the Saskatchewan River, with particular emphasis on information generated since October 2011 after completion of the Ten-Year Review;
- An outline of the SRSMB's objectives for recovery, and the strategies and management options that will be implemented from 2014-2023 to achieve the objectives; and,
- An implementation plan for the strategies and management options selected.

2.0 SASKATCHEWAN RIVER STURGEON MANAGEMENT BOARD

Formation of the Saskatchewan River Sturgeon Management Board is described in the 2002 SRSMB Ten-Year Management Plan (SRSMB 2002). During the process of drafting this management plan, the Board made the following revisions to its Terms of Reference:

- Membership
    - The Board is comprised of one representative from each of following organizations or communities:
        - Cumberland House Cree Nation
        - Cumberland House Fishermen's Cooperative
        - Manitoba Conservation and Water Stewardship, Fisheries Branch
        - Manitoba Hydro
        - Opaskwayak Cree Nation
        - Opaskwayak Commercial Fishermen's Co-op Association
        - Saskatchewan Environment
        - SaskPower
    - Co-chairpersons, one from Saskatchewan and one from Manitoba, shall be elected by the Board members to serve for a two-year period. Preferably, the chairpersons would be comprised of one community member and one member from industry/government.
- Decision Making
    - Following each meeting, one of the Chairpersons shall compile and circulate minutes of the meeting for review by each member. Comments or revisions to the minutes shall be forwarded to the Chairperson such that the minutes can be revised and presented at the following meeting. Following unanimous approval, the minutes will form a record of decision making by the Board.
- Responsibilities of the Chairpersons
    - 11. To update the SRSMB website with relevant information and meeting minutes on a regular basis.

The revised Terms of Reference for the SRSMB are provided in Appendix 2.

3.0 BACKGROUND

3.1 STUDY AREA

The Saskatchewan River watershed originates in the Rocky Mountains near the British Columbia border (Figure 1). Headwater streams converge into the North and South Saskatchewan rivers in Alberta, which then merge into the Saskatchewan River below Prince Albert, Saskatchewan (approximately 400 km upstream of The Pas). The Saskatchewan River enters Manitoba near The Pas, then flows through Cedar Lake, and enters Lake Winnipeg at Grand Rapids. The Saskatchewan River basin drains an area of approximately 365,000 km^2, making it the largest watershed draining into Lake Winnipeg (Ashmore 1986).

Figure 1. The Saskatchewan River watershed.

The available habitat for the Lake Sturgeon population that is of concern to the SRSMB lies between the E.B. Campbell Dam in Saskatchewan and the Grand Rapids Dam in Manitoba (Figure 2). This area includes an estimated total of 900 km of river channels in Saskatchewan, including the Old Saskatchewan River channel (130 km), Tearing River (15 km), and major channels in the Cumberland Lake delta area (490 km) (Royer et al. 1968, Wallace 1991) and 280 km of river channel, including Cedar Lake, in Manitoba (R. Wallace, Saskatchewan Environment [SE], Saskatoon, pers. comm.). The area also includes Cumberland Lake (including Mud Lake and Cross Lake), which is 246 km^2 or 60,753 acres (Reed 1959), and Grand Rapids Reservoir/Cedar Lake (including Cross Bay and South Moose Lake), which is 3,494 km^2 or 862,694 acres (Manitoba Hydro, unpublished).

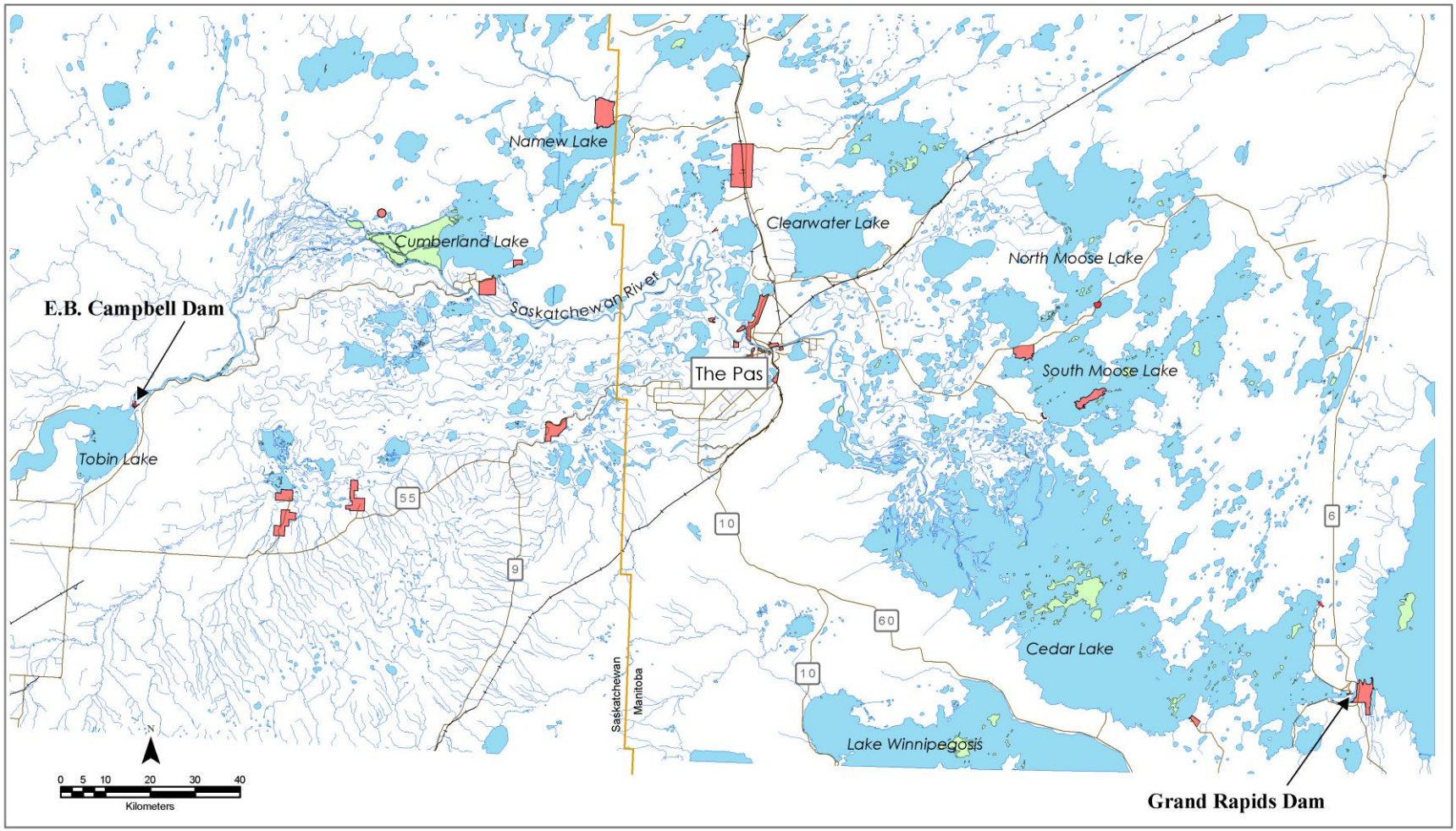

Figure 2. The Saskatchewan River from E.B. Campbell Dam to Grand Rapids Dam.

The lower Saskatchewan River downstream of Tobin Lake is underlain by sedimentary bedrock overlain with glacio-lacustrine and till deposits consisting mainly of stratified sands, silts, and clays including alluvial and Aeolian deposits (Smith et al. 1998).

3.2 SASKATCHWAN RIVER LAKE STURGEON POPULATION

Lake Sturgeon (*Acipenser fulvescens*) are found from the St. Lawrence River in the east, to the headwaters of the Saskatchewan River in the west, and from the Churchill River and Hudson Bay in the north, to the Mississippi River system in Alabama and Mississippi in the south. Commercial fisheries for the species grew rapidly at the turn of the 20th century and by the mid-1900s most North American sturgeon populations had become depleted. Habitat alterations and pollution resulting from industrial developments affected the ability of sturgeon populations to recover. Houston (1987) described the decline of sturgeon populations throughout North America as a "synergistic product of life history factors, exploitation, and environmental change". A description of the unique life history characteristics of Lake Sturgeon, including their size, longevity, and extended spawning periodicity is provided in the 2002 SRSMB Ten-Year Management Plan (SRSMB 2002).

Once abundant in the Hudson Bay drainage of Saskatchewan and Manitoba, Lake Sturgeon populations in both provinces have shown a steady decline over the last century. In Manitoba, Lake Sturgeon have been designated as a "heritage species" due to its "unique life history characteristics, limited distribution, and economic, social, and historical significance" (Manitoba Department of Natural Resources [MNR] 1991). Management objectives for "heritage species" include: documenting distribution and habitat requirements; assuring stocks are conserved or enhanced; managing and conserving habitat and assuring perpetuation of the stocks; assuring implications to heritage stocks are considered prior to approval of species introductions; and, increasing public information on heritage stocks. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has assessed Lake Sturgeon populations within seven designatable units (DU) in Canada, including six that overlap with or occur in the provinces of Manitoba and Saskatchewan. Of these, five DUs have been assessed as "Endangered", including DU2 which encompasses the Saskatchewan River upstream from the Grand Rapids Dam.

Historically, Lake Sturgeon in the Saskatchewan River watershed ranged from Edmonton, Alberta on the North Saskatchewan River, and from the convergence of the Bow and Oldman rivers on the South Saskatchewan River, downstream to Grand Rapids and Lake Winnipeg in Manitoba. Although Lake Sturgeon are still found throughout most of this historical range, the

species was and remains most abundant in the lower reach of the river below the convergence of the North and South Saskatchewan rivers.

3.2.1 Historical Exploitation

Like most other North American populations, lower Saskatchewan River Lake Sturgeon have been subjected to a history of unsustainable harvests. Stewart (2009) reported that Saskatchewan River Lake Sturgeon harvests totalled over 275,000 kg marketed weight from the Saskatchewan portion and over 290,000 kg from the Manitoba portion over just 13 years from 1898 to 1910. To provide context, if we conservatively assume an average size of 30 lbs (13.6 kg) round weight, it can be estimated that more than 42,000 fish would have been harvested from the Saskatchewan River during this period.

After this initial boom, harvests declined rapidly (Harkness 1980) and from 1938-1970, harvests from both the Manitoba and Saskatchewan portions of the river combined did not exceed 6000 kg (marketed weight) annually. After a three-year closure in the early 1970s, annual harvests quickly reached approximately 5,700 kg in 1976 and 1977, before decreasing steadily for the following 16 years. Commercial fishing for sturgeon in the Manitoba portion of the Saskatchewan River was closed in 1995 after less than 25 kg were harvested in 1994. A moratorium was placed on commercial sturgeon fishing in Saskatchewan in 1996. Angling catch limits for sturgeon were reduced to zero in Manitoba and Saskatchewan in 1995 and 1999, respectively. The First Nations and Métis fisheries are currently the only legal harvests of sturgeon from the lower Saskatchewan River. A more detailed historical overview of the Lake Sturgeon fishery in the Saskatchewan River can be found in the 2002 SRSMB Ten-Year Management Plan (SRSMB 2002).

3.2.2 Habitat Changes

Climate and upstream water management in Alberta and Saskatchewan are the primary influences on long-term flows in the lower Saskatchewan River. Retention of water behind upstream dams (there are now over 25) for hydroelectric generation, irrigation, and recreation has gradually resulted in a reduction in mean annual flow and a dampening of seasonal flow fluctuations downstream (Figure 3). Average mean annual discharge at The Pas from 1960-2013 (606 m^3/s) was 14% lower than average mean annual discharge from 1913-1959 (704 m^3/s) (derived from data in Environment Canada 1991). While some of this decrease may have been related to climatic factors, much of the flow reduction was likely the result of increased water usage upstream.

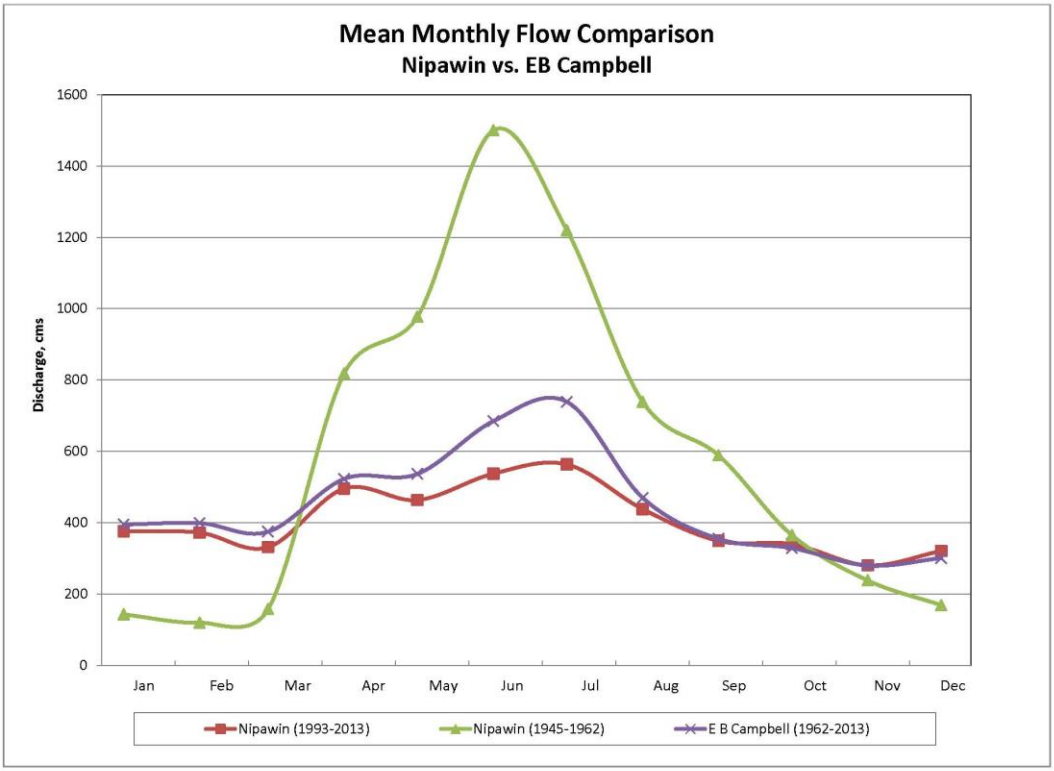

Figure 3. A comparison of mean monthly flows in the Saskatchewan River at Nipawin from 1945-1962, at Nipawin from 1993-2013 and at E.B. Campbell from 1962-2013 (data provided by SaskPower).

Construction of SaskPower Corporation's E.B. Campbell Dam at Iskwao Rapids and Manitoba Hydro's Grand Rapids Dam at Grand Rapids during the early 1960s had more direct impacts on lower Saskatchewan River habitat. Although E.B. Campbell Dam is responsible for only a small portion of the long-term decrease in flows, it has a large effect on daily water levels in the lower Saskatchewan River. The dam is utilized as a hydro-peaking station, generating electricity in response to demand. Prior to 2004, the license for the station called for a minimum average daily discharge of 150 m^3/s, but allowed for no water to be released for up to 12 hours per day. On September 7, 2004, after a period of negotiations with Canada Department of Fisheries and Oceans regarding the ongoing Harmful Alteration Disruption or Destruction (HADD) of fish and fish habitat occurring in the Saskatchewan River below the hydro-power generating station at the E.B. Campbell Dam, an authorization pursuant to Section 35 (2) of the *Fisheries Act* was provided that restricted the minimum flow to 75 m^3/s. Although the minimum average daily

discharge was not restricted, SaskPower was now required to provide at least the minimum flow at all times. A typical weekly hourly outflow form EB Campbell since 2004 is illustrated in Figure 4.

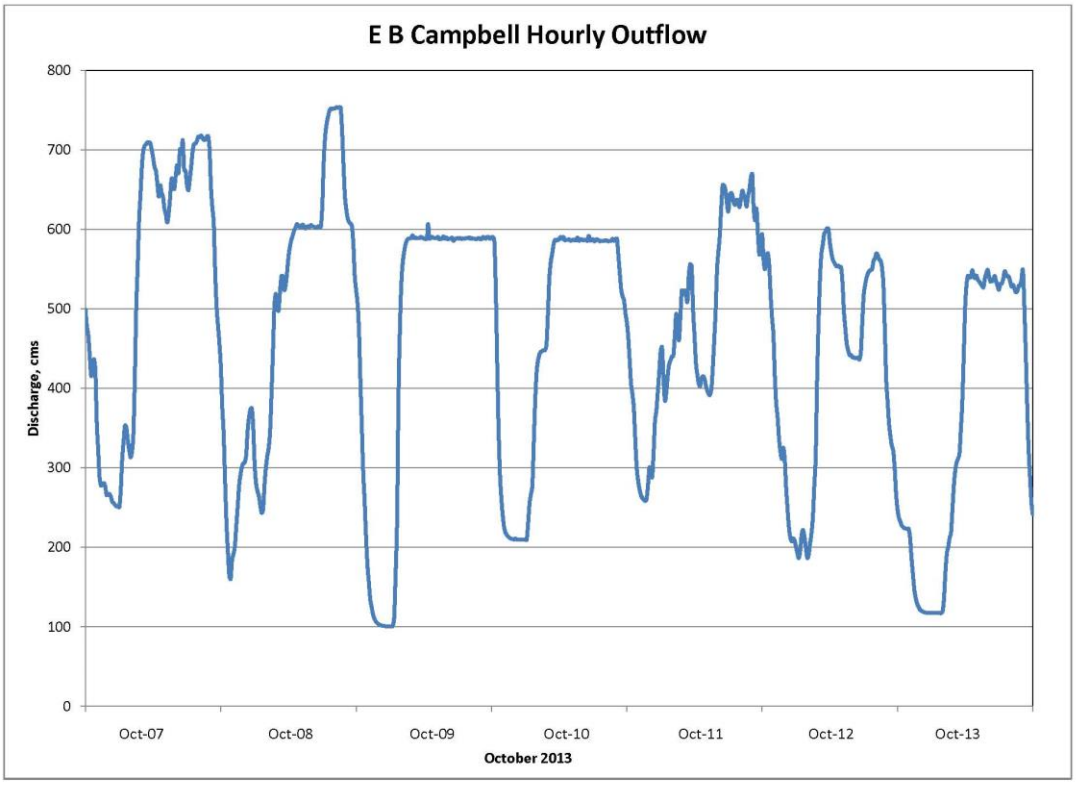

Figure 4. Typical weekly discharge from E.B. Campbell Generating Station (October 7-13, 2013)(data provided by SaskPower).

Construction of Grand Rapids Generating Station by Manitoba Hydro in the mid 1960s not only increased water levels on Cedar Lake but also changed the annual water level regime. Lake levels now peak in fall, on average, 1.8 m higher than in spring (Figure 5). Prior to construction of the dam, water levels generally peaked in spring and then gradually decreased through fall.

Potential impacts to Lake Sturgeon from construction of the E.B. Campbell and Grand Rapids hydroelectric generating stations include: modification or loss of potential spawning areas at Tobin and Iskwao Rapids (dewatered or inundated by E.B. Campbell Dam); habitat fragmentation; dampening of biologically relevant flows in spring; daily water level fluctuations affecting habitat availability or productivity; and flooding of Cedar Lake in Manitoba.

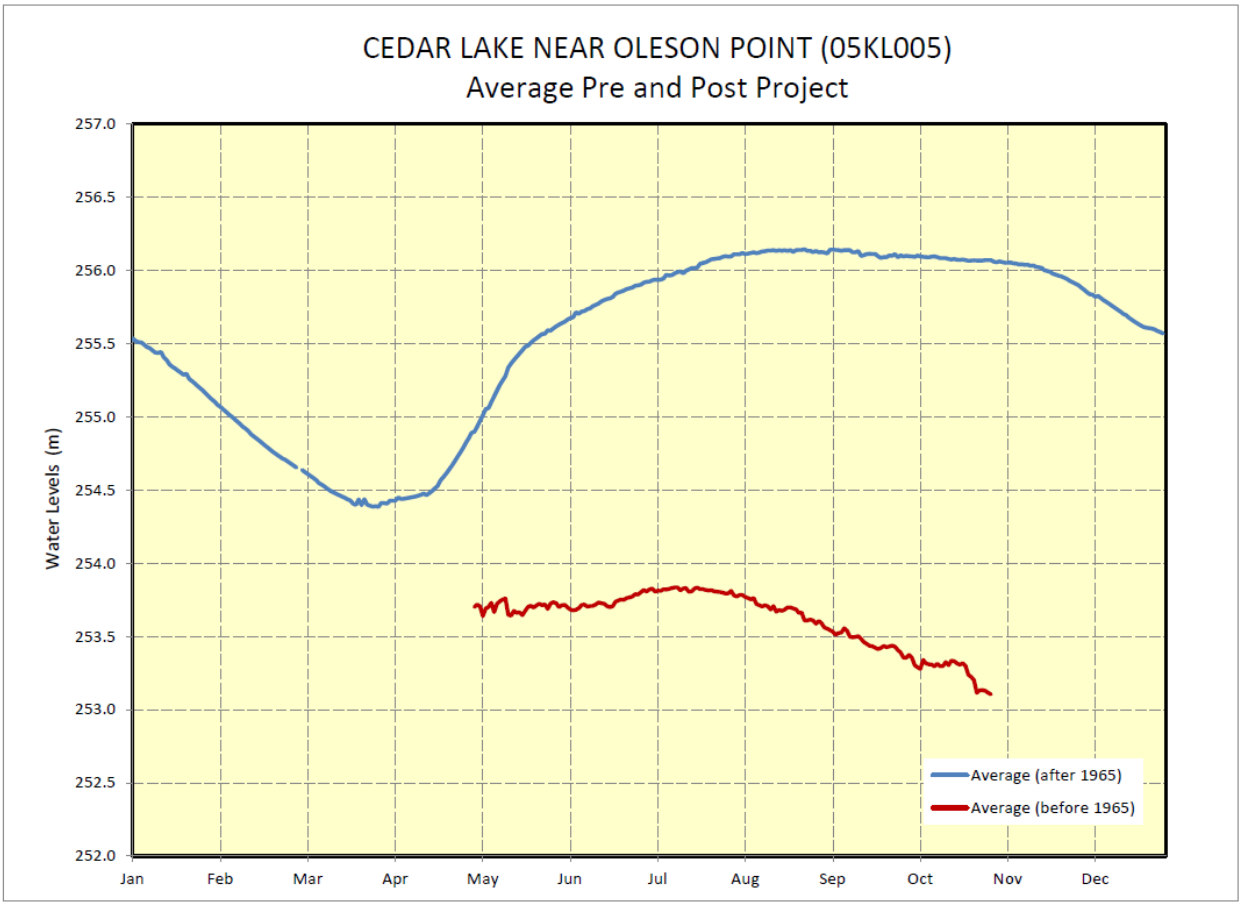

Figure 5. Average daily water levels on Cedar Lake before 1965, prior to construction of Grand Rapids Generating Station, and after 1965 (data provided by Manitoba Hydro).

3.2.3 The Population Decline

In his retrospective evaluation conducted in the late 1990s, Wallace (1999) concluded that the Saskatchewan River sturgeon population was "healthy" in the 1950s. His conclusion was based on several factors, including: fishing had been sustained since the early 1900s; the population had a good size and age composition (some fish older than 60 years) and acceptable mortality rates (about 4% annually); and, available habitat was suitable for young, mature, and spawning sturgeon. Using two different methods (an analysis of mortality rate and harvests; and, an analysis of carrying capacity of the habitat), Wallace (SE, Saskatoon, pers. comm.) estimated that the abundance of sturgeon 18 lbs (8.2 kg) and over (round weight) in the Saskatchewan River between Tobin Rapids and Grand Rapids in 1958 was between 6,500 and 16,000 fish. According to Wallace (1991), the loss of many spawners and habitat changes around 1960 seriously reduced the health of the population. The annual mortality rate rose from 4.8%

between 1958 and 1963 to 18.9% between 1975 and 1980. Sturgeon over age 40 completely disappeared from the population by the late 1970s and, by 1990, recruitment was only 8 to 15% of what it was in 1958. There were suggestions of substantially less sturgeon under 24 years of age compared to earlier years, because the number of young fish growing to catchable sizes decreased by approximately 90%. However, there were no mark and recapture data to estimate population size in 1990 (Wallace 1991).

The Saskatchewan River historically supported a domestic fishery for Lake Sturgeon and this harvest continues as the only legal harvest on the river. Opaskwayak Cree Nation (OCN), Cumberland House Cree Nation and local Métis have indicated that sturgeon were of historical importance as a food source and for ceremonial purposes. However, historical records on domestic harvests have not been documented. Findlay et al. (1995) reported that OCN community members did not believe that domestic fishing was to blame for the decline of the sturgeon population in the Saskatchewan River. They reported that the level of domestic fishing for Lake Sturgeon decreased from 1985-1995.

During the early 1990s, concern for the Lake Sturgeon population downstream of E.B. Campbell Dam led to a four-year (1994-1998) sturgeon study funded primarily by SaskPower with personnel and equipment provided by Saskatchewan Environment and Resource Management (SERM; now Saskatchewan Environment [SE]) and Manitoba Natural Resources (now Manitoba Conservation and Water Stewardship [MCWS]). These studies morphed into index fishing and mark-and-recapture programs that have been continued by the SRSMB through to 2014. A description of the history, objectives, initial results and evolution of this program are provided in the 2002 SRSMB Ten-Year Management Plan (SRSMB 2002) and the SRSMB Ten-Year Management Plan Review (North/South Consultants Inc. 2011).

During preparation of the previous Ten-Year Management Plan in 2001, the average annual population estimate for the previous five years was 1300 fish (R. Wallace, SE, Saskatoon, pers. comm.). Based on Wallace's estimate of population size in 1958 (6,500-16,000 sturgeon), the estimates suggested that there had been a 80-92% reduction in the abundance of sturgeon 18 lbs (8.2 kg) and over in the E.B. Campbell Dam to Grand Rapids Dam reach of the Saskatchewan River from 1960 to 2001.

Manitoba Hydro and SaskPower funded Lake Sturgeon harvest surveys at The Pas, MB during the summers of 2001 and 2002 and at Cumberland House, SK, in 2002 (North/South Consultants Inc. 2003). The surveys consisted of a combination of creel, household, camp, river and harvest-recall interviews. Lake Sturgeon harvests from the Saskatchewan River at Cumberland House

and The Pas were estimated to range from 74 to 319 fish annually in 2001 and 2002 and almost half of the fish harvested weighed less than 8 kg. The estimated harvest rate based on known harvests of fish greater than 8 kg and the SRSMB population estimate for sturgeon 8.2 kg and over (1,300 fish) at the time was approximately 2.8%; however, the extrapolated harvest estimates suggested that the harvest may have been as high as 12.3% of the population estimate. The authors noted that the observed harvest rate was within what is considered a safe harvest level for the species by most management agencies (5%), but that the estimated harvest level was unsustainable. It also deserves mention that a large proportion of the harvest was directed at juvenile fish and was not considered in the harvest rates. Even if the population was double that estimated at the time, the harvest estimates were likely not sustainable. No further harvest surveys have been conducted.

Rob Wallace (SE) gave a presentation of index netting program results from 1994 to 2005 to the SRSMB (Wallace 2005). The key findings outlined in the presentation were as follows:

- a 100 cm long sturgeon weighs on average 6 kg (combined data from Manitoba and Saskatchewan);
- sturgeon captured from the Saskatchewan portion of the study area are generally longer and heavier than those captured from the Manitoba portion of the study area;
- the abundance of sturgeon over 8.2 kg (n=957 - calculated using mark-recapture data from 2000-2005) was declining (combined Manitoba and Saskatchewan data);
- the abundance of small sized sturgeon was estimated at 1,000 to 1,200 based on the analysis of 2000-2005 data for all fish sizes (combined Manitoba and Saskatchewan data); and
- the movements of three sizes of sturgeon (i.e., small, medium, large) were similar based on mark-recapture data, and the majority of recaptured individuals moved less than 30 km upstream or downstream.

At the November 2008 assessment meeting it was noted that the 1994-2006 data set had been analyzed and the population was estimated at 1,032 medium/large fish (i.e., over 8.2 kg). This marked the first time since monitoring was initiated that there was an increasing trend in the sturgeon population.

In consideration of these data in the Ten-Year Management Plan Review (North/South Consultants Inc. 2011), it was determined that the data were insufficient to conclude that the

Lake Sturgeon population (over 8.2 kg in weight) within the Saskatchewan River between E.B. Campbell and Grand Rapids dams had reached a stable, non-declining, population level (which was Goal #1 of the 2002 Management Plan). It was recommended that more recent data be analysed to draw a more accurate conclusion with regard to the current population trend.

3.2.4 Current Population Trend

Index netting data provided by Saskatchewan Ministry of the Environment (SE) and Manitoba Conservation and Water Stewardship Fisheries Branch for all Lake Sturgeon captured and tagged on the Saskatchewan River between E.B. Campbell Dam and Cedar Lake from 1994-2014 were reviewed by North/South Consultants Inc. The analyses focused on "medium to large" Lake Sturgeon ≥800 mm in length that equate to the "medium to large" Lake Sturgeon (12 lb dressed [marketed] weight, ~18 lb round weight) that R. Wallace (SE) focused on in previous analyses.

Using Program MARK (White and Burnham 1999), two separate population analyses were run on the mark-recapture data from the Saskatchewan River between E.B. Campbell Dam and Cedar Lake, MB dating back to 1994. The population trajectory (λ) was estimated using the Pradel-λ Jolly-Seber formulation (Pradel 1996) and abundance of adult Lake Sturgeon (≥ 800 mm in length) was estimated using POPAN (Arnason and Schwarz 2002). Both of these models have the same basic assumptions as the general Cormack-Jolly-Seber model:

- Tagged fish are representative of the population of fish to which inferences are to be made (i.e., tagged fish are a random sample of the population of interest);
- Numbers of releases are known;
- Tagging is accurate; no tag loss, no misread tags, no data entry errors;
- All releases are made within relatively brief time periods (relative to time intervals between tagging periods.);
- The fate of individual fish and the fates of fish in differing cohorts are independent;
- Fish in an identifiable class or group have the same survival and reporting probability (parameter homogeneity) for each time interval; and
- Parameter estimates and sampling covariance are based on model inference, thus, results are conditional on the model used.

Population analyses are assumed to represent all adult Lake Sturgeon ≥800 mm in length that use the Saskatchewan River below E.B. Campbell Dam.

Specific model parameterizations were as follows:

- Using the Pradel λ formulation, allowing λ (change in abundance) to vary with time provided the best model. Using POPAN, allowing abundance to vary with time provided the best model.
- Although using a *constant survival* generally provides the best model for Lake Sturgeon mark-recapture studies, resolution was improved by using two survival time periods: 1994-2004 and 2005-2014.
- The *time-varying recapture model* indicated there were three periods which had different but consistent recapture rates: 1994-1997, 1998-2010, and 2011-2014.

The analysis showed that survival increased significantly from 0.81 (0.79-0.83 in 1994-2004) prior to 2004 to 0.87 (0.85-0.89 in 2005-2014) over the next ten years (Table 1). Recapture rate was low initially 0.07 (0.04-0.11 in 1994-1997), then stabilized to 0.14 (0.13-0.15 in 1998-2010), and recently decreased to 0.04 (0.04-0.06 in 2011-2014, Table 1). During the same periods, abundance initially increased from 145 to 1262 (1994-1997), fluctuated from 1022 to 2168 over the next 13 years (1998-2010), and then increased significantly in recent years to between 2935 and 4119 (2011-2014) (Table 1 and Figure 6).

A preliminary assessment of the change in abundance indicates that there was a significant increase in the numbers of small adults in the catch between the 2003-2010 and 2011-2014 time periods. It is not clear whether this was due to adaptive sampling in Manitoba or whether it was true recruitment of new adult Lake Sturgeon. While the proportional increase of smaller adults appears to have occurred in both Saskatchewan and Manitoba, it was most notable in Manitoba in 2012 when approximately 75% of the Lake Sturgeon sample less than 900 mm in length was from 800-899 mm in length, while in other years between 2011 and 2014 proportions were in the 21-38% range in both provinces (Table 2).

The most recent data suggests that Objective 1 of the previous Ten-year Management Plan may have been achieved. Current population estimates show that the population has likely stabilized in relation to abundance estimates at the commencement of the last Ten-year Management Plan, and may be increasing. The increased numbers of young fish entering the adult population may be a product of increased juvenile recruitment occurring more than a decade ago as a result of decreased fishing mortality following closure of the commercial fishery and, possibly as a result of the public education program of the Board. However, it should be noted that the current population is still at a level that is extremely vulnerable to even a small change in mortality or

recruitment. The survival rate of 0.87 remains relatively low compared to other "healthy" populations where survival rates are generally over 0.90.

3.2.5 Habitat Use and Growth

A summary of habitat studies conducted on the Saskatchewan River and tributaries is provided in North/South Consultants Inc. (2011). Growth data are also summarized within the report.

A condition of the *Fisheries Act* authorization provided to SaskPower in September 2004 was that a research study be conducted to determine the efficacy of the flow change on fish habitat. A research partnership agreement was developed among SaskPower, Fisheries and Oceans Canada – Fish Habitat Management and Science, Saskatchewan Environment, Saskatchewan Watershed Authority, and an engineering group from the University of Regina. It's primary goal was to examine the habitat/flow relationship in the river below the dam. The research spanned two full years, from

Table 1. Pradel and POPAN results for the Saskatchewan River Lake Sturgeon population between E.B. Campbell Dam and Cedar Lake, MB.

Parameter	Estimate	Standard Error	Lower CL	Upper CL
Apparent Survival 1994-2004	0.81	0.01	0.79	0.83
Apparent Survival 2005-2014	0.87	0.01	0.84	0.89
Recapture 1994-1997	0.10	0.01	0.09	0.12
Recapture 1998-2010	0.14	0.01	0.13	0.15
Recapture 2011-2014	0.05	0.00	0.04	0.06
Lake Sturgeon Abundance 1994	145	40	67	222
Lake Sturgeon Abundance 1995	446	75	298	594
Lake Sturgeon Abundance 1996	1558	117	1329	1787
Lake Sturgeon Abundance 1997	1262	95	1077	1447
Lake Sturgeon Abundance 1998	1022	79	868	1176
Lake Sturgeon Abundance 1999	2168	139	1895	2442
Lake Sturgeon Abundance 2000	1846	118	1615	2077
Lake Sturgeon Abundance 2001	1958	96	1769	2146
Lake Sturgeon Abundance 2002	1586	86	1417	1754
Lake Sturgeon Abundance 2003	1404	73	1260	1547
Lake Sturgeon Abundance 2004	1137	67	1006	1267
Lake Sturgeon Abundance 2005	1597	83	1433	1760
Lake Sturgeon Abundance 2006	1385	77	1234	1535
Lake Sturgeon Abundance 2007	1574	80	1417	1731
Lake Sturgeon Abundance 2008	1365	77	1214	1516
Lake Sturgeon Abundance 2009	1618	103	1416	1820
Lake Sturgeon Abundance 2010	1612	103	1410	1814
Lake Sturgeon Abundance 2011	2935	336	2277	3593
Lake Sturgeon Abundance 2012	4119	380	3374	4864
Lake Sturgeon Abundance 2013	3572	356	2875	4270
Lake Sturgeon Abundance 2014	3099	335	2442	3756

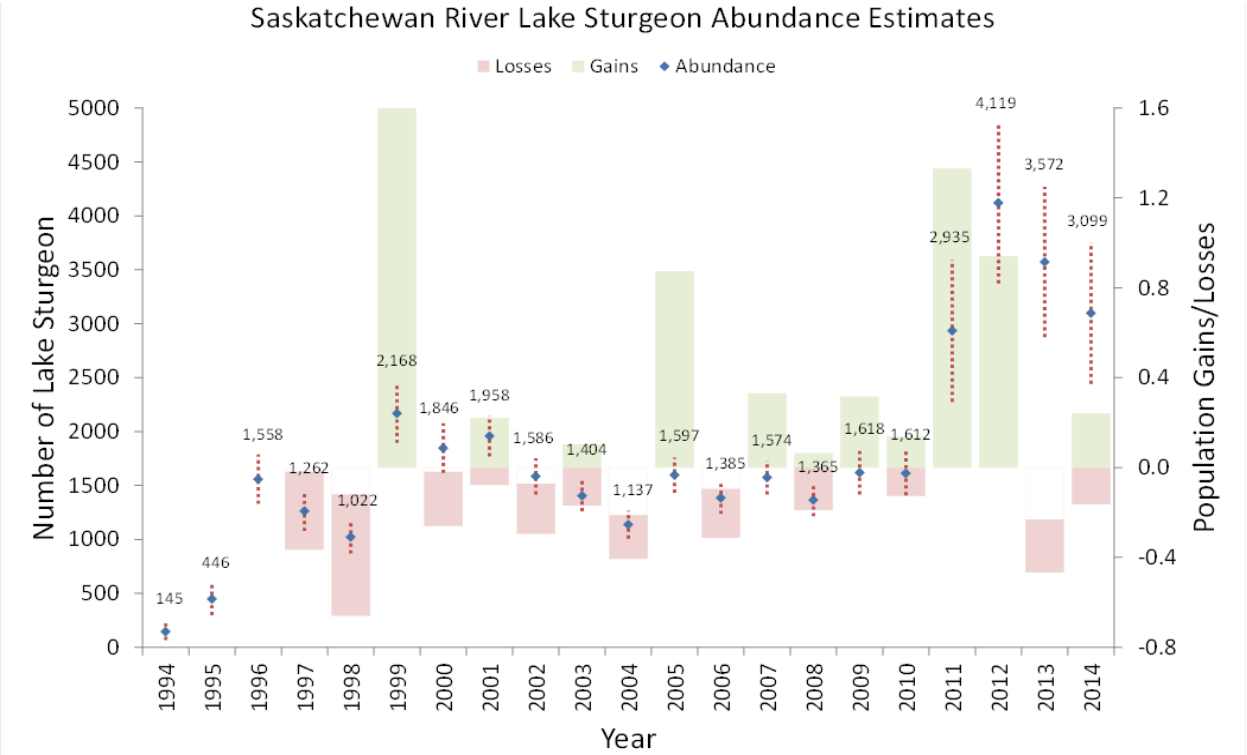

Figure 6. **Results of the Pradel Model (Gains/Losses) and POPAN Model (abundance) for Saskatchewan River Lake Sturgeon between 1994 and 2014. Gains and Losses are shown as the full 95% Confidence Limits. Where the modeled range of lambda (bars) is <1 the bar is shaded red and when the range is >1 the bar is shaded green. For some years, 1 lies within the 95% CI so the bar is both red and green.**

Table 2. **Number of Lake Sturgeon captured less than 800 mm and 900 mm in length in Manitoba and Saskatchewan from 2011 to 2014. The bottom row shows the proportion of 800-899 mm Lake Sturgeon in the total catch of Lake Sturgeon less than 900 mm in length.**

	MB	SK	MB	SK	MB	SK	MB	SK
	2011		2012		2013		2014	
<800 mm	34	88	39	237	-	97	167	-
<900 mm	43	128	161	319	-	157	225	-
800-899	9	40	122	82	-	60	58	-
%	20.93%	31.25%	75.78%	25.71%	-	38.22%	25.78%	-

April 2005 to March 2007, and substantial effort was put into modeling habitat for several fish species at a range of flows. A final report of this work was not available at the time this Management Plan was written.

In 2010/11, SaskPower commenced studies to assess changes in habitat quality and quantity in the tailrace and spillway channel of E. B. Campbell Dam where Lake Sturgeon are known to occur. E.B. Campbell dam operates according to a peaking water regime and, as such, habitat availability downriver of the structures varies considerably. North/South Consultants Inc. was contracted to conduct high-resolution mapping of substrate and topography below the GS and in the spillway channel, to: assess changes in wetted areas according to discharge; assess fish stranding; and develop measures that will mitigate limitations to fish production. In spring of 2014, SaskPower initiated an egg mat study that confirmed Lake Sturgeon spawning occurs in the immediate tailrace of EB Campbell.

The recently completed Manitoba/Saskatchewan combined database generated from the population analysis conducted by North/South Consultants Inc. could be used to do further growth analysis based on known fish.

3.2.6 Genetics

SaskPower recently began to collect genetics samples from Lake Sturgeon captured during salvage fishery operations in the E.B. Campbell spillway, and during spawning and movement studies conducted further upstream on the Saskatchewan River. It is expected that additional samples will be collected during subsequent salvage operations and scientific studies in the next few years. These samples will contribute to a potential future study of population structuring in the Saskatchewan River. The Saskatchewan Water Authority (2011) also recently collected genetic data on sturgeon from the Saskatchewan River upstream of the Nipawin Dam.

4.0 MANAGEMENT OPTIONS

A discussion of management options for Lake Sturgeon was provided in the SRSMB Ten Year Management Plan (SRSMB 2002). These options were reviewed at the SRSMB planning meetings on January 28 and March 7, 2014, for consideration for inclusion in the 2014-2023 Ten Year Management Plan.

5.0 RECOVERY GOALS, OBJECTIVES, AND STRATEGIES

A goal is defined as a desired result or end point that is achieved by establishing specific, measurable, attainable, realistic and time-bounded objectives. The following section describes the long- and short-term goals of the SRSMB long range recovery plan and objectives that have been set for the next ten years that will move the SRSMB toward achieving those goals. Objectives will be met by implementing a variety of management strategies as described.

5.1 GOALS

The goals of this ten-year plan will remain consistent with the goals (Objectives) from the previous plan and are fundamental to the mission of the Board.

As with the previous ten-year plan, there is an expectation that the long-term goal may take several generations to be achieved. Implementation of this plan will occur over a ten-year period, but the plan will be reviewed and, if necessary, revised after five years. A complete re-evaluation of the plan will occur at the end of the ten-year period. An adaptive management approach will be used to review information as it becomes available and revise management strategies as appropriate.

Short Term Goal

The short-term goal of the Ten-Year Management Plan is to meet the first step of the Board mission statement:

> ***To prevent decline of the Saskatchewan River Lake Sturgeon population between the E.B. Campbell Dam and Grand Rapids Dam.***

The current monitoring data suggests that the population has remained relatively consistent over the past decade, and may even be increasing due to the recruitment of young adults. However, the Board also recognizes that the current population is still at a level that is vulnerable to even a small change in recruitment or mortality. The Board is committed to further efforts to prevent any downward trend.

Long Term Goal

The long-term goal of the Ten-Year Management Plan is:

To have a Saskatchewan River Lake Sturgeon population between E.B. Campbell Dam and Grand Rapids Dam that is:

- ***self-sustaining; and,***
- ***capable of supporting the traditional uses of local Aboriginal people.***

This goal is directed toward a long-term recovery of the stock such that it can regain its traditional role in local First Nations and Métis communities.

5.2 SPECIFIC OBJECTIVES

The SRSMB has developed four specific objectives for the ten-year management plan to measure progress toward accomplishing the short- and long-term goals. Achieving the first two objectives is fundamental to ensuring that the short-term goal of the Ten-Year Plan is met. The third and fourth objectives are directed at achieving the long-term goal.

OBJECTIVE 1: Achieve a measureable increase in the Lake Sturgeon population between E.B. Campbell Dam and Grand Rapids Dam within 10 years.

The Board recognizes that to protect the sturgeon population, further declines in abundance must be prevented. Analyses of index-fishing results suggest that the population of Lake Sturgeon ≥800 mm fork length in the Saskatchewan River between E.B. Campbell Dam and Grand Rapids Dam is between 3000 and 4000 fish. Although the most recent trend is toward increasing numbers, the current population level and survival rate remain relatively low and vulnerable to even a small change in recruitment or mortality. Consequently, the Board is committed to achieving a measureable increase in the Lake Sturgeon population over the next ten years.

To achieve a measureable increase in the population, the number of fish recruited to the spawning population must be greater than the number of fish dying naturally and through fishing mortality. To increase population growth, either recruitment must be increased or mortality be decreased in the immediate future. There are two management strategies that can be implemented in the short term to ensure that this objective is achieved: stocking and programs to reduce harvest. Taking action to achieve the third objective of the Management Plan (undertaking studies to understand limiting factors - as discussed below) will also contribute to meeting this objective over the long term.

The availability of spawning adults can be an important limitation in small populations (Jager et al. 2001). The Board recognizes that the current spawning population in the Saskatchewan River is at a dangerously low level where as few as 200 females may spawn in any given year (assuming a sex ratio of 1:1 and a spawning periodicity of seven years). When a population decreases to below 500 breeding individuals, its ability to maintain adaptive variation (i.e., its genetic viability) is threatened (Rieman and Allandorf 2001). The existing spawning population must be protected to maximize the level of natural reproduction and recruitment that occurs in the near future and to maintain genetic diversity.

Monitoring of juvenile recruitment and harvests will provided evidence of whether management strategies are effective. Success in achieving this objective can be determined by monitoring the Lake Sturgeon spawning population on a regular basis (i.e., continuing the index-fishing program).

OBJECTIVE 2: Achieve a sustainable harvest level that allows population growth.

It is generally accepted that most Lake Sturgeon populations cannot support a harvest of greater than 5% of the adult population. Thus, the smaller the population, the smaller the harvest it can support. If harvests remain constant in a declining population, it is likely that, in the absence of a change in recruitment, the population will continue to decline at an ever increasing rate. Undertaking measures to increase recruitment is futile if harvest levels are not sustainable.

Based on the most recent population analysis, annual survival appears to have increased over the past 10 years (from 0.81 to 0.87), but remains lower than survival estimates for other "healthy" Lake Sturgeon populations (which are generally over 0.90). Consequently, to ensure that the short-term and long-term goals of this management plan are achieved, focus should continue to be directed at increasing survival. Since harvest is thought to comprise a significant proportion of the mortality on this population, efforts directed at reducing harvests may the simplest and most effective way to increase survival.

If it is assumed that the adult population of Lake Sturgeon in the Saskatchewan River between EB Campbell and Grand Rapids dams is currently 3000 fish, the current objective should be to maintain harvests under 150 adult fish annually. However, if the Board wishes to expedite achievement of the long-term goal of this plan, an even smaller harvest should be targeted. As measures are undertaken to understand and mitigate limitations to recruitment, and as the adult population grows, a sustainable harvest target can be adjusted.

Given the difficulties in understanding and mitigating the factors that may be currently limiting recruitment, and the long time frames that are associated with understanding whether mitigation may be effective, and given the difficulties in implementing stocking programs, achieving a sustainable harvest is the most certain and effective method of stabilizing and effecting an increase in the Saskatchewan River sturgeon population. Several strategies can be implemented to achieve harvest goals, including communicating the vulnerability of the Lake Sturgeon population to local resource users, fostering interest in the work of the SRSMB, and employing sturgeon harvesters in monitoring to offset harvesting.

Progress toward achieving this objective can be measured by annual monitoring of the adult population and by periodic harvest surveys.

OBJECTIVE 3: Conduct programs to identify and understand factors limiting population growth and sustainability.

At present it is known that some natural recruitment is occurring to the Saskatchewan River Lake Sturgeon population and that some mortality is occurring that is not related to fishing (e.g., turbine mortality). What is not understood is how these factors can be practically mitigated in order to increase the adult population. The third objective of the SRSMB Ten-Year Management Plan is to promote and facilitate studies that will provide information fostering an understanding of factors that are currently limiting the population, and to mitigate and offset those limitations. This may include conducting studies to understand how spawning habitat is used, where nursery habitats are located, and the suitability of foraging habitats.

Progress toward achieving this objective will be measured by the programs that are conducted and by the results generated. Success in achieving this objective will contribute toward achieving the long-term goal of the management plan by providing the information necessary for achieving Objective 4.

OBJECTIVE 4: Based on results generated by achieving Objective 3, undertake or facilitate management actions that will reduce mortality or increase recruitment.

Undertaking measures to offset factors currently limiting the Saskatchewan River Lake Sturgeon population could play a fundamental role in achieving the Long-Term Goal of the Board. However, until studies undertaken as part of Objective 3 are completed, it would be imprudent to implement strategies that lack the necessary background information against which achievements

can be measured. Strategies that may be effective in achieving this objective include physical habitat manipulation, flow management, habitat protection and fish passage.

5.3 MANAGEMENT STRATEGIES

The objectives of the Management Plan will be achieved by implementing the following management strategies over the short term. Additional strategies may be undertaken over the longer term pending the achievement of management objectives.

During this management term, the Board will focus on monitoring, education, and facilitating studies to understand limiting factors.

5.3.1 Strategy 1 – Monitoring

Monitoring is essential to any management plan as it provides the information necessary to make management decisions, and to measure the success or failure of those decisions.

5.3.1.1 Monitoring the Lake Sturgeon Population

5.3.1.1.1 Index Fishing

The current index-fishing program will be conducted at a minimum of triennially or more frequently if the Board decides that more effort is required. The program will focus on providing data that will allow the Board to estimate the number of adult sturgeon in the river between E.B. Campbell Dam and Grand Rapids Dam. The Board will work toward standardizing sampling methodologies in Saskatchewan and Manitoba.

5.3.1.1.2 Sub-Adult Monitoring

Current monitoring data only allow for population estimates of fish ≥800 mm in length. Because up to 60% of the current domestic harvest could be comprised of fish <800 mm, the monitoring program should be expanded to provide information on the sizes of fish most heavily exploited. Increasing the amount of information on smaller (sub-adult) fish in the population will allow the Board to make more timely decisions with regard to achieving Goals 1 and 2. The Board will investigate methods to increase information on the abundance of sub-adult Lake Sturgeon in the population.

5.3.1.1.3 Recruitment Monitoring

Restoring self-sustaining populations of fish requires an understanding of recruitment because populations can only sustain themselves if successful reproduction, followed by survival to maturation, occurs (Jager et al. 2001). The Board continues to recognize a need to broaden the current monitoring program to gain a better understanding of recruitment of young fish into the population. The current index-fishing program cannot detect a change in the number of small sturgeon entering the population until as much as 20 years after the change has occurred (i.e., until fish have reached 800 mm in length). By understanding changes in the number of young fish in the population, the Board will be able to make better and timelier management decisions with respect to Objectives 1 and 2.

A method (including sampling location) has not been identified to date that can adequately measure the population of juvenile and young of the year sturgeon in the Saskatchewan River. The Board will continue to pursue potential options for monitoring these younger cohorts.

5.3.1.2 Monitoring the Domestic Harvest

As discussed in Objective 2, a sustainable harvest is essential for effective Lake Sturgeon management. To have an understanding of whether the current Lake Sturgeon harvest is sustainable and to direct management efforts, it is important to have an understanding of the number of fish that are being removed from the population. Studies conducted in 2001 and 2002 at The Pas and Cumberland House concluded that the harvest was not likely sustainable at that time (North/South Consultants Inc. 2003).

Over the past 10 years, the SRSMB has invested considerable effort in educational and outreach programs to foster an interest in the vulnerability and conservation of Lake Sturgeon. Although these programs have been effective in reaching many of the resource users in The Pas and Cumberland House, it remains uncertain how effective this has been in managing harvests.

The only way to determine if harvests are sustainable in the short term is to monitor actual harvests. The Board recognizes that implementation of such programs is difficult, time consuming and expensive. Consequently, while the Board will continue to examine the feasibility of conducting harvest surveys, it will direct effort at educational and outreach programs to encourage voluntary harvest reductions (see Section 5.3.3).

Should a harvest survey be conducted, the types of information that are required include: the number of fish caught; the number of tagged fish caught; the size of the fish caught; and whether the fish are kept or released. The Board recognizes that this information should be requested on a confidential and voluntary basis and must not be related to enforcement activities. The Board will consider a number of harvest study methodologies including river surveys, household surveys, and harvest calendars (where individuals track harvests on calendars) and implement the most appropriate approach on an as needed and as feasible basis. Consideration could be given to having this work done by a university graduate student.

5.3.2 Strategy 2 – Decrease Mortality

Decreasing mortality (the number of fish that die) is the second strategy that can be employed to increase the population within 10 years and achieve Objective 1 of the Ten-Year Management Plan. This strategy can also be directed at achieving a sustainable harvest that will also allow population growth (Objective 2).

Decreasing mortality will:

- help to maintain or increase the current population;
- help to maximize the number of fish spawning now;
- increase the chances of survival of the stock; and
- increase the rate of recovery.

Sturgeon mortality results from both "natural" (e.g., climatic, predation) and "human" (e.g., fishing, habitat manipulation) causes. The "natural" reasons for mortality are hard to control and often difficult or impossible to offset. The "human" reasons for mortality are more easily offset through harvest reductions or habitat improvement. Habitat improvement requires an understanding of the habitat factors that are currently limiting the population. This understanding will be provided through habitat assessment studies, which are discussed under Strategy 5.

To decrease mortality over the next five years, the Board will focus effort on decreasing both legal and illegal harvests.

5.3.2.1 Legal Harvests (i.e., Aboriginal harvests)

First Nations and Métis have the right to harvest fish for their own consumption at any time of the year without the need for fishing licenses. The Board understands the importance of these harvests and recognizes this in the long-term objective of this management plan.

The Board also recognizes that to protect the Saskatchewan River Lake Sturgeon population it is essential that harvest levels are sustainable. A reduction in harvest is the most effective method of protecting the population in the short term. The Board will direct effort at encouraging community members to voluntarily reduce harvests, or to keep only certain numbers or sizes of fish. For example, female sturgeon, which are critical to the reproductive capacity of the population, comprise a significantly higher proportion of the larger fish in the population than male sturgeon. The Board could choose to recommend that fish of a certain size be released to protect a key segment of the population.

5.3.2.2 Illegal Harvests (i.e., poaching)

Although First Nations and Métis have the right to harvest fish for their own consumption, they cannot sell fish without being in possession of a commercial fishing license. Non-Aboriginals cannot retain any sturgeon captured in Saskatchewan or Manitoba. The Board will focus effort on eliminating Aboriginal harvests that are sold, and non-Aboriginal harvests.

Based on the Board's current understanding, sturgeon poaching is not a significant problem on the Saskatchewan River. However, it should be noted that an illegal harvest of just 30 sturgeon ≥800 mm in length represents a loss of 20% of the annual sustainable yield from the current population estimate (assuming the sustainable yield is 5% of 3000 fish or 150 sturgeon). Consequently, the Board sees the elimination of even a small amount of poaching as desirable. Effort will be directed at encouraging community members to report poachers to the responsible authorities, and increasing regulatory patrols on the river. Harvest reductions and reporting poachers will be encouraged, and educating poachers will be accomplished, through Strategy 3 – Communication and Education.

5.3.3 Strategy 3 – Communication and Education

To achieve the overall objective of establishing a self-sustaining sturgeon population that meets the needs of local people, it will be necessary to achieve community support for sturgeon conservation. To gain this support, the communities must feel that they are active participants in the decision making process. It is important for the Board to communicate to community

members the rationale for, and results of, Board activities, and to educate community members with regard to the vulnerability of Saskatchewan River Lake Sturgeon. Each representative on the Board must ensure that the Board's message reaches their community or organization and, in turn, ensure that the opinions of the community or organization are expressed to the Board. Community representatives must be given the full support of the Board.

The communication and education programs will focus on:

- fostering interest in Lake Surgeon;
- educating the communities about the current low population levels of sturgeon;
- educating the communities about the activities of the Board;
- providing valuable feedback on Board initiatives;
- encouraging informed community involvement;
- providing the Board with a level of credibility;
- fostering community support for the need to reduce harvest levels;
- conveying recommended sustainable harvest levels to harvesters; and,
- encouraging voluntary harvest reductions.

The Board will seek to communicate with and educate communities through the following actions:

Community Meetings/Band Council Meetings

Meetings will be conducted in Cumberland House and The Pas on a periodic basis to discuss Board activities, to present findings of Board investigations and recommendations, and to seek feedback on management options (e.g., on desired harvest levels). The information will be conveyed in a manner that it is understandable to a non-technical audience.

Communication Material and Newsletters

When feasible and appropriate, the Board will contribute articles to community newsletters that discuss sturgeon issues and Board activities. The Board may also produce and distribute printed material to communicate its activities and encourage sturgeon conservation.

Sturgeon in Schools Program

When and where there is interest, the Board will continue to participate in school programs to educate students about sturgeon.

Traditional Knowledge

The Board will examine the feasibility of collecting traditional knowledge of sturgeon and the sturgeon fishery from the communities of The Pas and Cumberland House. Traditional knowledge is a tool that can foster interest in Lake Sturgeon populations within the communities and encourage active participation in sustainable management of the species. Traditional knowledge can provide information on Lake Sturgeon life history characteristics and habitat, including historical information that is not available from other sources.

Website

The Board will continue to operate its website to communicate Board activities and encourage Lake Sturgeon conservation. The website will be updated on a regular basis.

5.3.4 Strategy 4 – Increase Recruitment

Increasing recruitment (the number of fish coming into the population) is one of two management strategies (see Strategy 3) that can be employed to actively increase the population. Increasing recruitment will:

- enhance the chances of population survival;
- help to maintain or increase the current population size into the future; and
- help support the domestic harvest.

However, the benefits of increasing recruitment to supplement the adult population will not be evident for approximately 15-20 years.

The number of sturgeon that hatch each year may currently be limited by the size of the spawning population or by habitat limitations. Increasing natural recruitment requires an understanding of the habitat factors currently limiting the population. This understanding will be provided through habitat assessment studies which are discussed under Strategy 5 and are specifically directed at achieving objectives 3 and 4 of the Plan. Introducing sturgeon into the system is an immediate method of increasing recruitment and will continue to be considered by the Board over the short term.

There are two methods of introducing sturgeon into a system: translocation and stocking. Translocation is not currently considered to be a viable alternative because large numbers of fish would need to be moved to have an immediate positive effect on the population; and there are no nearby locations with an excessive number of sturgeon that could be moved.

Stocking has the potential to have a more measurable effect on the population, but requires a longer period than translocation for measureable effects to become evident (it would require approximately 20 years to have a measurable effect on the spawning population). Sturgeon stocking requires the collection and artificial fertilization of eggs from wild brood stock. Recent efforts in Manitoba have shown that stocking one-year-old Lake Sturgeon can be extremely effective in increasing recruitment of fish into the two-year-old cohort.

If the brood stock were to originate from downstream of E.B. Campbell Dam, the intent of stocking would be to increase fertilization, hatch, and larval survival rates compared to the natural setting. If natural spawning conditions and YOY habitat are limiting, collection and incubation of eggs in a hatchery and rearing the fish to one year of age before stocking may significantly improve recruitment. Stocking of sturgeon originating from brood stock collected outside of the E.B. Campbell Dam to Grand Rapids Dam reach of the river would supplement recruitment from natural reproduction.

Maintaining the genetic integrity of the Saskatchewan River Lake Sturgeon is a primary concern. Saskatchewan River sturgeon are genetically distinct from other populations in Manitoba where spawn-taking operations have been conducted. The Board believes that it is currently undesirable to mix stocks without a more detailed consideration of the consequences. Thus, the source of brood stock would be restricted to the Saskatchewan River and its tributaries from the forks of the North and South Saskatchewan rivers downstream to Grand Rapids Dam.

At present the SRSMB lacks the resources to undertake a stocking program. However, the Board will continue to examine the feasibility of a stocking program and, should it be determined through activities conducted as part of Strategy 5 that there are currently severe restrictions to recruitment, the Board may promote stocking as a priority strategy.

5.3.5 Strategy 5 – Habitat Assessment

The Board recognizes that habitat within the Saskatchewan River is unique and has been irreversibly changed. At least two sets of rapids (Iskwao and Tobin) have been permanently de-watered or inundated, and the suitability of the remaining habitat for spawning remains in question. The location of young of the year and juvenile habitats also remains uncertain. Although the carrying capacity of the habitat is probably less than it was historically (i.e., in 1958), the extent of the decrease is unknown.

Habitat assessment will:

- provide information on limiting factors and critical habitat;
- help identify opportunities for habitat improvement and protection; and
- increase interest in sturgeon, fostering community participation in management initiatives.

Spawning habitat (along with overexploitation) is often suspected to be one of the key limiting factors of impacted sturgeon populations. As discussed previously, at least two sets of rapids where sturgeon may have formerly spawned (i.e., Tobin and Iskwao) no longer exist. The Board has identified a number of other sites where sturgeon are, or were, suspected to spawn in the Saskatchewan River.

It is acknowledged that conditions at all of these sites have changed dramatically since the 1950s because of upstream water and hydroelectric development; therefore, their present suitability for spawning remains in question. The Board recognizes that there is a need to confirm whether the existing spawning habitat is suitable and if it is being utilized. This information will also facilitate the decision making process for implementation of a stocking program.

Habitat assessment priorities include:

Investigations of spawning site utilization

Investigation of spawning sites will identify critical habitats for protection and provide an understanding of current reproductive activity and recruitment. Sites should be prioritized according to known spawning activity (e.g., Torch River) and suitable conditions for spawning (i.e., appropriate substrates, water velocities and depths). It should be noted however, that due to the current low abundance of spawning fish, historical sites may currently be underutilized even if habitat conditions remain suitable. In 2014, SaskPower commenced spawning studies below E.B. Campbell dam.

Investigations of juvenile habitat utilization

Availability of suitable young of the year and juvenile habitats may play a critical role in the recruitment of Lake Sturgeon. There is still much uncertainty as to the optimal physical parameters for such habitat, and where these habitats may be in the Saskatchewan River. It is known that young sturgeon prefer deep water habitats and that younger Lake Sturgeon are typically more abundant in the Manitoba portion of the lower Saskatchewan River than they are in the Saskachewan portion. The Board intends to direct effort at locating juvenile Lake

Sturgeon within the river and further defining the habitat parameters that may be important to this component of the population. Locating juvenile habitats will also facilitate development of a juvenile monitoring program (see Strategy 1, Section 5.3.1.1.3).

Habitat modeling and instream flow needs

Habitat modeling will provide information on the suitability of existing habitats and how those habitats may be enhanced. Instream flow needs studies will provide information on how to optimize flow management for power generation and Lake Sturgeon production. For example, the area immediately below the power station outfall at E.B. Campbell Dam contains the last available section of the extensive pre-dam rapids that has coarse substrate suitable for sturgeon spawning. However, existing hydro-peaking operations may affect the suitability of this habitat for spawning. Determining if conditions for sturgeon spawning in this area can be improved requires the collection of habitat utilization data, physical habitat data and modeling of the habitat conditions under various flows.

Over the course of this management plan, the Board will examine the need for and feasibility of conducting such investigations and develop further plans as required.

5.3.6 Strategy 6 –Habitat Improvement/Restoration/Protection

Pending results from implementation of programs under Strategy 5, the SRSMB will examine the feasibility of habitat manipulation and/or habitat protection that will maintain or increase current recruitment or decrease current mortality rates. However, until studies undertaken as part of Objective 3 are completed, it would be imprudent to implement strategies that lack the necessary background information against which achievements can be measured.

6.0 IMPLEMENTATION PLAN

The SRSMB will operate as outlined in its Terms of Reference for the duration of the Ten-Year Management Plan (Appendix 2). Management strategies identified within the Ten-Year Management Plan will be implemented through the following three processes.

6.1 PLANNING ACTIVITIES

The SRSMB will meet at least two times per year and additionally as required. The responsibilities of the Board organizations, members, and chairperson are outlined in the SRSMB Terms of Reference (Appendix 2). During the Ten-Year Management Plan, the Board will undertake the following:

6.1.1 Assessment Meeting

An Assessment Meeting will be held in October or November each year to review results of activities from the previous year and assess progress toward meeting Management Plan objectives. The meeting agenda will include*:*

Presentation of Results from Previous Year

- Each organization that conducted work for the Board in the previous year will provide a presentation their results.

Review of the Monitoring Program

- A review of the monitoring program from the previous year will be conducted. The Board will recommend changes to the program for the upcoming year that will satisfy the monitoring needs of the Board.

Sustainability Assessment

- The Board will review the most recent monitoring data, including the population estimate, age and sex structure of the population, available harvest estimates, and current understanding of poaching, and evaluate the progress toward achieving Objectives 1 and 2 of the Management Plan and the sustainability of the existing population. A decision making flow-chart for annual implementation of management strategies to achieve a sustainable Lake Sturgeon population is provided in Figure 7. Management strategies that can be applied to achieve specific management objectives are summarized in Table 2.

Table 3. Summary of relevant management strategies for each management plan objective.

	Objective	Relevant Management Strategies
Objective 1	Achieve a measureable increase in the Lake Sturgeon population in the next ten years.	**Strategy 1 – Monitoring –** measure success **Strategy 2** – **Decrease mortality -** through harvest reduction. **Strategy 3** – **Education and communication** - fosters support for a harvest reduction. **Strategy 4** – **Increase recruitment** – stocking
Objective 2	Achieve a sustainable harvest level that will allow for population growth.	**Strategy 1 – Monitoring –** measure success **Strategy 2** – **Decrease mortality -** through harvest reduction. **Strategy 3** – **Education and communication** - fosters support for a harvest reduction.
Objective 3	Conduct programs to understand factors limiting population growth and sustainability.	**Strategy 5** – **Habitat assessment –** develop understanding of limiting factors
Objective 4	Based on results generated by achieving Objective 3, facilitate management actions that will reduce mortality or increase recruitment.	**Strategy 6** – **Habitat Improvement, restoration/protection** – offset limiting factors

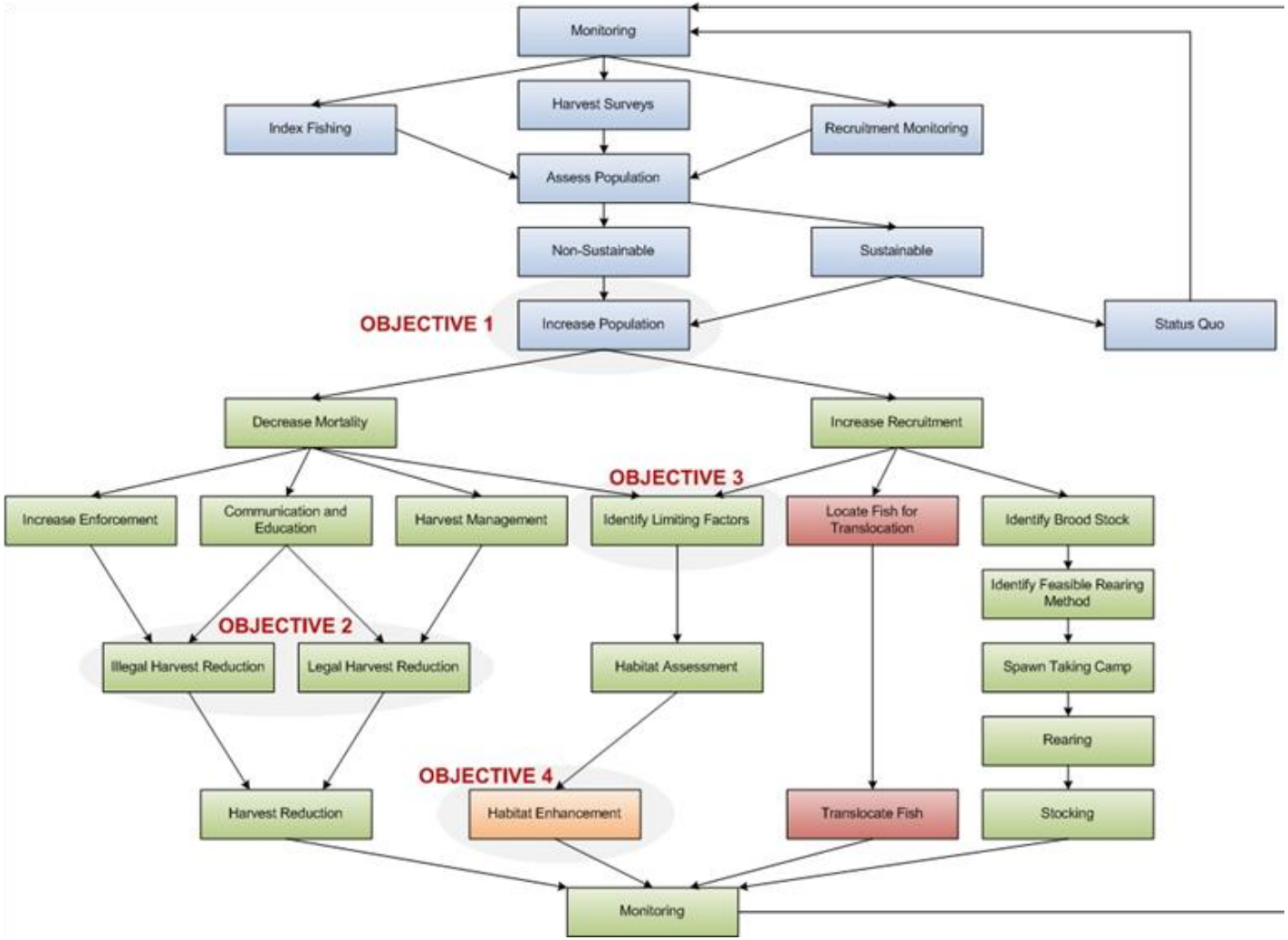

Figure 7. Decision making flow chart illustrating management strategies and how they may be used to achieve management plan objectives. Boxes illustrated in green are the most likely pathways for implementation over the short term.

Review Management Strategies and Progress Toward Objectives

Pending the evaluation of sustainability, the Board will:

- Investigate, discuss, and recommend appropriate management measures (e.g., habitat protection, harvest recommendations) to achieve a sustainable harvest.
- Review the communication and education initiatives undertaken in the previous year and recommend appropriate actions in the coming year.
- Review habitat assessment activities from the previous year particularly in relation to recruitment and mortality. The board will discuss and recommend appropriate actions for the coming year.
- Pending the outcome of habitat assessment activities, the Board will develop plans for habitat enhancement initiatives that will increase recruitment and/or decrease mortality and ultimately increase carrying capacity.

Prioritize and Develop Preliminary Budget

- The Board will prioritize the proposed management initiatives based on cost, available funding and importance of the initiatives for reaching management plan goals, and develop a preliminary plan and budget for Management Board activities for the coming year.

Subsequent to the Assessment Meeting, Board members will conduct research and planning activities required to undertake the proposed Board initiatives for the coming year. Board members will be responsible for securing the necessary project funding during this period such that a commitment for implementation of proposed Board initiatives can be made at the Planning Meeting in February.

6.1.2 Planning Meeting

A Planning Meeting will be held near the end of February each year to commit to activities and conduct detailed planning for the coming year. The Planning Meeting agenda will include implementation plans for the following:

- population, recruitment and harvest monitoring;

- communication and education initiatives;
- habitat assessments;
- potential stocking activities; and
- habitat enhancement/protection.

Responsibilities for reporting, population estimates, and further research will also be assigned at the meeting. Budgets to conduct the planned activities will be finalized.

6.2 FUNDING

There is no centralized base funding for Board activities. Funding for Board activities may be provided by participating members based on Board decisions on an annual basis. Budgets are discussed during the spring planning meetings each year, and provision of funds is made for meeting participation of community members through payment of per diems and travel/accommodation.

6.3 FIELD PROGRAMS

The Board will facilitate implementation of field programs to achieve and measure progress toward management plan objectives and goals. Annual field activities will be undertaken as determined during the assessment and planning meetings. Field programs will include, but may not be limited to, the following activities.

6.3.1 Population Monitoring

The Board will conduct a population-monitoring program in both Saskatchewan and Manitoba at a minimum of once every three years (triennially) or more often as the Board may determine.

The primary objective of the population-monitoring program will be to provide information (i.e., scientific data) on the size and condition of the Saskatchewan River sturgeon population to act as a base against which progress of the management plan can be measured. Monitoring program results will also provide information upon which to base implementation of management strategies and measure the success or failures of those strategies. Therefore, the population-monitoring program should be designed to provide, where possible, the type of information upon which management plan strategies are based. This includes providing information on abundance and condition of the following:

- the spawning population;
- fish to be recruited into the spawning population in the near future; and
- the population targeted by harvesting activity (sturgeon 4 kg and up).

A secondary objective of the monitoring program is to utilize the experience and knowledge of former commercial fishermen, and to allow the fishermen to participate in the management program while supplementing their incomes.

SaskPower and Manitoba Conservation and Water Stewardship will coordinate the population monitoring programs in Saskatchewan and Manitoba, respectively. Population monitoring will continue to be conducted by index-fishing and mark-and-recapture. Presently, the index-fishing program only provides information to estimate the population of sturgeon ≥800 mm in length. If feasible, the Board will implement additional methods of monitoring that will provide a better understanding of the progress being made towards achieving the management plan goals.

6.3.2 Harvest Surveys

The Board will consider undertaking harvest surveys at Cumberland House and The Pas. Should the Board undertake a harvest survey it would be developed in consultation with community members on the Board and would focus on hiring local people. Harvest studies would be designed to provide an estimate of the overall domestic harvest from the Saskatchewan River. The Board will consider a number of harvest study methodologies including river surveys, household surveys, and harvest calendars (where individuals track harvests on a calendar). A harvest estimate in concert with the population estimate of harvestable sturgeon would provide a measure of the sustainability of the domestic harvest.

6.3.3 Stocking

The Board will continue to consider the feasibility of stocking and prioritize it based on results of monitoring and habitat assessment studies.

6.3.4 Habitat Assessment

Habitat assessment studies will be undertaken when funding can be secured. The focus will be on spawning and nursery sites.

6.3.5 Other Field Programs

Based on annual assessments of monitoring results, planning activities, and results of other field activities, the Board may undertake other field programs to achieve management plan objectives and goals. These field programs would be dependent on available funding and completion of certain preliminary requirements or investigations (Table 3).

Table 4. Potential SRSMB field programs and preliminary requirements for implementation.

Field Program	Preliminary Requirement for Implementation
Spawn Taking Operation	Identify brood stock.
Rearing Operation	Identify feasible and cost-effective rearing technology.
Translocation	Identify adequate source of sturgeon.
Monitoring Abundance of 4-8 kg sturgeon	Identify feasible method.
Monitoring Recruitment (young-of-the-year)	Identify feasible method and locations.
Habitat Enhancement	Identify limiting habitat and feasible cost-effective improvements.

6.4 COMMUNITY LIAISON

The SRSMB will conduct a community liaison program which will be developed on an annual basis. The program may consist of the following components.

6.4.1 Community/Band Council Meetings

OCN – When deemed appropriate, the Board will hold a meeting with the OCN Band Council. The meeting may be scheduled to coincide with regularly scheduled assessment or planning meetings. The purpose of the meeting will be to review Board activities, present current information on the status of the Saskatchewan River Lake Sturgeon population, and review proposed Board activities and recommendations for safe harvests.

The Board member representing OCN will organize and chair the meeting. Other Board members will attend, as required, to help present information. Information will be presented at a level understandable to those with no background in fisheries sciences.

Cumberland House – When deemed appropriate, a community meeting will be held in Cumberland House. The purpose of the meeting will be to review Board activities, present current information on the status of the Saskatchewan River Lake Sturgeon population, and review proposed Board activities and recommendations for safe harvests. The meeting will be organized and chaired by the Board members representing Cumberland House. Other Board members will attend, as required, to help present information. Information will be presented at a level understandable to those with no background in fisheries sciences.

6.4.2 Community Newsletters

With assistance from the Board members from OCN, the Board will periodically prepare and submit articles on Saskatchewan River Lake Sturgeon to OCN for distribution within OCN community newsletters. The objective of the articles will be to encourage support for the Board and sustainable harvest levels. The articles will focus on the vulnerability of Lake Sturgeon populations, the current status of sturgeon in the Saskatchewan River, and current Board activities and recommendations for safe harvests.

The Board will examine the feasibility of periodically producing a newsletter for distribution in Cumberland House. The purpose of the Cumberland House newsletter would be similar to the OCN newsletter articles.

6.4.3 Schools Program

The Board will continue to pursue the Sturgeon in Schools Program at both OCN and Cumberland House. This program educates school children about Lake Sturgeon and motivates student interest by providing sturgeon fingerlings for school aquaria.

6.4.4 Website

The Board will continue to update its website on a regular basis. The website will be used to foster interest in Lake Sturgeon conservation by sharing information on SRSMB activities, the Saskatchewan River Lake Sturgeon population and Lake Sturgeon in general.

6.4.5 Traditional Knowledge

The Board will examine the feasibility of collecting traditional knowledge on Lake Sturgeon from community members at Cumberland House and OCN. Collection of traditional knowledge will focus on increasing knowledge of Lake Sturgeon life history characteristics and habitat

utilization in the Saskatchewan River and on increasing awareness and support for Board activities.

6.4.6 Sustainable Harvest Goal

The Board will use community consultation and traditional knowledge to define traditional use of sturgeon within the communities, and establish a safe harvest goal based on those traditional uses and knowledge of the existing population.

6.4.7 Other Activities

Based on annual planning activities and results of field and community liaison programs, the Board may undertake other activities to increase public awareness of and encourage support for Board activities and recommendations.

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APPENDIX 1.
Commercial harvests of Lake Sturgeon reported from the Saskatchewan River near Cumberland House and The Pas, 1898-1995.

Commercial Lake Sturgeon harvests (in kg marketed weight [headless dressed]) from the lower Saskatchewan River, 1898-1995 (data from Stewart 2009).

Year	Saskatchewan	Manitoba	Year	Saskatchewan	Manitoba
1898	18160		1947/48	Closed	
1899			1948/49	2954	
1900	2722	19051	1949/50		
1901	11249	37558	1950/51	1922	
1902	5443	52073	1951/52	3990	
1903	37195	35381	1952/53	3655	
1904	63050	34020	1953/54	3250	
1905	57154	38556	1954/55	1230	
1906	33113	56700	1955/56	3335	
1907/08	20412	9072	1956/57	3440	
1908/09	4082		1957/58	3129	967
1909/10	12247	10025	1958/59	3583	636
1910/11	13064	13381	1959/60	1428	157
1911/12	726		1960/61	1455	123
1912/13			1961/62	682	
1913/14			1962/63	3626	
1914/15			1963/64	1782	
1915/16		6939	1964/65	935	
1916/17	3946	29983	1965/66	1043	
1917/18		12154	1966/67	804	
1918/19		14603	1967/68	1760	
1919/20		30158	1968/69	2344	
1920/21	2540	14606	1969/70	1591	
1921/22			1970/71	Closed	
1922/23	2540		1971/72	Closed	
1923/24		29545	1972/73	Closed	
1924/25		16364	1973/74	3249	
1925/26		5357	1974/75	2410	563
1926/27		14483	1975/76	2799	1252
1927/28		7355	1976/77	2845	2915
1928/29			1977/78	2841	2870
1929/30		1313	1978/79	3026	2312
1930/31		952	1979/80	2973	1550
1931/32		454	1980/81	3212	628
1932/33	2273	272	1981/82	3144	323
1933/34	2273	41	1982/83	3672	412
1934/35	6818		1983/84	2687	240
1935/36	6273		1984/85	2774	289
1936/37	8636		1985/86	3488	201
1937/38	3392	907	1986/87	2131	346
1938/39	2045		1987/88	2469	272
1939/40	795	1952	1988/89	2153	410
1940/41	4545	272	1989/90	667	391
1941/42	4082		1990/91	3131	134
1942/43	3647		1991/92	1537	267
1943/44	564	45	1992/93	1330	485
1944/45	670	195	1993/94	831	118
1945/46	Closed	45	1994/95	628	22
1946/47	Closed		1995/96	641	Closed
			1996/97	Closed	

APPENDIX 2.
Saskatchewan River Sturgeon Management Board Terms of Reference.
Revised October 23, 2014

The Saskatchewan River Sturgeon Management Board

Terms of Reference

Role

The Board will act in an advisory role on sturgeon management on the Saskatchewan River between the Grand Rapids and E.B. Campbell dams to the governments of *Canada*, Manitoba, Saskatchewan and First Nations.

Mission Statement

To prevent further decline of the sturgeon population; and to develop and coordinate a recovery plan.

Scope

The Board will advise on all matters related to sturgeon management on the Saskatchewan River between the Grand Rapids and E.B. Campbell dams. The Board may, but is not restricted to, making recommendations on the following matters:

- Provincial harvest (sport, commercial, and domestic);
- Aboriginal domestic harvest;
- Population monitoring;
- Habitat assessment and enhancement;
- Fish culture activities;
- Community education;
- Water management with respect to sturgeon requirements; and
- Other research.

Compensation for the impacts of hydro-electric facilities is beyond the scope of the Board.

Membership

The Board shall consist of one representative appointed by each of the following organizations:

- Saskatchewan Environment
- Manitoba Conservation and Water Stewardship, Fisheries Branch
- Opaskwayak Cree Nation
- Cumberland House Cree Nation
- Cumberland House Fishermen's Cooperative
- Saskatchewan River Fishermen's Association
- SaskPower
- Manitoba Hydro

Co-chairpersons, one from Saskatchewan and one from Manitoba, shall be elected by the board members to serve for a two-year period. Preferably, the chairpersons would be comprised of one community member and one member from industry/government.

Decision Making

Following each meeting, the Chairperson shall compile and circulate minutes of the meeting for review by each member. Comments or revisions to the minutes shall be forwarded to the Chairperson such that the minutes can be revised and presented at the following meeting. Following unanimous approval, the minutes will form a record of decision making by the Board.

Responsibilities of the Board

1. To develop and implement an annual management/activity plan, including a proposed budget, for recommendation to the member organizations. This shall be completed no later than December 31 for the following year.

2. The Board will develop a long-range sturgeon recovery plan no later than December 31, 2003. After that date, the recovery plan will be annually reviewed and updated.

3. To coordinate the sturgeon management activities of the member organizations within the scope of its mandate.

4. To review all research conducted by member organizations on sturgeon in the Board's area of operations.

5. To produce an annual report on its activities for distribution to the member organizations and the affected communities.

6. To identify and source financing for all board activities.

7. To hold at least one community informational meeting per year to inform the community of Board activities.

Responsibilities of Member Organizations

1. To designate their representative in writing to the Chairperson. A member organization may change their representative at any time by notifying the Chairperson in writing.

2. To review all recommendations submitted by the Board. If a recommendation pertaining to that organization is not accepted, then a written response detailing the reasons for rejection shall be sent to the Board within 45 days.

3. To submit all relevant research to be conducted by the organization to the Board for review.

4. To submit an annual report to the Board on all activities conducted by their organization in accordance with the Board's management plan for that year.

Responsibilities of the Chairperson

1. To arrange for all meetings of the Board and prepare the agenda.
2. To chair and ensure the orderly conduct of all Board meetings.
3. To determine if a consensus has been reached on all decision items.
4. To compile and circulate a draft Record of Decision following each meeting, for signature by all members at the next meeting.
5. To ensure follow-up action takes place on any action item resulting from a Board meeting.
6. To maintain the official file on all Board matters.
7. To convey all recommendations of the Board to the respective governments.
8. To notify other members of any change in representatives to the Board.
9. To ensure the Board carries out all its responsibilities and that the Terms of Reference are adhered to.
10. To act as a spokesperson and the point of contact for the Board.
11. To update the SRSMB website with relevant information and meeting minutes on a regular basis.

Meetings

The Board shall meet as required, but as a minimum no less than two times per year. A tentative date for the next meeting shall be set at the end of each meeting. The meeting date shall be confirmed, and agenda circulated by the Chairperson, no later than 14 days prior to the meeting date. Any member is entitled to ask for a meeting to be rescheduled. If a representative is unable to attend a particular meeting, they are expected to send a designate.

Board members may only invite guests or observers to meetings with the approval of the Chairperson who shall notify the other Board members in advance of the meeting.

Finances

Each member organization is responsible for all costs related to the participation of its representative on the Board.