# Chapter 21
# Environment—Sustainable Fish Population Management

## 1.0 Main Points

The Ministry of Environment is responsible for monitoring freshwater fish populations in the estimated 50,000 fish bearing water bodies within Saskatchewan.

The Ministry has effective processes to manage freshwater fish populations in a sustainable manner, other than the following areas. The Ministry needs to:

- Determine the resources needed to achieve timeframes established in its Fisheries Management Plan, and periodically assess the Plan's overall effectiveness.

  The current timeframes within the Plan are not being consistently met. Identifying the resources required to complete the Plan's goals would better position the Ministry to achieve its desired timeframes. This in turn will allow the Ministry to better assess its effectiveness in meeting the goals of the Fisheries Management Plan.

- Develop specific management plans for key high-risk fish species and/or high-usage water bodies.

  Having specific plans for the highest-risk species and/or highest-usage water bodies would give the Ministry guidance to assess whether existing populations for each of those species, and in each of those water bodies align with established expectations.

- Assess fish populations and their health using an established risk-based interval, proven sampling techniques, and science-based protocols for field data collection.

  Use of risk-based intervals and science-based protocols and techniques would help the Ministry collect sufficient information to detect changes in fish populations and health to avoid potentially irreversible declines in population or health of fish species.

- Prepare timely reports, including documenting key assumptions used, on the results of its assessments of water bodies.

  Completing final lake assessment reports, within a timely manner, would allow the Ministry to adjust future behaviour (e.g., adjust catch limits, restocking decisions) based on documented analysis. Documenting key assumptions used during the assessment, such as sampling methods or sample sizes, enables the Ministry to assess whether the work completed during the assessment was reasonable and the conclusions reached in reports are appropriate.

## 2.0 Introduction

This chapter includes the results of our audit of the Ministry's processes to manage freshwater fish populations in a sustainable manner.

In Saskatchewan, an estimated 50,000 water bodies contain fish with the majority in the northern half of the province. These waters contain 69 fish species with 58 species native to Saskatchewan and 11 introduced or invasive species. Most fishing and harvesting in the province focuses on five fish species: pike, walleye, perch, lake trout, and whitefish.[1]

## 2.1 Background

The Ministry of Environment is responsible for monitoring freshwater fish populations to detect changes resulting from harvest, environmental conditions and stocking as described in *Fish Populations, Management, Research, and Fish Populations Monitoring*.[2] Its specific responsibilities include:

- Permitting the establishment, development, maintenance, and enhancement of any fish population
- Controlling the importation or stocking of any fish
- Performing anything the Minister considers necessary to conserve, develop, maintain, enhance, manage and utilize Saskatchewan's fish resources in a sustainable manner[3]

In 2019–20, the Ministry plans to spend about $14.3 million (2018–19 actual: $13.8 million) on conserving fish and wildlife populations, and maintaining biodiversity including around $5 million for the Fish and Wildlife Development Fund.[4,5,6]

The purpose of the Ministry-administered Fund is to maintain natural habitats including maintaining and growing sustainable fish populations and their habitats, as well as maintaining game populations and accessible hunting.[7,8]

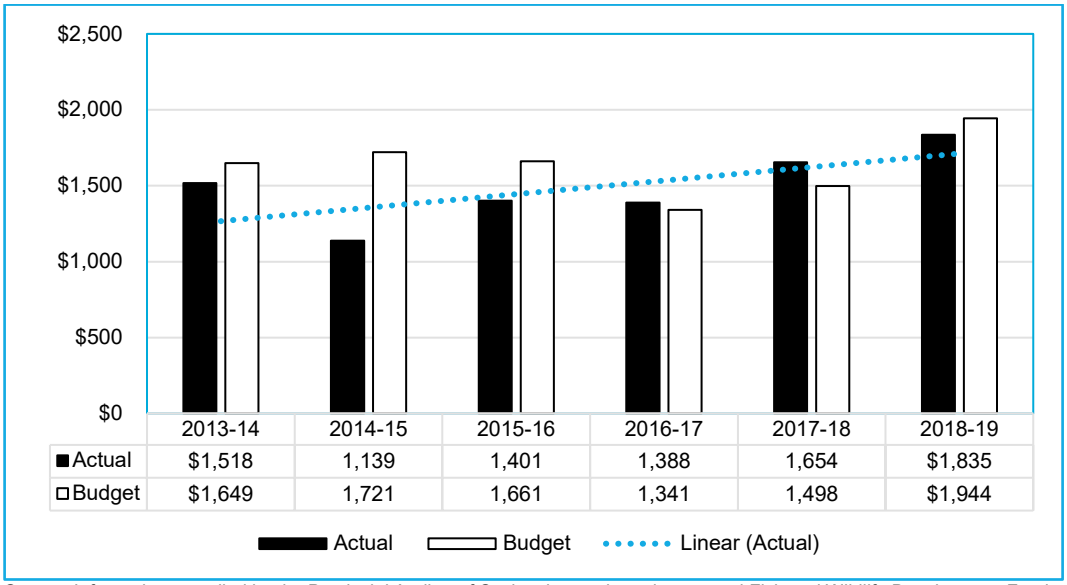
Thirty percent from each angler's licence invests in the Fund to finance research, data collection, and determining at-risk fish species projects and fish stocking programs.[9] During 2018–19, the Ministry generated approximately $7.5 million from individual fishing licences, and roughly $20,000 from commercial fishing licences.

The Saskatchewan Wildlife Federation (under a 2014 Trust Agreement with the Ministry) carries out certain Fund activities on behalf of the Ministry to enhance Saskatchewan fisheries; it also operates the Fish Culture Station (Provincial Hatchery) located near Fort Qu'Appelle.[10]

[1] Ministry of Environment, Fisheries Management Plan (2010), p. 2; www.environment.gov.sk.ca/Default.aspx?DN=44c1e4e5-c717-42d3-bef7-75f0d398b55d (13 September 2019).
[2] *Ministry of Environment, Fish Populations, Management, Research, and Fish Population Monitoring*, (2018).
[3] *The Fisheries Act (Saskatchewan)*, 1994 (s.9).
[4] *Government of Saskatchewan 19–20 Estimates*, p. 53.
[5] *Ministry of Environment Annual Report for 2018–19*, p.15
[6] The Fish and Wildlife Development Fund operates under *The Natural Resources Act* (s.20).
[7] The Ministry of Environment's Fish and Wildlife Development Fund Financial Statements for the year ended March 31, 2019.
[8] In order to maximize the use of resources from the Ministry's Fund, the Saskatchewan Wildlife Federation uses its best efforts to seek matching funding on a project/program basis. This allows for funding expansion to other projects that the Ministry and Federation deem necessary.
[9] www.saskatchewan.ca/residents/parks-culture-heritage-and-sport/hunting-trapping-and-angling/fish-and-wildlife-development-fund (23 September 2019).
[10] The Fish Culture Station contains the capacity to rear as many as 60 million fish each year. The 2014 Agreement establishes a separate trust account managed by the Saskatchewan Wildlife Federation, which is part of the Fish and Wildlife Development Fund.

As shown in **Figure 1**, the Fund's spending on fish enhancement projects (e.g., stocking and fish population enhancement, species at risk projects) increased over the last five years.

**Figure 1—Fish and Wildlife Development Fund: Five-Year Fish Enhancement Project Spending (in thousands of dollars)**




| | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 |
|---|---|---|---|---|---|---|
| Actual | $1,518 | 1,139 | 1,401 | 1,388 | 1,654 | $1,835 |
| Budget | $1,649 | 1,721 | 1,661 | 1,341 | 1,498 | $1,944 |

Source: Information compiled by the Provincial Auditor of Saskatchewan based on annual Fish and Wildlife Development Fund Audited Financial Statements.

## 2.2 Importance of Managing Freshwater Fish Populations

Saskatchewan fisheries provide economic and social benefits to residents of Saskatchewan and Canada, including providing livelihoods for residents in remote communities.

Fish, although a renewable resource, are at risk without proper management. Each fish caught or harvested should benefit the angler while minimizing the impact to the fish's ecosystem. In addition, sustainable fishing allows the remaining fish to repopulate. Stocking alone cannot sustain a fishery.[11,12]

Increasing pressures of climate change, access to fisheries, development of new fish harvesting technologies, and competition among users negatively affect fish populations and make sustaining fish populations challenging.[13]

Effective fish population management in freshwater fisheries is critical to sustainable fisheries today, and for future generations.

[11] Ministry of Environment, *Fisheries Management Plan,* (2010), p. 3.
[12] Under *The Fisheries Act*, "fishery" means any business or undertaking involving fishing or raising, possessing, using, culturing, processing, packaging, marketing, carrying, transporting or disposing of any fish.
[13] Ministry of Environment, *Fisheries Management Plan,* (2010), p. 1.

## 3.0 AUDIT CONCLUSION

**We concluded that for the 12-month period ended July 31, 2019; the Ministry of Environment had, other than the following areas, effective processes to manage freshwater fish populations in a sustainable manner.**

**The Ministry needs to:**

- **Determine resources needed to achieve timeframes established in its Fisheries Management Plan, and periodically assess the Plan's effectiveness**
- **Develop specific management plans for key high-risk fish species and/or high-usage water bodies**
- **Sufficiently assess fish populations and their health in water bodies using risk-based intervals and proven sampling techniques; and consider obtaining alternate information where possible (e.g., from commercial fishers)**
- **Prepare timely reports on its key decisions and results from its analysis of information collected about fish populations and their health**
- **Maintain written, standardized, science-based protocols for field data collection and reporting on fish populations and their health**

**Figure 2—Audit Objective, Criteria, and Approach**

**Audit Objective:** To assess whether the Ministry of Environment has effective processes for the 12-month period ending July 31, 2019, to manage the populations of freshwater fish in a sustainable manner.

**Audit Criteria:**

Processes to:

1. Plan to sustain freshwater fish populations
   - 1.1 Have a short to long-term plan to maintain healthy fish populations
   - 1.2 Determine which fish species to include in the plan
   - 1.3 Make sustainability plans for all key fish species
2. Implement freshwater fish sustainability management plan
   - 2.1 Collect relevant data on fish populations across different bodies of water
   - 2.2 Use accepted methods to estimate fish stock health of key species
   - 2.3 Keep data on fish populations current (e.g., within five years)
   - 2.4 Carry out fish management activities as planned (e.g., stock levels, angling limits)
3. Monitor results of the fish sustainability management plan
   - 3.1 Keep track of how much fish is caught (e.g., recreational, commercial)
   - 3.2 Evaluate the effectiveness of the fish sustainability management plan
   - 3.3 Adjust fish sustainability management plan as necessary based on outcomes (e.g., analysis of populations of fish)
   - 3.4 Report to senior management on significant findings

**Audit Approach:**

To conduct this audit, we followed the standards for assurance engagements published in the *CPA Canada Handbook—Assurance* (CSAE 3001). To evaluate the Ministry's processes, we used the above criteria based on our related work, literature reviews including other auditors' reports, consultations with a subject matter expert, and consultations with management. The Ministry's management agreed with the above criteria.

We examined the Ministry's criteria, policies, and procedures relating to managing fish populations. We assessed the Ministry's processes to assess bodies of water in Saskatchewan for fish species' health. We tested a sample of water body assessments to determine the consistency of information, timeliness of collection, and the reasonableness of data collection methods. We consulted with an independent consultant with subject matter expertise in the area. The consultant helped us identify good practice.

# 4.0 KEY FINDINGS AND RECOMMENDATIONS

## 4.1 Comprehensive Fisheries Management Plan In Place

Since 2010, the Ministry uses a comprehensive fisheries management plan with content aligning with good practice.

The Ministry created the Fisheries Management Plan in 2010 with the vision of healthy, sustainable fish populations and habitats providing diverse benefits for Saskatchewan.[14]

The Plan includes expected areas based on good practice, and clear goals and outcomes. The Plan's four primary outcomes are:

- Sustainable Management
- Protect and Accommodate the Treaty, and Aboriginal Right, to Fish
- Allocation to Optimize Social and Economic Benefits
- Shared Responsibility and Public Engagement[15]

The Plan sets out risks (challenges) over the short, medium, and long terms (e.g., potential effects of environmental threats, impact of human activities, increased harvesting and fishing activities). We found the risk areas identified consistent with those outlined in good practice.

The Plan also includes strategies to monitor and manage freshwater fish populations and changes. It lists 51 actions with timelines to achieve the Plan's stated outcomes. It classified 17 actions to complete within two years (short), 13 actions to complete within two to four years (medium), five actions to complete in more than five years (long), and 17 actions as ongoing.[16] That is, the Plan expected the Ministry to complete over one-half of the actions by 2015.

Consistent with good practice, and to keep it relevant and up-to-date, the Plan included an action expecting a review and evaluation of the Plan's effectiveness every five years. The Ministry last formally reviewed the Plan in 2015.

The 2015 five-year review, entitled the *Fisheries Management Plan (2010–2015)—Five Year Review*, did not determine how well the Plan achieved its outcomes (i.e., evaluate the Plan's effectiveness). Instead, it focused on the relevance of the Plan's goals, outcomes, and actions, and status of those actions. See **Figure 3** for details on completion of the Plan's actions. See **Recommendation 9**.

[14] Ministry of Environment, *Fish Populations, Management, Research, and Fish Population Monitoring*, (2018), p. 1.
[15] Ibid, p. 2.
[16] One action (i.e., #18. Conduct a provincial angler survey every five years as part of the cross-Canada angler survey) is both short and long term.

**Figure 3—Summary of Completion of the 51 Actions in the 2010 Fisheries Management Plan**

| Progress | Actual Progress as of 2015 Five-Year Review | Expected Progress Based on Plan as of July 2019 | Actual Progress as of July 2019 |
|---|---|---|---|
| Completed | 21 | 34 | 27 |
| Progressing | 11 | 0 | 8 |
| Ongoing Work Remaining | 19 | 17 | 16 |
| **Total** | **51** | **51** | **51** |

Source: *Fisheries Management Plan—Five-Year Review 2010–15* (Information as of 2015 five-year review) and compiled from the Ministry of Environment's records (as of July 2019).

The 2015 five-year review did not revise the timeframes for the remaining actions; rather it identified the following six priority areas for 2016–2021:

- Assessing the vulnerability of Saskatchewan's aquatic species to climate change
- Developing a fisheries enhancement plan
- Reviewing and refining fisheries productivity models
- Further refining processes to collect and report field testing data, including for freshwater fish populations
- Improving communications with First Nations and Métis
- Providing adequate resources to address significant threats to fisheries such as aquatic invasive species[17]

The Ministry expects to do its next review of the Plan in 2021.

Having a comprehensive fisheries management plan provides a solid framework and identifies key activities essential to maintaining sustainable freshwater fish populations.

## 4.2 Annual Plans Used to Set Work Priorities—Implementation of Fisheries Management Plan Slower Than Expected

The Ministry did not determine resources required to complete actions within timeframes set out in the 2010 Fisheries Management Plan or achieve priorities established in the 2015 Five-Year Review. Rather, the Ministry expects its Fish, Wildlife and Lands Branch assigned responsibility for managing fish populations to allocate existing resources to implement the Fisheries Management Plan.

On an overall basis, as at September 2019, the Ministry continued implementing actions set out in the Plan slower than the Plan's timeframes (See **Figure 3**).

[17] Ministry of Environment, Fisheries Management Plan—Five Year Review, (2015), p.2, https://pubsaskdev.blob.core.windows.net/pubsask-prod/94972/94972-Fisheries_Management_Plan_5-Year_Review_Backgrounder.pdf (23 September 2019).

The Fish, Wildlife and Lands Branch uses its strategic plan along with related annual work-priority plans to identify work priorities for the upcoming year for its existing staff complement, and available resources.

For example, consistent with one of the 2015 Five-Year Review priorities, the Branch created a program to prevent and detect aquatic invasive species—the Aquatic Invasive Species program. It developed an *Aquatic Invasive Species Plan*. We found this Plan outlines the Ministry's response to manage, monitor and prevent aquatic invasive species (e.g., zebra and quagga mussels). The Ministry expects to receive approval to implement this Plan by the end of the 2019–2020 fiscal year.

The Ministry makes the Fisheries Unit of the Fish, Wildlife and Lands Branch primarily responsible for the delivery of the Fisheries Management Plan. The Unit employs six, full-time permanent biologists who possess either Bachelor's or Master's of Science (biology) degrees. On average, the biologists collectively hold over 11 years of experience (minimum six months, maximum 36 years). The Unit assigns a biologist to each of its four fish management regions—La Ronge, Prince Albert, Meadow Lake, and Saskatoon. In addition, it hires a summer student for each region.

We found the Fisheries Unit appropriately identified and focused its efforts on five fish species—northern pike, walleye, whitefish, yellow perch, and lake trout. The last federal anglers' survey results indicate these species account for the highest percentage (approximately 98%) of game fish population in Saskatchewan.[18,19]

Our review of the Fisheries Unit's 2018–19 and 2019–20 work plans found planned work priorities generally aligned with the five-year review priorities set in 2015, and the 2010 Fisheries Management Plan actions. For example, consistent with a 2015 Five-Year Review priority, its 2018–19 work plan shows the Fisheries Unit planned to initiate a retrospective review and assessment of fisheries' enhancement programming, and provide options for future direction. It continued this work into its 2019–20 work plan.

However, consistent with the results from the 2015 Five-Year Review, the Ministry inconsistently met timeframes for actions established in the 2010 Plan. We found, as of July 2019, the Ministry completed 53% of actions. See **Figure 3** for details on status of completion.

Management noted it perceived some of the actions from the 2010 Plan as no longer relevant (e.g., prepare a strategy to address the potential impacts of climate change to Saskatchewan's fishery) or required change (e.g., define population management objectives and develop specific targets and actions for individual waters, in consultation with users). It expected to reconsider these actions and related timelines as part of its next review set for 2021.

Not determining resources needed to achieve the Ministry's Plan timeframes and priorities increases the risk of not completing sufficient work to achieve its vision of healthy, sustainable freshwater fish populations and habitats.

[18] Ministry of Environment, *2015 Survey of Sport Fishing in Saskatchewan*.
[19] Fisheries and Oceans Canada surveys recreational anglers every five years, and shares provincial data with the Ministry.

1. **We recommend the Ministry of Environment formally determine resources needed to meet timeframes outlined in its Fisheries Management Plan.**

## 4.3 Collection and Reporting Protocols for Water Body Assessments Not Finalized

Consistent with good practice, the Ministry uses lake assessments to collect information on the health and population of fisheries. However, it has not finalized protocols for carrying out these assessments for water bodies (e.g., written guidance on sampling fish) or analyzing results.

When doing lake assessments, the Fisheries Unit's regional staff go to a selected water body (lake) to collect information about the fishery health and population in that water body. They catch fish using a variety of methods (e.g., gill nets, trap nets) in line with good practice.[20] They record the number and types of fish species caught, and data about their general health (length, weight, sex, maturity, age, and stomach contents). They also keep some fish to determine its health in the lab.[21] In addition, they evaluate and document water quality (e.g., pH balances) and temperature using various water quality devices.[22]

The 2010 Fisheries Management Plan short-term action item #15 expected the Ministry to review and refine standardized, science-based protocols for field data collection and reporting. As of September 2019, this action was incomplete.

At September 2019, the Ministry drafted sampling guidance as part of a field manual to help staff consistently and properly sample fish during lake assessments. The draft guidance sets out expected sampling methods and approaches. For each approach, it includes the number of nets to use, information on net placement, and the minimum number of fish to catch. It expects random selection of net locations by staff stratified by depth. The Ministry plans to approve the draft guidance by March 31, 2020 for use thereafter.

We found the draft guidance provides sufficient information on sampling methodologies, and the methodologies align with good practice.

However, the draft does not give clear direction for when to use each sampling method (e.g., historical versus random sample locations). It also does not expect staff to document key sampling decisions. Furthermore, it does not give guidance to help staff determine what constitutes a healthy fish population. Such guidance is useful when analyzing data and determining whether stocking is desirable.

Giving staff written guidance on Ministry-accepted sampling methodologies enables staff to use a valid sampling approach, and properly execute the approach. This in turn helps the Ministry to collect sufficient and appropriate data about the fish ensuring its sample

[20] A gill net is a type of net used to catch fish for sampling; this type of sampling is lethal. Varying sizes of mesh squares make up the length of the net, which is designed for fish to swim into. However, trap nets catch fish for sampling and house them within the net until sampling is complete; this type of net is not lethal.
[21] The Ministry collects portions of fish to test internally in its lab for mercury levels, which are sent to an external consulting lab for determining the age of fish.
[22] The Ministry uses secchi discs, pH testers and temperature guns.

results represent the water body's fish population and their health. Use of a science-based approach helps maintain healthy and resilient habitats and fish populations.

Using consistent approaches to sample fish from one water body to the next, and to analyze results helps ensure comparability of results, and consistent analysis.

**2. We recommend the Ministry of Environment give staff written, standardized, science-based protocols for field data collection and reporting on fish populations and their health.**

## 4.4 Clear Approach Exists to Prioritize Lakes

The Ministry uses a clear, risk-based approach to consistently identify high-risk water bodies to prioritize them for lake assessments.

The Ministry's approach considers risk factors such as proximity of developments near the water body, water body use (e.g., recreational fishing, sustenance fishing, commercial fishing), the types of species in the water body, and required special regulations (e.g., reduced limits on kept fish numbers, size limitations for kept fish).

The approach to identify high-risk water bodies quantifies risk factors by assigning points. The presence of risk factors accumulate points with more points indicating an increase in risk to freshwater fish thereby warranting more frequent monitoring.

As shown in **Figure 4**, these points contribute to a priority category from one to four, which defines how often the Ministry expects an assessment for that specific water body (i.e., conduct a lake assessment).

**Figure 4—Point Totals and Priority Categories for Water Body Monitoring Frequency**

| Total Points | Priority Category | Monitoring Frequency[A] |
|---|---|---|
| 0–5 points | Priority 4 | 10+ years |
| 6–7 points | Priority 3 | 7–9 years |
| 8–10 points | Priority 2 | 5–7 years |
| 11+ points | Priority 1 | 3–5 years |

Source: Ministry of Environment, Guidelines for Prioritizing Fisheries Population Assessments.
[A] The approach considers these monitoring frequencies as minimums required to obtain a reasonable measure for detecting change in high-risk waters.

We found this risk-based approach aligns with good practice.

The Ministry expects staff to apply this approach to waters with reasonable road, trail or boat access only. It expects staff to use this approach to quantify risk factors, and determine overall priority category, and monitoring frequency. The Ministry examines remote waters only if the lake hosts multiple fishery uses, and identified issues justify the expense required to study them.

Having a consistent, risk-based approach to prioritizing lakes for assessments, and determining monitoring frequencies helps the Ministry direct resources to collect information about fish population and health to water bodies with fisheries populations at highest risk.

## 4.5 Prioritized Water Bodies' Listing Inaccurate and Incomplete

The Ministry's prioritized listing for high-risk water bodies is inaccurate and incomplete.

In 2008, the Ministry first prioritized its water bodies listing. The listing of water bodies is subject to editing and updating. Management expects to update the listing based on results of annual water body assessments. As shown in **Figure 5**, its listing includes 381 lakes with respective priority categories.

**Figure 5—Ministry of Environment's Listing of Prioritized Lakes by Region[A]**

| Priority Category | La Ronge | Meadow Lake | Prince Albert | Saskatoon | Total |
|---|---|---|---|---|---|
| 1 | 14 | 20 | 6 | 8 | 48 |
| 2 | 23 | 33 | 29 | 19 | 104 |
| 3 | 10 | 28 | 36 | 30 | 104 |
| 4 | 12 | 36 | 31 | 46 | 125 |
| **Total Lakes** | **59** | **117** | **102** | **103** | **381** |

Source: Compiled from Ministry of Environment Priority Listing (July 2019).
[A] As of July 2019

Our analysis of the listing found the overall priority categories and monitoring intervals are not always determined consistently with the Ministry's risk-based approach for determining monitoring frequencies.

We identified:

- Two water bodies with point totals placed in an inappropriate priority category on the listing.
  - For example, both water bodies listed as priority-three (i.e., monitoring frequency every seven to nine years) rather than its actual priority-four (i.e., every 10+ years)
  - This error may result in more frequent monitoring and data collection for lower priority water bodies.

- Three water bodies (two with priority category of two and one with a priority category of four) where the monitoring frequency was not determined consistent with priority category. For the two priority-two water bodies, the monitoring frequency was longer than expected (i.e., every five to seven years). The listing indicates these were last assessed in 2002 (17 years ago) and 2008 (nine years ago), respectively. For the one priority-four water body, the monitoring interval was shorter than expected (i.e., assessed seven to nine years instead of 10+ years). The listing did not indicate the last assessment for this water body.

- Two water bodies listed as priority-four and priority-three respectively, did not either include a monitoring frequency or indicate the last assessments, if any.

Our testing of assessments for 16 water bodies found the Ministry did not update the listing, or update total points to rate priority based on results from a water body's last assessment.

We found:

- One water body located in a higher-usage area and assessed in 2019 was not included on the prioritized listing. Management agreed this water body should be listed as priority-three.

- For all 16 lake assessments tested, total risk factor points on the prioritized listing were not updated. Not updating risk factor points results in inaccurate priority categories and monitoring frequencies.

Management acknowledged it had not done a comprehensive update of its prioritized listing for high-risk water bodies since 2008.

Maintaining an incomplete and inaccurate list results in the Ministry using outdated and inaccurate information in determining lake assessments and monitoring frequency. It is also contrary to its scientific, risk-based approach. Using a scientific, risk-based approach is key to collecting sufficient information about fish populations and their health.

3. **We recommend the Ministry of Environment keep its listing of lakes, and associated priority categories used to determine the frequency of assessing fish populations of water bodies up-to-date and accurate.**

## 4.6 Assessments of Fish Populations Completed Less Often Than Risk-Based Approach Expects

The Ministry often assesses the fish population and health of water bodies (including some higher priority lakes) less frequently than its risk-based approach expects.

The Ministry expects staff to use its prioritized lake listing for a risk-based approach in selecting water bodies for lake assessments in an upcoming year.

In 2019, the Ministry assessed fish in 15 water bodies (2018: 13 water bodies). The Ministry has not finalized how many water bodies it plans to assess in 2020.

We found the rate of actual to planned water body assessments does not coincide with the monitoring frequency determined in its risk-based approach. As shown in **Figure 5**, its prioritized listing includes 48 priority-one water bodies (to inspect every three to five years), and over 100 priority-two water bodies (inspect every five to seven years). Application of the monitoring frequency of its risk-based approach means it should assess at least 24 water bodies each year. Its risk-based approach considers these monitoring frequencies as minimums required to obtain a reasonable measure of change detection for high-risk waters.

From 2017–18 to 2018–19, the Ministry assessed an average of 14 water bodies per year. Current resources allocated for assessments do not fulfill the expected risk-based monitoring frequencies for the priority lakes. See **Recommendations 1** and **3**.

Our testing of 2018 and 2019 assessments for 16 water bodies confirmed the Ministry routinely assesses water bodies later than its risk-based approach expects. One-half of 16 assessments we tested took place between two and eight years later than the Ministry's risk-based approach expected.

Of these eight instances, three were priority-one water bodies (interval of three to five years), and three were priority-two water bodies (interval of five to seven years). Four of the eight were water bodies with commercial fishers.

Completing assessments inconsistent with suggested risk-based frequencies increases the risk of not collecting information sufficiently to detect changes in fish population or fish health within a water body, particularly those assessed as high-risk water bodies. This increases the risk of not addressing underlying reasons (e.g., new invasive species, disease, etc.) quickly enough to avoid potentially irreversible declines in overall fish population and health of key fish species.

4. **We recommend the Ministry of Environment assess fish populations including their health using intervals determined through a scientific, risk-based approach.**

## 4.7 Specific Fish Population Management Plans Needed for High-Risk Fish Species and High-Usage Water Bodies

The Ministry has not created specific management plans for the high-risk fish species or for high-usage water bodies.

The 2010 Fisheries Management Plan does not include specific strategies to manage key fish species, geographic areas or water bodies. While creating a different plan for each species of fish or each water body in the province is not feasible or cost-effective, focusing on high-risk species and/or highly used water bodies is good practice.

Plans for high-risk species or high-usage water bodies would establish benchmarks for quantitative measurements of ideal values for fish maintained within the water body, objectives for the water body, an assessment of the current state of the water body, and options that management can take to reach objectives and benchmarks.[23]

The Ministry expects to use the results of its periodic lake assessments to evaluate the population and health of the fish within a water body. Based on its evaluation of the results, it determines actions necessary, if any, to sustain the fish population of key species.

However, as noted above, the Ministry is not assessing the fish population and health in water bodies, including those water bodies assessed as high risk and with commercial fishers, as often as its risk-based approach expects. This means it is collecting crucial information on the health and populations of key fish species in higher-risk water bodies less frequently.

[23] Ideal values defines what constitutes a healthy population of fish (e.g., total number of fish, fish size and weight).

The Ministry has not developed alternate plans to collect the information it needs to make sure it properly manages fish populations and health of key fish species and high usage water bodies.

While the Ministry appropriately uses information from the Freshwater Fish Marketing Corporation about commercial fishing to enforce quota limits imposed on commercial fishers, the information does not help it monitor the overall health of the fish population in the water body used by commercial fishers.[24] It does not include fish health data (e.g., age, length, maturity) of the fish caught.

The Ministry could consider use of an emerging practice in another jurisdiction where commercial fishers routinely submit additional information on fish caught (e.g., size, length, maturity).[25] It could use this additional information to augment information it collects through its periodic assessments of high-usage water bodies to enable a more up-to-date assessment of the health of those fish populations.

5. **We recommend the Ministry of Environment consider adopting the emerging practice of asking commercial fishers to submit additional key information about the health of fish populations in water bodies they use.**

Not creating species-specific plans increases the risk the Ministry does not take actions appropriate for each specific high-usage water body. In addition, it increases the risk of not having clear thresholds to define a healthy population for each specific key species of fish in the body of water. Clear thresholds would include goals of population characteristics (e.g., fish weight, number of fish) and strategies on how to achieve goals.

6. **We recommend the Ministry of Environment create specific management plans for key high-risk fish species and/or high-usage water bodies.**

## 4.8 Limited Catch Information on Recreational Fishing Reasonable

Consistent with other jurisdictions in Canada, the Ministry collects limited information about recreational fishing activities in Saskatchewan (e.g., total catch, lakes frequented).

Current good practice has not identified cost-effective ways to collect reliable data about key fishing activities of recreational anglers (e.g., catch rates, total catch, and total harvest). It recognizes tracking recreational fishing (e.g., use of radio receivers in fish) is expensive and time consuming.[26]

The Ministry relies on data it obtains from Fisheries and Oceans Canada. In five-year cycles, Fisheries and Oceans Canada asks for voluntary completion of a survey by Saskatchewan anglers. In the survey, it asks anglers to identify water bodies fished, for how long, what they caught, and what they kept.

[24] Each year, the Freshwater Fish Marketing Corporation gives the Ministry, for each commercial fisher, the location fished and total weight per species purchased by the Corporation from the commercial fisher.
[25] The provincial government of British Columbia is starting to receive information about fish health directly from commercial fishers.
[26] Placing radio receivers gives the ability to trace fish to determine catch rates for species where catch-and-release is required.

The Ministry received the results for 2015 Fisheries and Oceans Canada Angler Survey in 2019. At September 2019, the Ministry considered using an app to gather similar and timely data from Saskatchewan anglers.

The Ministry recognizes data collected from these types of surveys is statistically unreliable.

The Ministry uses survey data to confirm high-usage water bodies and species. In addition, through its licensing activities, it knows the number of recreational fishing licences it issues each year.

We found the recreational fishing data the Ministry collects is reasonable and consistent with practices of other Canadian jurisdictions.

## 4.9 Additional Detail in Water Body Assessment Reports Needed

The Ministry documents its analysis of fish population health for each assessed water body. However, reports need additional detail to further support conclusions reached.

Regional biologists are responsible for analyzing data collected from each lake assessment of water bodies within their assigned regions. They summarize the results in a written assessment report and submit it to the head of the Fisheries Unit.

Biologists consider the results of past assessments (if any), determine key changes, identify relationships, and reasons thereof. The report should include an overall evaluation of the health of the fish population, and recommendations for future monitoring or interventions, if any. This may include stocking or the need for special regulations (such as changing angling limits).

We reviewed 10 completed assessment reports. Each report contained sufficient detail to document relevant data collected during the lake assessments other than the following:

- None of the tested reports sufficiently outlined key assumptions (e.g., research papers consulted, quantitative models used) made in analyzing the data to support conclusions.

- None of the tested reports clearly identified key sampling decisions made during the assessment. Sampling decisions include sampling methods used (e.g., randomized or historic locations, depths of nets, and reasons for the sample sizes taken [e.g. number of nets, number of fish per sample]).

- Assessments of each water body we tested did not include reasons for the number of nets used, and selecting depths for placing the nets.

- Assessments tested showed inconsistent net sampling methods. Only four assessments included reasons for the placement of nets. We found these staff did not consistently use a scientific method for selecting net locations. For two of these four assessments, staff placed nets in the same location as used on the last assessment of the water body in addition to random locations, with no reference to the method used for selecting these new net locations.

The Ministry noted it depends on biologists to use professional judgment to determine when they caught enough fish to reflect a representative population. The experiences of the regional biologists range from six months to 36 years; all hold appropriate educational requirements.

Not documenting key fish sampling decisions increases the risk a biologist may be unaware of or not recognize risks associated with certain sampling approaches. The sample may be inconsistent or misrepresentative of the fish population in the water body. It may also result in inconsistent sampling of fish from one water body to the next. This could call into question the overall reliability of the data collected.

7. **We recommend the Ministry of Environment document, in its reports of fish populations and health of assessed water bodies, key decisions (e.g., key assumptions, sampling methods and sizes).**

## 4.10 Reports on Lake Assessments Not Finalized within Reasonable Timeframes

The Ministry does not finalize its reports of assessed water bodies within a reasonable timeframe.

Reports evaluating information obtained from assessments of water bodies from the prior fishing and lake assessment season are unavailable for decision making for the next fishing and lake assessment season.

We found, as at September 2019, the Ministry only completed five reports of 13 assessed water bodies from the summer of 2018. It did not have a deadline for when it expected regional biologists to finalize the remaining eight reports.

Management noted it relies on biologists to verbally share significant findings throughout the year.

The Ministry uses its analysis of lake assessments to confirm whether its existing actions remain appropriate, and determine further actions to take, if any.

Delays in completing these reports increases the risk the Ministry cannot use the full analysis of data to make decisions. If the full analysis differs from preliminary findings, this increases the risk of delays in addressing issues that may adversely affect the health of the fish population in that water body.

8. **We recommend the Ministry of Environment finalize analysis of fish data collected from water body assessments in a reasonable timeframe to allow for consideration before the next assessment season.**

In addition, senior management does not receive or approve completed water body assessments or summaries thereof. Rather, it relies on staff verbally sharing significant findings from water body assessments at unit meetings.

We found management meets on a bi-annual basis to discuss significant findings arising from analysis of assessments of water bodies. Management could consider staff periodically sharing a written summary of key findings from its assessments.

## 4.11 Actively Stocking Lakes to Supplement Fish Populations

The Ministry actively uses stocking to supplement fish populations in water bodies without sufficient natural production.

As shown in **Figure 6**, each summer, the Ministry actively stocks numerous water bodies with various species of fish to supplement their natural fish populations. In addition to discussions with Provincial Hatchery staff that take place throughout the stocking season, the Ministry receives a final stocking report from the Provincial Hatchery in October each year.

**Figure 6—Five-Year Ministry of Environment Summary of Stocked Waters**

| Year | Total Fish Stocked (in thousands) | Total Species Stocked | Total Waters Stocked |
|---|---|---|---|
| 2019 | 10,668 | 8 | 148 |
| 2018[A] | 1,684 | 5 | 134 |
| 2017 | 15,208 | 7 | 145 |
| 2016 | 11,224 | 5 | 160 |
| 2015 | 11,904 | 8 | 166 |

Source: 2019 data obtained from Ministry of Environment records; other years data from Ministry of Environment, *Stocked Waters* (2018).

[A] The level of fish stocked in 2018 significantly decreased from the prior three years because of uncontrollable environmental factors. These factors prohibited the Ministry and Provincial Hatchery staff from accessing the eggs to place in the Hatchery. As a result, the Hatchery had less fish available for stocking.

The Ministry uses hatchery fish obtained from the Provincial Hatchery to stock Saskatchewan's water bodies. It works with staff at the Hatchery to collect eggs to place in the Hatchery and monitor the health of fish produced.

The Ministry relies on the expertise of its biologists to determine the number and types of fish species to stock, and to decide which water bodies to stock. Biologists use information obtained from periodic assessments and observations of lakes (e.g., knowledge of fish winterkill), and analysis of collected data from periodic assessments.

We compared completed reports on assessments of 12 water bodies with stocked fish to actual stocking. For three water bodies, we found the actual stocking frequency took place less than the recommended stocking frequency, which differed from the recommended quantity in the report. We found:

- One report for a priority-four water body recommended stocking every two years; instead, the Ministry stocked this water body using a four-year interval.
- One report for a priority-two water body recommended stocking every two years; instead, the Ministry stocked this water body every three-years.

- One report for a priority-three water body recommended stocking with 200,000 walleye every two years; instead, the Ministry stocked the water body with 100,000 walleye in 2014 and 400,000 walleye in 2016.

While the Ministry did not document the reasons for these discrepancies, we found its reasoning logical. Management indicated biologists, when making stocking decisions for an upcoming season, consider the availability of fish stock from the hatchery, and priority to stock a specific water body. For example, as shown in **Figure 6**, the 2018 shortage of fish stock resulted in water bodies not receiving the recommended fish stock due to demand of other, higher priority water bodies.

In addition, this coincided with our testing of completed reports of lake assessments. Our testing found an instance of management adjusting stocking levels for a water body. It ceased stocking the water body in 2012 to assess natural reproduction. The last completed assessment noted little natural reproduction and recommended stocking resume. We found the Ministry did stock this water body in 2019.

## 4.12 Analysis of Lake Assessments to Regulate Angler Limits

The Ministry uses results from its analysis of water body assessments to regulate angler limits.

Our testing of completed assessment reports found an instance where the Ministry's analysis of a water body assessment identified pressures from fishing as contributing to a decline in fish populations. It identified the need for, and recommended, special regulations to decrease catch limits for the water body in the Anglers' Guide (e.g. catch limits and sizes) for the next year.

## 4.13 Evaluation of Fisheries Management Plan Needed

The Ministry periodically monitors its progress in implementing the 2010 Fisheries Management Plan, but does not have a strategy to review the effectiveness of the Plan.

The Ministry uses the development and monitoring of unit work-priorities plans to monitor progress on actions related to the 2010 Fisheries Management Plan. As previously noted in **Section 4.2**, we found a number of the work priorities in these plans related to the Fisheries Management Plan.

Each year, the Ministry publishes *Stocked Waters* to outline the type of fish stocked in its water bodies.

In addition, the Ministry uses conservation officers to enforce angling limits. We found the conservation officers set benchmarks for the number of anglers to assess, and their expected compliance rate. They tracked their actual activity against those benchmarks. While they assessed less anglers than expected, they found anglers complied as expected. The Fisheries Unit, through its interactions with conservation officers, are generally aware of the nature and extent of angler compliance.

We also found, each year, staff responsible for implementing the 2010 Fisheries Management Plan prepare a brief report outlining progress in implementing actions. This report lists actions completed during the fiscal year, and actions planned for the upcoming year.

In past years, the Ministry shared its annual progress report with its Fisheries Advisory Committee.[27] It did not share its 2018 annual progress report because the Committee has been inactive since October 2018. The Ministry notes it is experiencing delays in renewing members because of delays in obtaining criminal record checks. It hopes to send the progress to the Committee in fall 2019.

At September 2019, the 2018 annual progress report is the most recent one.

Our review of the 2018 annual progress report found it does not set out the status of all 51 actions in the Fisheries Management Plan, or the status of the six priorities areas set out in the 2015 Five-Year Review. In addition, it does not identify actions or priority areas that management considers no longer relevant or requiring revision.

This type of analysis or tracking would facilitate the Ministry's next review of the Fisheries Management Plan.

The Ministry has also not evaluated whether the 2010 Fisheries Management Plan achieves its stated outcomes (i.e., sustainable management; protect and accommodate the Treaty, and Aboriginal Right, to Fish; allocation to optimize social and economic benefits; and shared responsibility and public engagement).

As noted in **Section 4.1**, consistent with good practice, the 2010 Fisheries Management Plan included an action that expected a review and evaluation of Plan effectiveness every five years. The scope of the 2015 Five-Year Review did not include this evaluation. Management notes it plans to do this in 2021.

However, it has not determined how it will assess the 2010 Fisheries Management Plan. For example, it has not identified what information it should gather, and from whom. In addition, it has not outlined success measurements for the Plan's stated outcomes.

Without a detailed plan to assess the effectiveness of its overall Fisheries Management Plan, the Ministry increases the risk that its actions are insufficient in achieving the overall goals. The Ministry also increases the risk that its actions are no longer relevant, require revision, or are not included in work plans.

**9. We recommend the Ministry of Environment develop a detailed strategy to assess the effectiveness of the Fisheries Management Plan including determining its success.**

[27] The FAC is comprised of not more than 10 organizations, with each organization allowed one member and one alternate. Organizations represent broad provincial interests related to fisheries conservation and sustainability (e.g., Saskatchewan Wildlife Federation, Saskatchewan Commission of Professional Outfitters). The FAC's goal is to provide feedback from and act as a liaison for major fishery user groups in the province.

## 5.0 GLOSSARY

Angler—a recreational fisher in Saskatchewan who holds a fishing licence.

Commercial Fisher—fishing for the purpose of marketing all or any portion of the catch (i.e., fishing for profit).

Harvest—the act of keeping a caught fish.

High-Risk Species—the species the Ministry has identified as the targeted fish of recreational, commercial, and/or sustenance fishing (i.e., northern pike, walleye, yellow perch, trout, and whitefish).

High-Usage Water Bodies—water bodies that have higher rates of fishing from recreational, commercial, or sustenance fishers.

Sustenance Fisher—fishing solely for the personal use of the person fishing or a member of the immediate family of the person fishing. Fishing is solely for consumption, rather than recreation or profit.

Fish Maturity—the age at which a fish is able to reproduce.

Aquatic Invasive Species—non-native species that can be introduced and become established in areas beyond where they are naturally found. Usually detrimental to the existing fish population.

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