

# Fisheries and Aquatic Resources Adaptive Management System



**2019-2023**

**Statewide Strategic Plan Components**

**South Dakota Game, Fish and Parks  
Wildlife Division**



**Formally adopted by GFP Commission: January 10, 2019**



## **Department Mission**

We provide sustainable outdoor recreational opportunities through responsible management of our state's parks, fisheries, and wildlife by fostering partnerships, cultivating stewardship, and safely connecting people with the outdoors

## **Vision**

We will conserve our state's outdoor heritage to enhance the quality of life for current and future generations

## **Values**

Excellence, Stewardship, Integrity, Compassion

## **Division of Wildlife Mission**

The Division of Wildlife will manage South Dakota's wildlife and fisheries resources and their associated habitats for their sustained and equitable use, and for the benefit, welfare and enjoyment of the citizens of this state and its visitors.

**Our Motto** *"Serving People, Managing Wildlife"*



## Introduction

The purpose of the Fisheries and Aquatic Resources Adaptive Management System is to guide fisheries and aquatic resource management based on the mission of the South Dakota Department of Game, Fish and Parks (GFP). This Statewide Strategic Plan is a dynamic tool addressing the issues, challenges, and opportunities in managing fisheries and aquatic resources in South Dakota. This plan begins with an inventory section containing a brief review of the five fisheries management areas (FMA), Aquatics Section staffing and organization, funding and expenditures, and existing infrastructure. Plans with issues and objectives specific to the nine statewide fisheries programs follow the inventory section. The nine statewide programs are surveys, research, habitat, access, nongame, fish production, bait and private aquaculture, fish health and contaminants, and aquatic invasive species. In addition to this statewide plan, each FMA has its own strategic plan. Lastly, the Department strategic plan (SDGFP 2016) includes a number of measureable outcomes and strategies for aquatics staff. Actions to accomplish the priorities of both the Department plan and numerous Aquatics Section plans are incorporated into Aquatics Section annual work plans.

### **Priorities for annual work plans related to accomplishment of objectives of statewide programs, for the 2019-2023 period include:**

- Identifying and addressing hatchery infrastructure maintenance and fish rearing expansion needs
- Implementation of the aquatic habitat plan
- Establishment of standardized statewide fish sampling protocols
- Continue to improve utility of the data management system, especially for creel surveys

Due to unforeseen obstacles and development of new management issues, plan priorities may change during the period of implementation.



# Statewide Inventory

## **Aquatic Habitats and Fisheries Management Areas**

Fisheries Management Areas used for planning purposes are loosely mirrored after the aquatic sub-regions identified in the South Dakota Wildlife Action Plan (2014), taking into account human demographics and resource use patterns. FMAs delineated for fisheries and aquatics planning include East River (northeast and southeast), Missouri River, West River, and Black Hills (Figure 1). The aquatic habitats of each of these areas are generally described in this plan. More detailed descriptions may be found in each individual management area plan. Specific plans for the northeast and southeast portions of the East River Fisheries Management Area (ERFMA) exist because of the difference in management issues that exist for each portion of the FMA.

### ***Eastern South Dakota***

Glaciation in eastern South Dakota created a landscape of rolling plains and potholes. Moraines are found close to the Missouri river, while prairie coteaus exist further east. Grasslands dominate, with only limited areas covered by woody vegetation. Wetlands are common, and tillage agriculture is the dominant land-use.

The three major aquatic ecosystems in eastern South Dakota are the James, Vermillion, and Big Sioux River watersheds (Figure 2) which include the rivers, their tributary creeks, glacial lakes, depressional wetlands, and small impoundments. The Prairie Coteau at the eastern end of the management area contains most of South Dakota's natural lakes. There are some small impoundments, many of which were created during the 1930s by the Civilian Conservation Corps (CCC) or Works Progress Administration (WPA).

National Wetland Inventory data indicates that wetlands and deep-water habitats account for over 2.2 million acres, or nearly 10%, of the 35,400 square mile area of ERFMA (Johnson and Higgins 1997). Most of the aquatic habitat consists of shallow and seasonal wetlands (1,780,859 acres), with the remaining acreage comprised of lakes (371,982 acres), and rivers (69,273 acres; Johnson and Higgins, 1997). Of the estimated 24,408 stream miles, only 1,164 are classified as small or large rivers, while 21,559 miles are classified as intermittent streams (Table 1. SDGFP 2006).



Figure 1. Fisheries Management Areas.

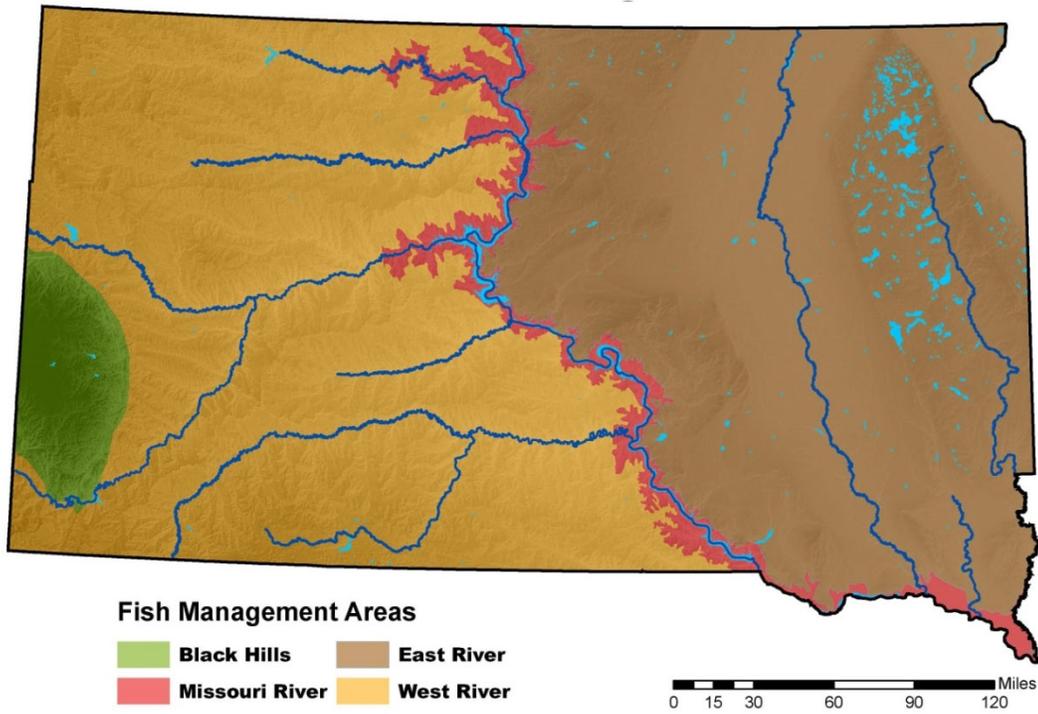


Figure 2. Major river systems in South Dakota.

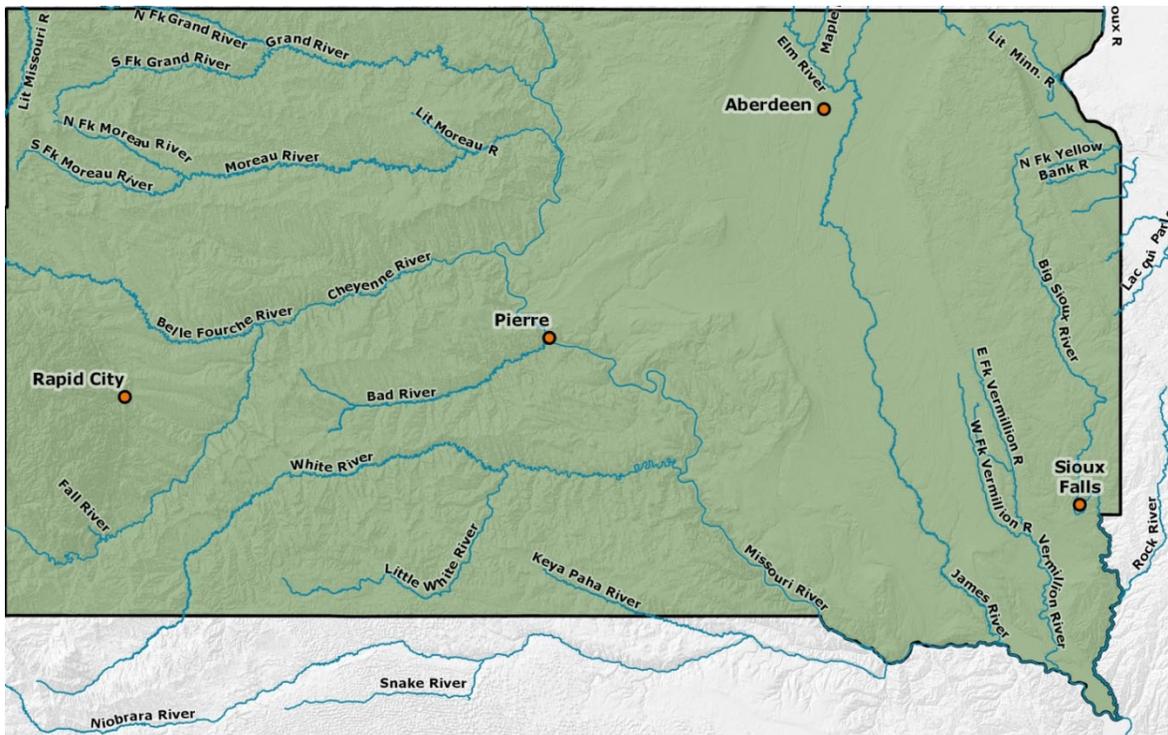




Table 1. Total stream miles for fisheries management areas, (South Dakota State Wildlife Action Plan 2006).

Area	Historical miles				
	Large river	Small rivers	Creeks	Headwater streams	Intermittent
East River	130	1,034	915	770	21,559
Missouri River	669	116	350	167	4,107
West River	1,019	2,019	1,633	656	52,876
Black Hills	23	78	288	295	3,448

### **Western South Dakota**

The main western tributaries of the Missouri River are the basis for most of the aquatic habitats in western South Dakota (Figure 2). The Grand, Moreau, Belle Fourche, Cheyenne, Bad, White, and Niobrara Rivers, and the tributaries and intermittent streams which support them, carved out the rugged terrain of the high plains from the bottom of the great inland sea that existed 60-70 million years ago. Natural wetland areas are rare and generally associated with rivers and streams. Land use is dominated by grazing, although tillage agriculture is increasing.

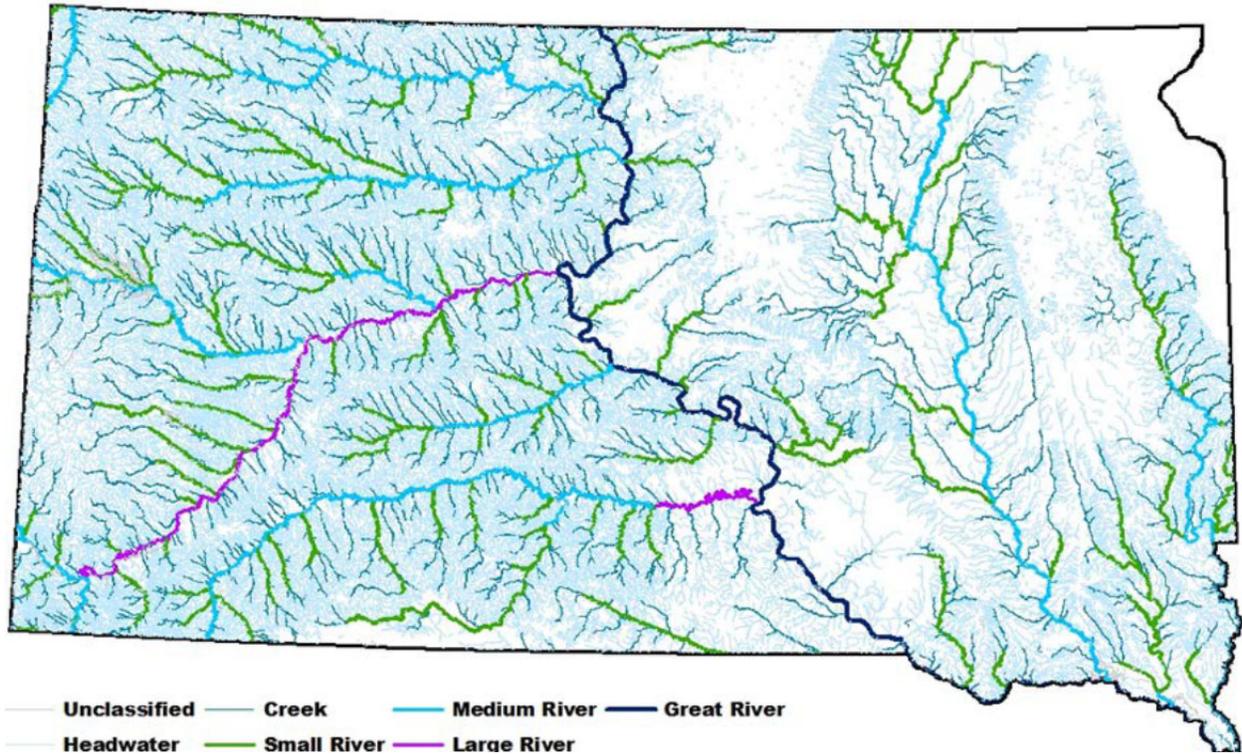
River mileage is dominated by intermittent streams, with the West River Fisheries Management Area (WRFMA) having more than twice as many intermittent stream miles as all other areas combined (Table 1, Figure 3). Dams or ponds, frequently constructed on intermittent streams for watering cattle and other livestock, provide a substantial portion of the fishing opportunity. There are three large Bureau of Reclamation reservoirs, Shadehill, Angostura, and Orman, found on the upper reaches of the Grand, Cheyenne, and Belle Fourche Rivers respectively, are extremely important sources of fishing opportunity in the WRFMA.

### **Black Hills Region**

The upheaval of the Black Hills by volcanic activity during the Tertiary period caused the concentric rings of sedimentary and volcanic rocks visible today. This forested region has numerous narrow valleys, high plateaus, and well defined drainages, with numerous streams but no natural lakes. However, a number of dams have created lakes which provide considerable recreational use. Aquatic systems in the Black Hills do not contain the diversity of plants and animals found in other management areas. Just like Western South Dakota, wetlands in the Black Hills are primarily associated with stream riparian areas.



Figure 3. South Dakota rivers and streams by classification.



### ***Missouri River***

The Missouri River is the longest river system in North America, and also encompasses the third largest watershed (529,350 square miles). The river occurs along the western edge of an ice sheet from the last period of glaciation. As the glaciers melted, water cut into the landscape, draining into the Mississippi river system. The Missouri River averages 1 mile wide and transports 20 to 25 million tons of sediments a year.

The Missouri River is the most altered aquatic management area in South Dakota. Four major dams were constructed as a result of the 1944 Pick-Sloan Act, creating Lakes Oahe, Sharpe, Francis Case and Lewis and Clark. These dams have greatly altered the form and function of the river, as well as the associated aquatic plants and animals. The only free-flowing river sections in South Dakota are located below Fort Randall Dam and Gavin's Point Dam.

### **Staff Structure**

The Aquatics Section of the Wildlife Division is led by the Section Chief for Fisheries and Aquatic Resources. The Section Chief directly supervises the Research and Management Program Administrator and the Fish Production and Fisheries Development Program Administrator.



The Production and Development Program Administrator oversees the state fish hatchery system, fish spawning operations, fishing access development, aquatic invasive species management, and administrative licenses and permits. The Management and Research Program Administrator leads research and management activities, fish habitat management and improvement, and the fisheries regulation recommendation process.

Staffing of the fisheries management areas typically consist of an Area Supervisor, Fisheries Biologists, and Resource Biologists. The primary responsibility of area fisheries staff is to manage the recreational fisheries in the area, primarily through activities such as fish spawning, fish trap and transfer, fish population surveys, stocking, regulation recommendations, aquatic invasive species monitoring, education and management, and habitat and access improvements. Area fisheries staff work is prioritized using the statewide and management area plans. Fisheries biologists also provide technical support for area and statewide fisheries management teams by conducting and assisting with research projects, conducting angler use, harvest, and preference surveys, monitoring and managing non-game fishes, aquatic invasive species and other aquatic organisms, implementing fishing access and habitat projects, and assisting with other management efforts. The Aquatics Section also includes hatchery staff, with each hatchery overseen by a manager and staffed with a Fisheries Biologist and Resource Biologists. Seasonal employees and interns assist with management, hatchery, and research activities. Organizational charts for positions related to the fisheries and aquatic resources program are provided in Figure 4.

Figure 5. Wildlife Division staff structures highlighting fisheries and aquatics staff, as of July 1, 2018.

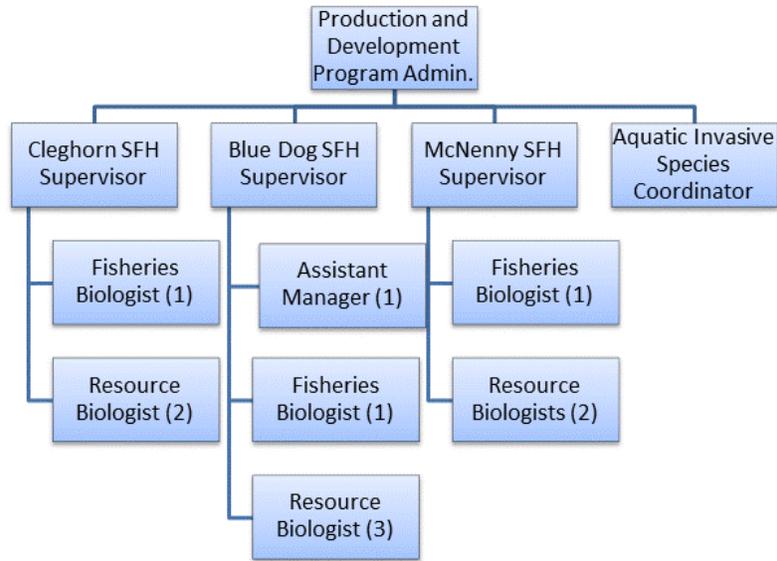
### Division of Wildlife Staff Structure



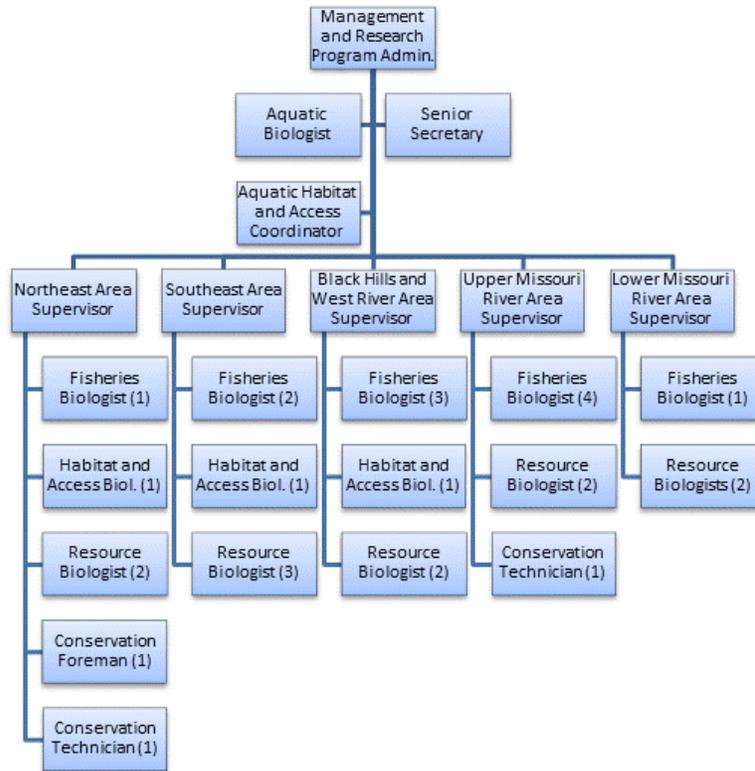


Figure 5. continued.

### Production and Development Programs Staff Structure



### Management and Research Programs Staff Structure





## Funding and Expenditures

### *Funding*

The major funding sources for managing fisheries and aquatic resources in South Dakota are license dollars and federal matching funds. The Wildlife Division receives no general fund appropriations from the State of South Dakota. Federal funds come from a number of sources, with the primary source being Dingell-Johnson Sportfish Restoration funds. These funds are generated through a 10% federal excise tax on fishing equipment, taxes on motorboat fuels, and a duty on imported fishing equipment and boats. Funding is then distributed among the states based on the number of licensed anglers and the surface area of land and water. State Wildlife Grants are another source of federal funding used to monitor and study non-game aquatic wildlife of greatest conservation need. There are also partnerships with federal agencies on projects and federal grants for specific projects. Fishing license revenue from 2010 through 2018 and Sportfish Restoration apportionments from 1999 through 2018 are provided in Figures 6 and 7, respectively.

License revenue is used to match federal funds for eligible work activities and to fund work activities not eligible for federal dollars. During 2017, 149,000 resident (age 16 and older) fishing licenses and 85,000 non-resident licenses were purchased (Figure 8). Annual fishing license sales fluctuate among years due to factors such as the quality of fishing and the availability of fishing access. Periods of drought and wet cycles have a major influence on fish abundance, which subsequently influences fishing pressure and the sale of fishing licenses. During the 2008-2017 period, annual fishing license sales ranged from a low of 186,500 in 2008 at the height of a prolonged drought to a high of 242,000 in 2016 at the middle of a wet cycle (Figure 8).

Figure 6. Fishing license revenue for South Dakota Game, Fish and Parks from 2008-2017. For the purpose of calculating fishing license revenue, 45% of combination license revenue was attributed to the fishing license component.

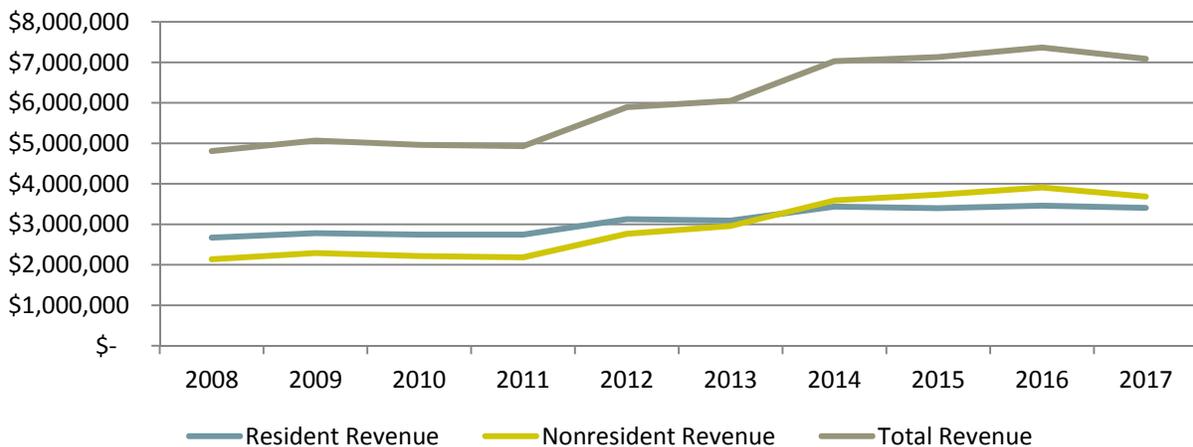




Figure 7. Annual Sportfish Restoration apportionments for the State of South Dakota, 2010 - 2018.

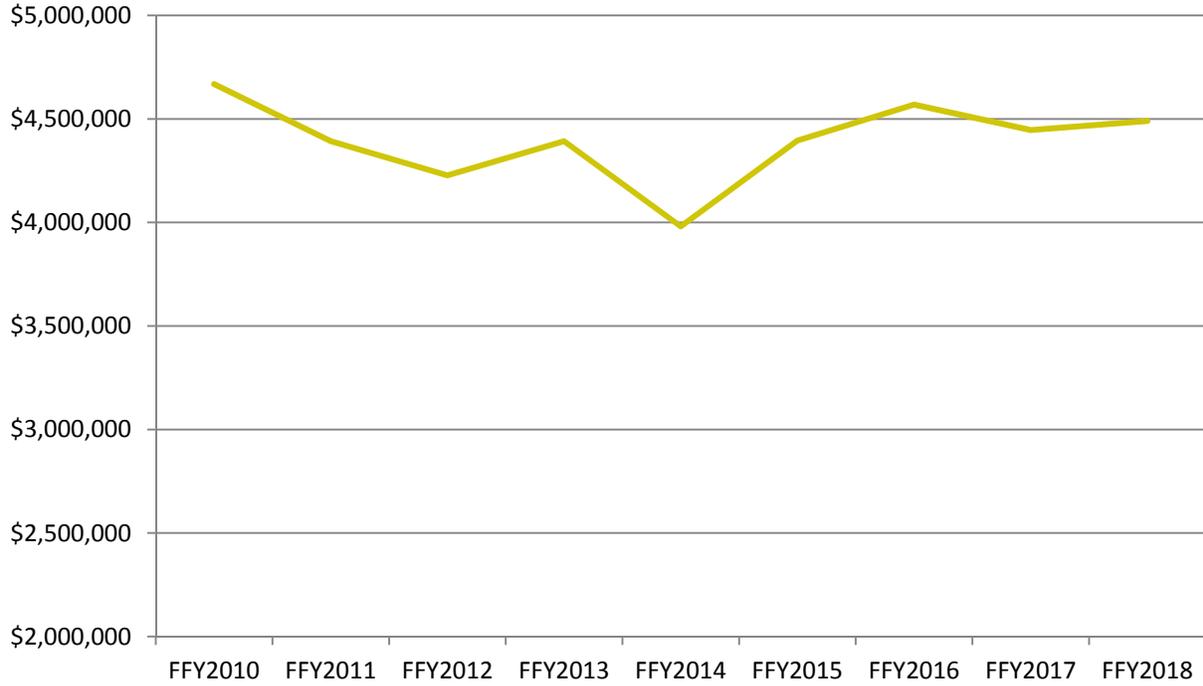
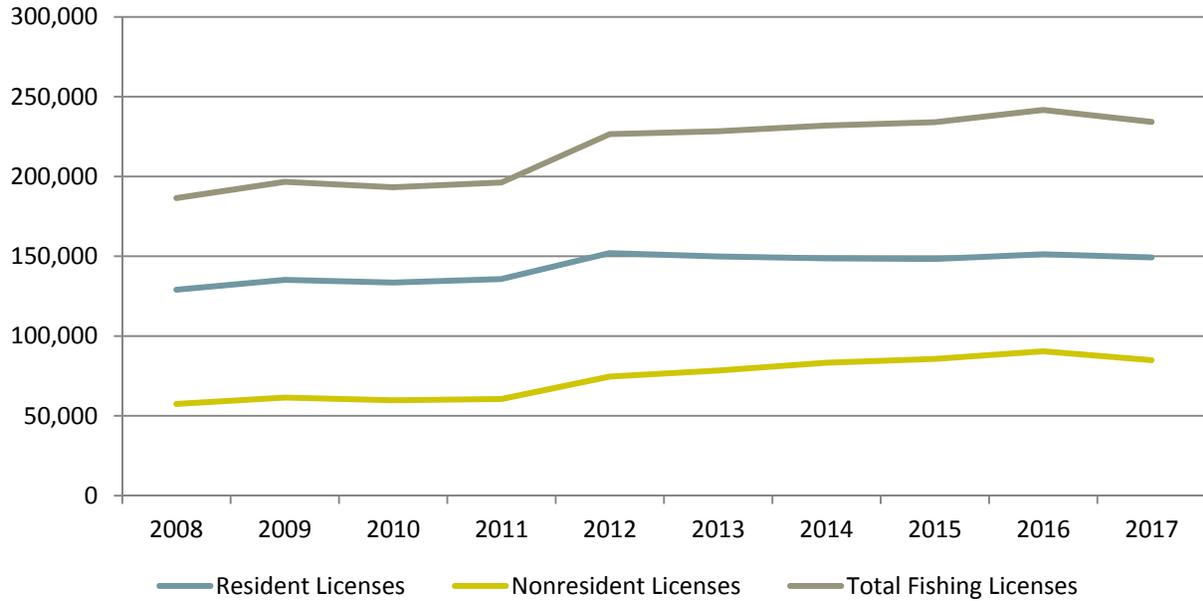


Figure 8. Total fishing license sales, for anglers 16 years of age and older, for the 2008-2017 period, including sale of resident combination licenses.



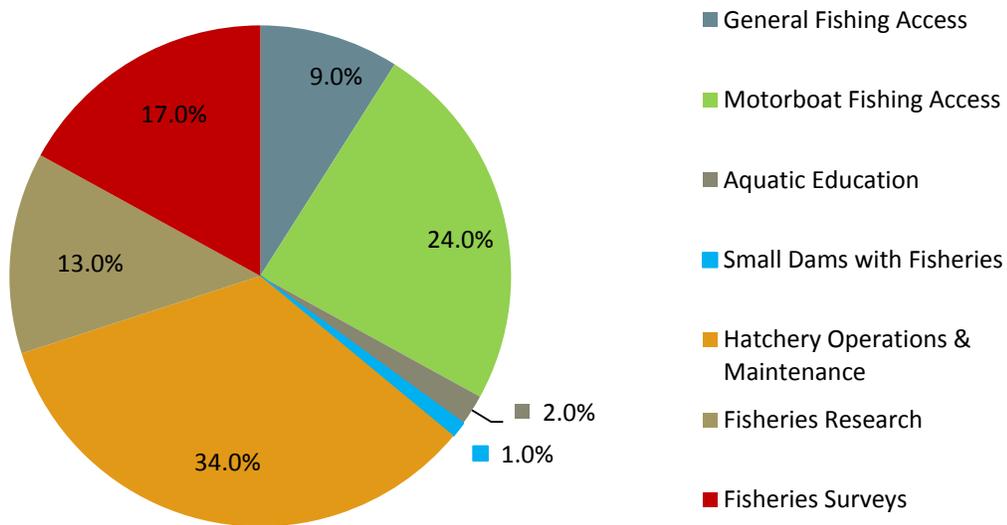


## Expenditures

A distribution of expenditures for 2018 Sportfish Restoration dollars is provided in Figure 9. These funds are generally matched at a ratio of 75% federal dollars to 25% license dollars while expenditures ineligible for federal match are funded completely with license dollars.

Planned expenditures related to fisheries and aquatics resource management are included in a number of GFP budgets (Figure 10). Habitat and access budgets include funding for improvements to fishing access, repair and maintenance of state-owned dams, and development of urban fisheries. Most of the fluctuation in expenditures among years is related to planned habitat and access projects or hatchery infrastructure repairs and improvements.

Figure 9. Percent distribution of Dingell-Johnson Sportfish Restoration funds for FY2018. The 2018 D-J apportionment was \$4,490,053.



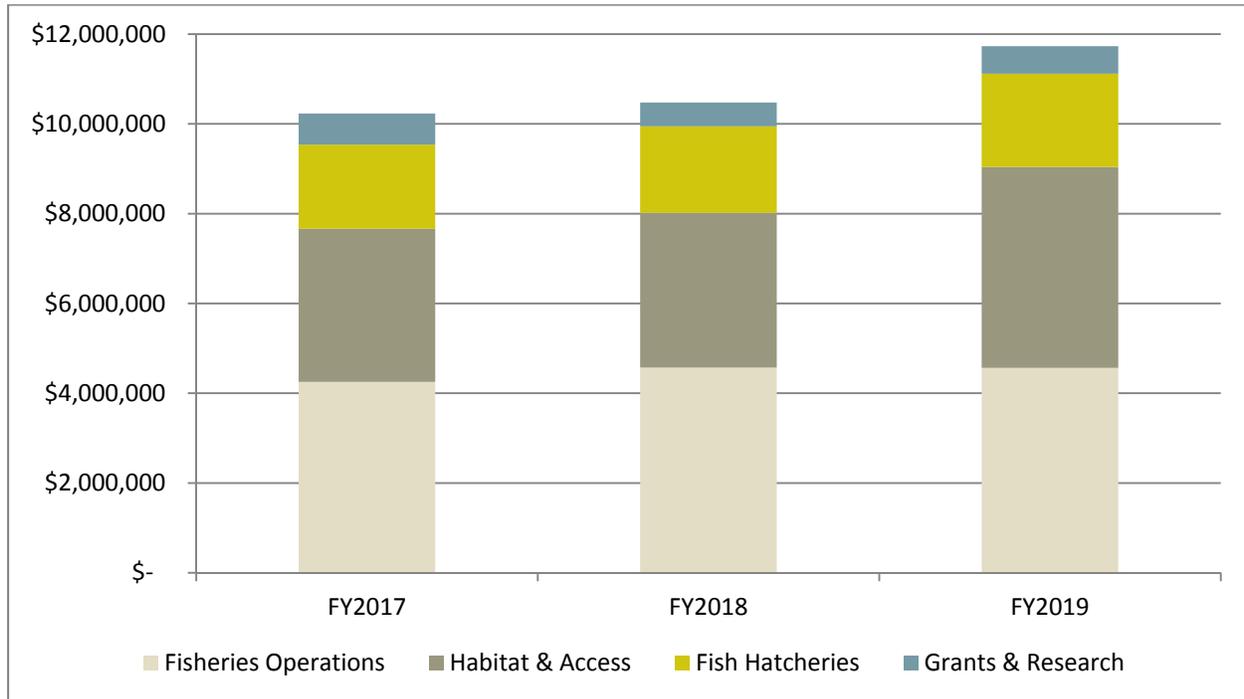
## Fisheries and Aquatics Infrastructure

### **Field Offices and Hatchery Infrastructure**

Aquatics Section staff are stationed at seven field offices throughout the state including Rapid City, Mobridge, Fort Pierre, Chamberlain, Webster, Watertown, and Sioux Falls (Figure 11). Work space includes offices, laboratory work areas, and equipment storage and maintenance areas. GFP currently maintains three state fish hatcheries (SFH), two spawning stations, and a number of natural rearing ponds to meet fish production needs. In addition, rearing space at Gavin's Point National Fish Hatchery (NFH) provides fish for stocking into waters of the State. Fourteen permanent employees are assigned to the three GFP Fish Hatcheries.



Figure 10. Budgeted amounts for various components of the Aquatics Resources Management program for FY17 through FY19.



	<u>FY2017</u>	<u>FY2018</u>	<u>FY2019</u>
<b>Total Aquatics</b>	<b>\$10,230,783</b>	<b>\$10,477,611</b>	<b>\$11,731,504</b>
<b>Grants &amp; Research</b>	<b>\$693,710</b>	<b>\$534,236</b>	<b>\$612,420</b>
<b>Fish Hatcheries</b>	<b>\$1,872,343</b>	<b>\$1,921,788</b>	<b>\$2,077,425</b>
<b>Habitat and Access</b>	<b>\$3,410,357</b>	<b>\$3,449,500</b>	<b>\$4,477,250</b>
<b>Fisheries Operations</b>	<b>\$4,254,373</b>	<b>\$4,572,087</b>	<b>\$4,564,409</b>

### Blue Dog State Fish Hatchery

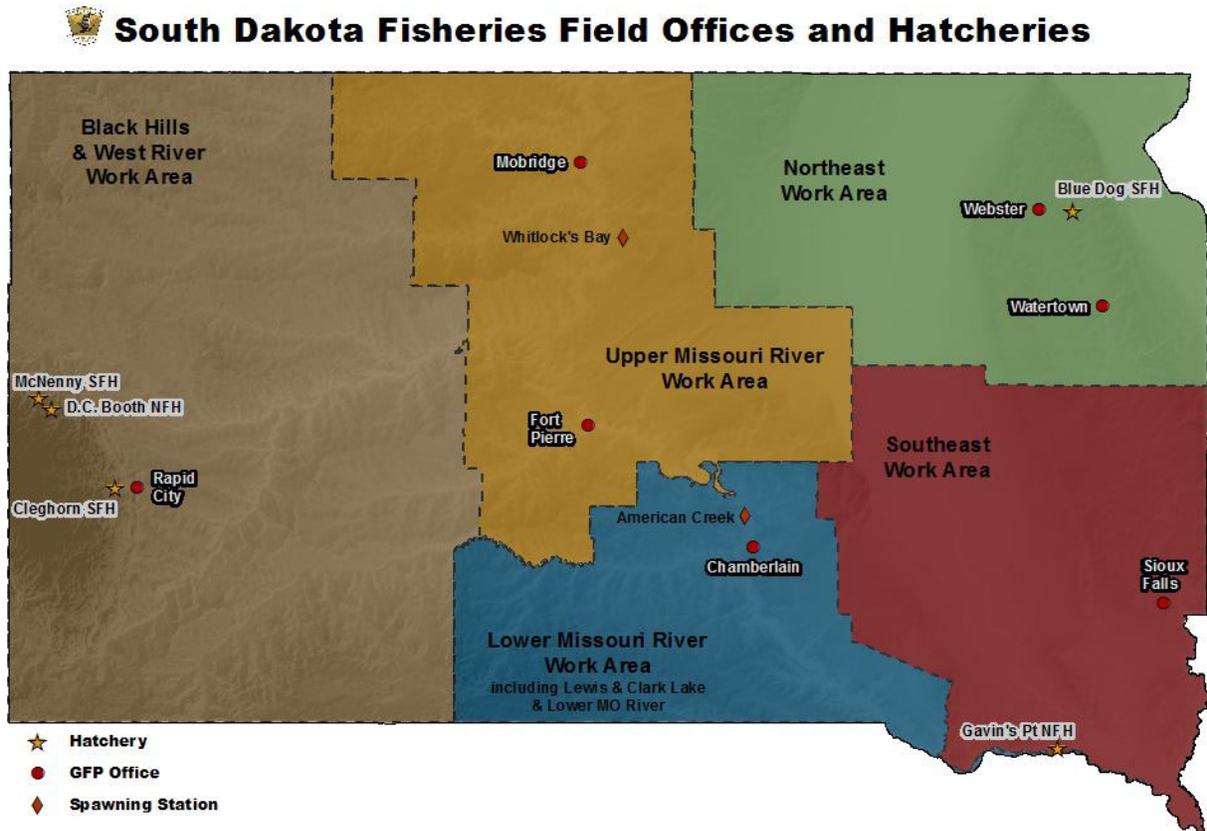
Blue Dog Lake SFH is the State’s only warm water (e.g., largemouth and smallmouth black bass and channel catfish) and coolwater (e.g., walleye, yellow perch, and muskellunge) fish production facility and is located on the northwest corner of Blue Dog Lake in Waubay, South Dakota. Walleye and yellow perch comprise the largest portion of their fish rearing activities.

### Cleghorn Springs State Fish Hatchery

Cleghorn Springs SFH, located in Rapid City, underwent a major renovation in 2006 and 2007. Water for fish rearing is pumped from an underground gallery that collects water from Cleghorn Springs. Species raised at Cleghorn Springs SFH include rainbow trout, brown trout and Chinook salmon.



Figure 11. Geographic locations of GF&P offices, State fish hatcheries (SFH) and spawning stations and Federal hatcheries (NHF).



McNenny State Fish Hatchery

McNenny State Fish Hatchery is located approximately 10 miles west of Spearfish. Rearing water is supplied by three artesian wells and numerous free-flowing springs. Species raised at McNenny SFH include rainbow trout, brown trout and Chinook salmon.

Whitlock Bay Spawning Station

This facility, located west of Gettysburg on Lake Oahe, is used to collect eggs from spawning Chinook salmon which do not naturally reproduce in Lake Oahe. Water is pumped from the bay into the station where it gravity flows through raceways and down the fish ladder into the reservoir. The station is typically operated from the last day of September through the first week of November.

American Creek Spawning Station

The main use of this station is for paddlefish spawning. Fertilized eggs are transported to Gavin’s Point NFH for hatching and rearing.



# Statewide Fisheries Programs

## Fisheries Surveys

### Inventory

#### ***Fish Population Surveys***

Fish population surveys provide information on the current status of fish populations and changes over time. Fish stocking practices and harvest regulations can be evaluated from survey results.

Surveys are conducted to collect information on a specific species, a certain life stage, or a fish community. Information collected includes relative abundance, size, age, growth rate, and body condition. Survey results are incorporated into water-specific reports that include both planned management activities and recommendations. Just over 100 fish population surveys were conducted in 2018.

#### ***Angler Use, Harvest and Satisfaction***

Site-specific angler surveys (creel surveys) have been routinely conducted since the early 1990's and provide important information for managing fisheries. Angler surveys provide estimates of fishing pressure, catch and harvest, angler satisfaction, angler demographics and other information required to evaluate stocking success, special regulations, or other management activities. Creel surveys were conducted on 15 waters in 2018.

GFP now conduct an annual statewide angler survey consisting of only a few questions. Then, every 3-5 years, we will conduct a more extensive survey with additional specific questions. The idea behind this design is to get baseline information every year, as well as information on "hot topics" as needed.

Questions about angler satisfaction have been routinely asked in both site specific and statewide angler surveys. Angler satisfaction of 70% has traditionally been used as a benchmark for measuring the success of a fishery (SDGFP 1994). However, survey findings have demonstrated that other factors such as drought affect angler success and satisfaction.

#### ***Data Management, Standardization, and Utility***

GFP Aquatics now has a statewide database to store, analyze and report fisheries data (creel and fisheries survey, stocking, spawning and some research). Data is stored in a Sequel Server database; fisheries and creel survey data are analyzed using programs coded in Sequel Server language; and reports are generated using Sequel Server



Reporting Services (SSRS). Scripts have been developed to auto-generate survey statistics which are placed into tables/reports located on the GFP website.

### **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Statewide Fisheries Surveys program, those tasks include conducting fish population surveys and angler use and harvest surveys.

### **Management Issues**

1. Lack of standardization in data collection and sampling methodologies reduces the ability to compare data among similar waters statewide.
2. Conducting traditional creel surveys is expensive and new, more-precise, cost-effective methods for obtaining angler counts and information are needed.
3. Bias associated with gear types used in fisheries surveys is not well understood.

### **Goals, Objectives, Strategies**

*Goal: Create and enhance fisheries and aquatic species communities using data acquired from well-designed fish population and angler use surveys.*

#### ***Objectives and Strategies***

Not all objectives will be met due to unforeseen obstacles and changes in needs or priorities, as a part of the adaptive management process.

##### ***1. Objective:***

Finalize standardized fish population survey protocols statewide by January 2023.

##### ***Strategies:***

- a) Develop guidelines for the amount of effort by gear type and lake size.



- b) Standardize and improve the precision of age estimation for each species by evaluating various aging methodologies and utilizing the best practices statewide.

## **2. Objective:**

Identify and implement more cost-effective and precise creel survey methods by 2023.

### **Strategies:**

- a) Evaluate the use of non-traditional methods (i.e. trail cameras, traffic counters and kiosks) for counting anglers and collecting information.
- b) Identify ways to reduce bias in angler preference and satisfaction questions.
- c) Determine the appropriate sample sizes needed to achieve a level of precision with pressure and catch/harvest estimates.
- d) Determine the feasibility, benefits, and whether there is a need for additional training for creel survey clerks.

## **3. Objective:**

More effectively disseminate survey findings to the public and peers by 2023.

### **Strategies:**

- a) Survey fishing license holders to determine how they prefer to receive information.
- b) Monitor current use of various information types/formats (i.e. lake survey reports, stacked fish graphs) through Google Analytics and a new in-house tracking system to determine angler preferences.
- c) Implement the most effective pathways, formats and filters (e.g., adding a year and species filter to the stacked graphs) for disseminating survey information.
- d) Develop an interface to permit immediate retrieval of survey analyses and tables.



- e) Increase use of social media to relay fish population survey results to anglers and other interested parties following completion of the survey.

## **Fisheries Research**

### **Inventory**

Research is an integral and essential component of the Aquatics Section. It leads to a better understanding of fish biology, ecology, and population dynamics. It creates hatchery production and fisheries management efficiencies, particularly by evaluating hatchery and management activities.

Aquatics Section research may be completed solely by Section staff, or in collaboration with universities, other state and federal agencies, or other outside entities. Dingell-Johnson (DJ) money typically funds large scale research projects. However, some projects are funded through State Wildlife Grants (SWG), other Wildlife Division funds, or supplemental funding from outside entities such as Muskies Incorporated.

The selection of large projects to receive DJ funding occurs annually. The process begins with a meeting where primary investigators submit a research proposal and present their research ideas to Aquatics Section staff. A subgroup of those attending the meeting then ranks the proposals and provides funding recommendations to Aquatics Section administrators. The Aquatics Section Chief makes the final decision regarding project funding.

The Aquatics Section Research Review Committee, consisting of appointed staff, has the mandate to assist Aquatics staff in all aspects of research. However, this committee has primarily been used to review formal proposals and draft manuscripts

Research results are disseminated through oral presentations and written documents. Presentations frequently occur at professional venues, such as American Fisheries Society Parent Society, Division, and Chapter meetings. Results are also shared with the general public during presentations at angling club or civic organization meetings. Written manuscripts are either self-published by the Aquatics Section or published in peer-reviewed journals.

In addition to completing their own research and in-house reviews, staff members are often asked to complete reviews of articles for peer-reviewed journals, and several staff also have taken on editorial responsibilities for these journals. Aquatics staff who hold adjunct faculty positions frequently serve on graduate student research committees and as thesis advisors. Involvement in these research-related professional activities helps keep staff current on new research techniques and findings.



## **Standard Tasks**

In addition to undertaking research projects to accomplish specific management objectives, Aquatics Section staff conduct numerous tasks as part of standard operations. These tasks include, but are not limited to, reviewing GFP research proposals, reviewing GFP publications, peer reviewing and other editorial duties for fisheries journals, assisting with graduate student and intern research projects, advising graduate students, fulfilling data requests from other researchers, reading current fisheries literature, and continual professional development.

## **Issues**

1. Collaboration among research and management staff is lacking.
2. Completed research projects may not be documented in a written manuscript.
3. Research results may not be fully disseminated within GFP, to the scientific community, or to the general public.
4. Research publications (i.e., journal articles and state reports) may not be easily accessible to GFP staff or external researchers.
5. Decreasing federal aid monies may cause a research funding shortfall.
6. Information exchange internally within GFP, as well as at the regional and national level, may be limited.
7. Traditional university research partnerships are changing.
8. Staff with research responsibilities may lack necessary skills and training needed to conduct scientifically-valid research.
9. The expectations and role of Aquatics Section biologists within fisheries research is unclear.
10. Other duties can compete with research responsibilities.
11. A standard site to archive Aquatics-Section-authored publications is currently lacking.



## **Goals, Objectives, Strategies**

### **Goal:**

*Be a nationally-recognized leader in fisheries research by completing scientifically-sound research to support fisheries management and hatchery programs.*

### **Objectives and Strategies**

Not all objectives will be met due to brushfires, unforeseen obstacles, and changes in needs or priorities as a part of the adaptive management process.

#### **1. Objective:**

Complete at least five objective-based, scientifically-valid and statistically-sound research projects annually by 2023.

#### **Strategies:**

- a) Collaborate with administrative, management, and hatchery staff to identify research priorities.
- b) Develop and maintain relationships with non-GFP research partners, such as university faculty and professionals in other states or the federal government.
- c) Request proposals from Aquatics Section staff and University partners to address high priority, larger research projects requiring DJ funding.
- d) Base DJ funded research projects on Fisheries Management Area strategic plans and identified research priorities.
- e) Use the Research Review Committee to ensure research proposals are scientifically valid and statistically sound.
- f) Provide clear expectations and defined responsibilities to Aquatics Section staff.
- g) Explore the development and organizational structure of a core research team with specific research responsibilities.
- h) Track progress and completion of research projects.



## **2. Objective:**

Improve dissemination of research results by 2023.

### **Strategies:**

- a) Develop an online accessible archive of research publications both peer-reviewed and in-house reports.
- b) Encourage fisheries biologists to author or coauthor at least one peer-reviewed publication every 2 years.
- c) Encourage staff to present research findings at a professional meeting at least once every 2 years.
- d) Encourage staff to give a presentation to the general public once a year.
- e) Encourage staff to write popular articles describing research results.
- f) Work with communications staff to disseminate information concerning research projects and research findings.
- g) Recognize staff research accomplishments.

## **3. Objective:**

Provide Aquatics Section staff research training opportunities.

### **Strategies:**

- a) Identify deficiencies in staff research skills including conducting literature reviews, experimental design, statistical analysis, technical writing, and scientific presentations.
- b) Find appropriate training opportunities to address identified research skill deficiencies.
- c) Require or encourage research staff to enroll in training opportunities.
- d) Solicit feedback from staff after completion of training.
- e) Continue to evaluate staff research skills.



## **Fishing Access**

### **Inventory**

Game, Fish and Parks seeks to enhance fishing access opportunities wherever possible. This includes maintenance and improvements on existing facilities and developing new facilities.

The Department of Game, Fish and Parks currently maintains hundreds of boat ramps and shore fishing access areas. Some of these areas are managed through partnerships with other governmental entities including the United States Army Corps of Engineers (USACE) and county and city municipalities. The GFP Parks and Wildlife Divisions are active partner in developing, maintaining, and improving fishing access.

Funding for fishing access development, improvement, and maintenance includes, but is not limited, to license revenues, Sportfish Restoration program dollars, United States Coast Guard Motorboat Safety program, and third parties such as sport fishing clubs, cities, counties, or private individuals. Federal Emergency Management Agency (FEMA) and Title VI (Missouri River Land Transfer) funds are also sometimes available for fishing access projects.

### **Standard Tasks**

In addition to the expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Statewide Aquatic Access program, those tasks include, but are not limited to working with partners to identify aquatic access needs, negotiating aquatic access agreements, leases, or acquisitions with private property owners, project proposal preparation, submission, prioritization and implementation, and communicating and coordinating aquatic access maintenance, improvement, and development with GFP Parks, Wildlife, and administrative staff.

### **Management Issues**

1. Information needed to prioritize where future access dollars should be spent is not located in a single location.
2. Short and long term water fluctuations, especially in tailwater areas, often make it difficult to design fishing access facilities usable under all conditions.
3. Project requests sometimes do not have accurate cost estimates, resulting in budgeted projects not being completed because of a lack of budgeted funds.
4. GFP budget cycles and permitting deadlines often conflict with federal, municipal, and private partner project development schedules, causing delays in project completion.



5. The amount of Sportfish Restoration dollars available for access projects varies annually.
6. Many existing boat launch facilities are not ADA accessible.
7. Available staff time may at times be taxed by maintenance of access structures and amenities.
8. Large rip-rap and adjacent road right of ways sometimes limit access to tailwaters, dam faces, and shoreline fisheries.
9. Terrestrial and aquatic vegetation can limit shoreline access, especially in small impoundments.
10. Signage of fishing access areas may be insufficient to provide information needed by anglers.
11. Heavy snow and a lack of vehicle parking may prevent access onto the ice and limit ice fishing opportunity.
12. Boat and ice anglers have expensive boats and ice houses and expect access areas to accommodate the use of this larger equipment.

### **Goals, Objectives, Strategies**

#### **Goal:**

*Enhance and maintain a system of diverse fishing access opportunities that meet the needs of all types of South Dakota anglers.*

#### **Objectives and Strategies**

Not all objectives will be met due to brushfires, unforeseen obstacles, and changes in needs or priorities as a part of the adaptive management process.

##### **1. Objective:**

Continue to update the existing inventory of access areas to include human dimensions information, including demographics, and use this inventory to assess needs and prioritize future access projects by December 31, 2022.



### **Strategies:**

- a) Determine what additional human dimensions information needs to be included in the inventory.
- b) Work with GIS and human dimension staff to modify the existing access inventory to include additional information
- c) Identify and add access areas that are not included in the existing inventory.
- d) Include project completion dates, projected usable life of structures, and periodic maintenance schedules in inventory to aid in budgeting and planning
- e) Incorporate the use of traffic counters, remote camera and angler surveys to gather user information regarding fishing access needs.

### **2. Objective:**

Determine angler needs and wants for fishing access and their satisfaction with existing access areas and facilities by January 2023.

### **Strategies:**

- a) Work with human dimension staff to develop questions that assess angler needs, wants and satisfaction with fishing access in statewide angler surveys.
- b) Report findings on access needs and angler satisfaction with existing access areas and facilities.
- c) Incorporate survey findings in prioritizing access projects.
- d) Form a statewide work group or work groups of anglers at key locations around the state to develop and rank access ideas.

### **3. Objective:**

Develop a plan to obtain alternative funding for access projects by January 2020.

### **Strategies:**

- a) Work with partners to identify and procure nontraditional funding sources.



- b) Investigate the feasibility of a stamp for fishing access and habitat projects to help fund and maintain projects.

**4. Objective:**

Annually modify one boat launch facility with safe and convenient wheelchair boat passenger loading so that it is ADA approved. .

**Strategies:**

- a) Identify suitable commercial wheel chair lifts.
- b) Identify and prioritize the best sights for lift use and installation.
- c) Install lift and evaluate angler use and satisfaction.

**5. Objective:**

Improve shore fishing access in five rip-rap area by providing safe access to the shoreline by 2023.

**Strategies:**

- a) Conduct literature reviews and collect ideas from other states to design safe access on rip-rap areas.
- b) Identify and prioritize the best sites for access development.
- c) Improve access to one site each year.

## **Fish Habitat**

### **Inventory**

A stand-alone Statewide Aquatic Habitat Plan is being developed. This comprehensive plan satisfies one of the objectives of the Aquatic Habitat component of the 2014-2018 Fisheries and Aquatic Resources Strategic Plan. Plan objectives and strategies will be implemented as part of the Fisheries and Aquatic Resources Adaptive Management System.

### **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Statewide Aquatic Habitat Program, those tasks may include small and large-scale habitat projects, small dam inspections,



shoreline alteration permitting, shoreline alteration inspection, small dam and water structure repair and maintenance, sedimentation removal, rough fish removal, submergent and emergent vegetation plantings, stream habitat projects, flow regime and water level modifications, riparian zone and watershed improvements, and water quality improvements.

## **Non-Game Aquatic Species**

### **Inventory**

Non-game species comprise most of South Dakota's native aquatic biological diversity. However, management of non-game species has only been a priority over the last few decades, unlike the active management of sport fisheries for well over 100 years.

Today, the Wildlife Diversity Program within the Wildlife Division works to inventory, protect, and manage non-game species and their habitats. This program collaborates with other Wildlife Division staff to address wildlife diversity issues. It uses a proactive approach in an attempt to prevent future listings of native species as threatened or endangered.

The Wildlife Diversity Program maintains the Dakota Natural Heritage Program, a member of NatureServe, an international network of biological inventories operating in all 50 states, Canada, Latin America, and the Caribbean. Natural Heritage Programs collect and manage detailed local information on native, non-game species and ecosystems with data uploaded onto NatureServe for access by various organizations to meet local, national, and global conservation needs.

The research and management of aquatic non-game species is focused on rare species tracked by the Natural Heritage Program and on species of greatest conservation need (SGCN; Administrative Rules of South Dakota: 41:10:02 Endangered & Threatened Species; 41:10:03 Species of Management Concern; Table 1). The first version of the South Dakota Wildlife Action Plan (SD WAP, SDGFP 2006, 2014), a strategic planning document that defines the state's priorities and serves as a framework to direct cooperative projects, was accepted by the USFWS in 2006 and a second version was accepted in spring 2015. The second edition of the SD WAP includes a more detailed aquatics component than the first and identifies aquatic conservation opportunity areas (SDGFP 2014). The primary objective of this plan is to avoid future listings of species as endangered or threatened while addressing conservation issues and management needs. Additionally, species-specific plans have been generated for Topeka shiner (Shearer 2003) and pallid sturgeon (Aron 2006), two federally endangered species present in South Dakota.

In return for developing the SD WAP, South Dakota is eligible for State Wildlife Grants. These grants are a federal-match funding source which helps fund management of many non-game species, including 20 fish, nine mussels, two turtles, and four aquatic



macroinvertebrates listed as SGCN in South Dakota. Recent projects in non-game fish management include monitoring Topeka shiner and pallid sturgeon populations, determining the status and distribution of listed SGCN turtles, determining the status and distribution of mountain sucker in the Black Hills, conducting surveys on glacial relict fishes in the headwater streams of South Dakota's Sandhills region, examining population demographics of Lake Sharpe shovelnose sturgeon, a statewide comprehensive survey of wadeable streams for freshwater mussels, East River lakes surveys for freshwater mussels and assessing the effects of the James River Conservation Reserve Enhancement Program (CREP) on aquatic habitats and species assemblages.

The Wildlife Diversity Program participates in several cooperative projects with South Dakota State University. These projects include developing a statewide reference collection of aquatic invertebrates and fish species, and completing a new version of The Fishes of South Dakota book. Plans are to have an on-line application, based on The Fishes of South Dakota book, to share information on current and historic species presence in South Dakota with fisheries staff and the public.

### **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are work tasks that are annually conducted as part of standard operations. Those tasks include general administration, work plan generation, strategic plan updates and reporting, popular articles, information requests from the public, presentations, writing and reviewing proposals, assisting with student research projects, landowner permissions, population sampling, age and growth analysis, analysis and report writing, equipment maintenance, environmental review, and data entry, species ranking/review and quality control for the Natural Heritage Program Database.

### **Management Issues**

1. A lack of up-to-date information on the distribution, status, and the role that aquatic species play in ecological processes impedes effective prioritization of work efforts to prevent future listings.
2. Many large river species native to the Missouri River are declining in abundance.
3. Aquatic habitat alteration and degradation are major management issues for all South Dakota aquatic species. However, the greatest impact is often on aquatic threatened, endangered, and species of greatest conservation need, and the needs of non-game species are typically not considered in land management decisions. Specific issues related to habitat alterations and degradation will be described in the Fish Habitat Plan.



4. Non-native aquatic species introductions, which include Aquatic Invasive Species (AIS) and recreational fish stockings into non-native water bodies, may negatively impact non-game species. However, the total impact is typically not fully known. Specific issues related to AIS and recreational fish introductions are described in the Aquatic Invasive Species Management Plan and the Production section of this plan.
5. Less emphasis and prioritization has been placed on the management of non-game species than game species in South Dakota.
6. Coordination and information sharing with non-game species management among stakeholders, partners, staff, and other state and federal agencies are limited, restricting the ability of limited personnel to maximize the benefits of conservation efforts.
7. Funding for non-game aquatic species research and management is limited and less reliable than recreational fisheries funding. Often, these funds are appropriated annually or as one-time allocations.
8. There is a need for a standardized reporting system and centralized database to record all non-game species occurrences and detailed habitat information. The current non-game database provided through NatureServe is useful for the Natural Heritage Program but does not allow for the full functionality and ease of use required for effective non-game management.

### **Goals, Objectives, Strategies**

#### **Goal:**

*To conserve, maintain, and restore native aquatic plant and animal communities for their long-term health, and for the benefit of the general public.*

#### **Objectives and Strategies**

Not all objectives will be met due to brushfires, unforeseen obstacles, and changes in needs or priorities as a part of the adaptive management process.

##### **1. Objective:**

Develop, prioritize and implement standardized surveys to sample rare, non-game species tracked by the Natural Heritage Program (with an emphasis on SGCN) to gain a better understanding of these species' population status and trends over time by 2023.



**Strategies:**

- f) Use existing research and monitoring projects and conduct additional research to provide information to develop standardized survey methodologies and monitoring programs.
- g) Identify and prioritize watersheds for monitoring and sampling non-game species.
- h) Work with Fisheries Management Area (FMA) Supervisors to incorporate non-game sampling into FMA work plans and associated sampling schedules.
- i) Define standardized sampling protocols for various watersheds (lotic streams and rivers, lentic lakes and ponds, Missouri River impoundments and tributaries) to collect information on complete fish communities.
- j) Implement a sampling schedule to determine status and long-term trends of non-game species with an emphasis on SGCN.

**2. Objective:**

Maintain up-to-date information on the status of rare species with an emphasis on SGCN.

**Strategies:**

- h) Use NatureServe's Conservation Status Assessment Methodology for Assigning Ranks to rare species tracked by the Natural Heritage Program.
- i) Identify and collaborate with partners to exchange data, and develop and conduct surveys.
- j) Follow the strategies identified within the South Dakota Wildlife Action Plan to meet the goals and objectives for SGCN.

**3. Objective:**

Improve coordination amongst natural resource agencies, public land management agencies and other partners to facilitate more effective conservation planning and increase plan implementation for non-game species.

**Strategies:**

- a) Identify all potentially-affected and potentially-interested individuals, organizations, and governmental agencies.
- b) Develop a non-game management committee to identify and prioritize research and information needs for non-game species.
- c) Work with habitat and access staff to identify core and connecting habitats critical to the conservation and recovery of



SGCN to help with prioritizing habitat improvement and fish passage projects.

- d) Actively participate as a member of the Aquatic Invasive Species Task Force, following strategies identified to meet the goals and objectives for the Aquatic Invasive Species Management Plan.
- e) Work collaboratively with state and federal agencies and non-governmental conservation partners to implement non-game projects and improve management efforts.

#### **4. Objective:**

Identify and obtain alternative funding sources for non-game aquatic management efforts.

##### **Strategies:**

- a) Brainstorm possible alternative funding sources.
- b) Research and identify private grant opportunities and novel federal funding sources (i.e. Climate change grants, Fish Passage grants, Landscape Conservation Cooperatives, NatureServe, Nature Conservancy).
- c) Apply for funds from identified alternative sources.

## **Fish Production**

### **Inventory**

Fish stocking is an important fisheries management tool for introducing new species to a water body, supplementing the number of fish naturally produced, repopulating a lake after winterkill, or maintaining a fishery in the absence of natural production or high angler use. State fish hatcheries and other fisheries staff play an important role in meeting South Dakota's fish production needs. Hatchery production programming is scheduled to meet stocking needs identified at the fish management area level, but requests for hatchery products must be within the statewide production capabilities of the hatchery system.

Purposes for stocking fish vary from creating an immediate fishery in an urban pond to re-establishing fish populations after a winterkill situation. The size of hatchery products varies accordingly to meet these needs. Products like 11-to-15 inch catchable-sized rainbow and brown trout are often stocked to provide immediate angling opportunity, while smaller products like walleye fry or small fingerlings are stocked where they can grow for several years before being harvested. The number of fish that can be produced from state fish hatcheries varies greatly depending on the species and size of fish requested by fisheries managers, as well as the timing of stocking.



### State Fish Hatcheries

The Department of Game, Fish and Parks owns and operates three state fish hatcheries and one spawning station. Blue Dog State Fish Hatchery is located on the northwest shore of Blue Dog Lake in Day County. Production at this hatchery is primarily cool and warm water fish species such as walleye, northern pike, yellow perch, and bass. Cleghorn Springs State Fish Hatchery in Rapid City and McNenny State Fish Hatchery in Lawrence County are the two coldwater hatcheries, producing trout and salmon for stocking throughout the state. Whitlock Bay Salmon Spawning Station is operated in the fall for Chinook salmon spawning, with the eggs transferred to one of the state hatcheries for incubation.

### Egg Collection Efforts

Spawning of wild fish populations represents a major annual undertaking by aquatic section staff. Eggs from species such as walleye, northern pike, and yellow perch are collected from sources across South Dakota each spring for culture at Blue Dog SFH while Chinook salmon eggs are collect from Lake Oahe in October.

### Trap and Transfer and Natural Rearing Ponds

Trap and transfer is the process of moving fish from one water body to another. It is frequently used to re-establish fish populations after a winterkill, and provide fisheries in heavily-used urban waters.

Natural rearing ponds are commonly used to rear coolwater fish like yellow perch and walleyes. Newly-hatched fish at Blue Dog State Fish Hatchery are stocked into small, shallow, productive waters that routinely experience winterkill, allowed to grow over the summer, and then are harvested in the fall. These waters are closed to public fishing when used for fish production.

### Partnerships

National fish hatcheries provide another source of fish for stocking into South Dakota waters. Trout eggs for use in coldwater fish production are typically obtained from the National Fish Hatchery System. Gavin's Point NFH and Garrison Dam NFH (North Dakota) raise walleye, bass, paddlefish and pallid sturgeon that are stocked into South Dakota waters.

Hatchery products are also occasionally imported from natural resource agencies in other states. This typically occurs when walleye egg supplies are limited within South Dakota, or when other states have fish species available (such as muskellunge and channel catfish) that are not normally produced at state hatcheries in South Dakota. South Dakota, Montana, and North Dakota collaborate on Chinook salmon spawning and egg sharing.



## **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Fish Production program, those tasks include routine fish culture, fish stocking, building and grounds maintenance (mowing, painting, cleaning, etc.), spawning, equipment maintenance, fish health sampling, mentoring and effective supervision, professional service, and numerous other activities.

## **Management Issues**

1. A complete and accurate record of annual stocking events can be difficult to obtain because numerous individuals enter fish stocking data into the statewide database.
2. Fisheries managers must plan well in advance when requesting coldwater fish due to long hatchery rearing times and the operation of coldwater hatcheries at full capacity.
3. Stocking and rearing strategies must be continually streamlined to accommodate increased production demands within the existing hatchery system.
4. Egg availability for some fish species can limit the fulfillment of stocking requests.
5. Trap and transfer operations produce highly variable numbers of fish, can be very costly to undertake, and have a high risk of spreading fish pathogens and aquatic nuisance species.
6. Out-of-state egg sources for some fish species, such as Chinook salmon, are limited due to disease concerns.
7. Diseases at state hatcheries can limit or significantly interfere with production.
8. Production capacities remain constant while requests for stocked fish are highly variable.
9. Maintenance and improvement of hatchery infrastructure is continually needed for hatcheries to operate at full potential.



10. Fish production using extensive culture is unpredictable.
11. Hatchery production techniques can dramatically influence post-stocking survival, angler harvest, and angler satisfaction.
12. The influence of different hatchery rearing practices on post-stocking performance and angler satisfaction are not typically considered by fisheries managers when making stocking requests.
13. Hatchery staff are challenged to keep up with rapid change and considerable innovation as a result of the explosive worldwide growth of commercial aquaculture.
14. Fish food is increasingly made using least cost production methods and novel ingredients, making it difficult to develop specifications, bid contracts, and to compare the effects of various feeds on hatchery and post-stocking performance.
15. Interaction among personnel at all three state hatcheries is negatively affected by geography.

### **Goals, Objectives, Strategies**

#### **Goal:**

1. *Efficiently operate and maintain a state hatchery system producing the highest quality fish in the numbers, sizes, and species requested by fisheries managers to maximize angler satisfaction.*
2. *Minimize risks of spreading AIS and fish pathogens during hatchery rearing and stocking.*
3. *Be a leader in hatchery-based research and innovation.*
4. *Hire, develop, and sustain highly motivated and productive hatchery staff.*

#### **Objectives and Strategies**

Not all objectives will be met due to brushfires, unforeseen obstacles, and changes in needs or priorities as a part of the adaptive management process.



### **1. Objective:**

Develop procedures and plans to ensure hatchery operations and fish stockings do not contribute to the spread of aquatic invasive species or fish pathogens of concern by 2021.

#### **Strategies:**

- a) Develop uniform fish health and aquatic nuisance species sampling procedures for hatchery operations in conjunction with fish health and AIS staff.
- b) Review and modify, if needed, hatchery fish health inspection needs and procedures.
- c) Review, assess, and modify as needed, existing HACCP plans and gear handling procedures.
- d) Train hatchery staff in biosecurity procedures.

### **2. Objective:**

Increase awareness of the capabilities and limitations of the state hatchery system and stocked fish by 2021.

#### **Strategies:**

- a) Provide production scenarios based on management requests.
- b) Schedule interactions among hatchery staff themselves, as well as between hatchery and management staff.
- c) Disseminate hatchery production and research information through presentations at scientific meetings, fisheries meetings, regional meetings, and popular venues.
- d) Develop a process for 2-year feasibility planning prior to new species rearing requests.
- e) Develop a formalized process for dependable Aquatics Section assistance at hatcheries when needed.

### **3. Objective:**

Improve hatchery staff knowledge of recent advancements in aquaculture science by 2021.



**Strategies:**

- a) Schedule interactions among hatchery managers, as well as all state hatchery staff, to discuss recent innovations and research.
- b) Disseminate hatchery research information through in-hatchery presentations and presentations at fisheries meetings.
- c) Encourage staff to participate in aquaculture continuing education courses and other training opportunities.
- d) Encourage hatchery staff to collaborate with fisheries research and management staff on post-stocking evaluations.
- e) Initiate a simple notification system to inform staff of GFP authored hatchery publications.

**4. Objective:**

Identify hatchery infrastructure and maintenance needs and develop funding priorities by December, 2021.

**Strategies:**

- a) Document the current status and condition of hatchery infrastructure, and prioritize recommendations for funding.
- b) Track hatchery infrastructure maintenance, repair, and replacement costs.
- c) Investigate options for a quarantine facility.
- d) Determine estimates of hatchery production demand for cool- and coldwater fish in 2021 and expand current hatchery production capabilities and staffing if needed to meet this demand.

**5. Objective:**

Conduct hatchery research to increase rearing efficiencies, system operations, production capabilities, post stocking survival, and angler satisfaction by 2021.

**Strategies:**

- a) Undertake research projects to improve hatchery rearing efficiencies.



- b) Collaborate with fisheries research and management staff on post-stocking evaluations, including stocked fish survival and angler satisfaction.
- c) Coordinate research among hatcheries and between management and hatchery staff.
- d) Investigate novel techniques to increase hatchery production if management needs exceed production capabilities.
- e) Develop hatchery staff research skills.
- f) Publish completed research projects in scientific journals.

## **Bait and Private Aquaculture**

### **Inventory**

#### **Bait**

Baitfish harvest from South Dakota waters is a commercial activity regulated by GFP. It has an economic impact of over \$3,000,000 a year. The number of commercial baitfish licenses issued fluctuates yearly. In 2018, 150 resident retail, 20 resident wholesale, 12 export, 13 non-resident retail, and no non-resident wholesale bait licenses were issued. While the sale of baitfish has easily measurable economic results, there may also be potential effects of such harvest on wild fish populations and recreational fisheries.

#### **Private Aquaculture**

Private aquaculture development in South Dakota lags well behind many other states. Only 12 private aquaculture and 6 fee fishing licenses were issued in 2018. Private aquaculture facilities vary from totally enclosed recirculating systems, to fish rearing in natural waters. Fish are reared for human consumption, sale to private landowners, export to other states or countries and evaluating commercial fish food diets.

The demand for cultured baitfish has recently increased because regulations in some states require that baitfish be farm-raised due to fish health and AIS concerns. Another factor driving increased bait production is the use of fathead minnows and white suckers as feed for game fish. It is the responsibility of GFP to license commercial aquaculture facilities. A requirement under the license is an annual fish health inspection for each private aquaculture facility. A fish importation permit with fish health certificates from the out-of-state hatchery must be obtained prior to bringing fish or their reproductive products into South Dakota. These regulations are in place to help protect wild fish populations and waters from the spread of fish pathogens and Aquatic Invasive Species.



## **Disease Issues and Importation Requirements**

The 2005 outbreak of viral hemorrhagic septicemia (VHS) in the Great Lakes area prompted Minnesota, Wisconsin, Michigan, and other states to implement stricter importation regulations for baitfish and private aquaculture products. Additional fish disease and AIS concerns led to increased fish health testing requirements for fish. Some states have either eliminated, or are working towards eliminating, the importation of baitfish or any fish that will be released into state waters. Historically, fish health inspections and importation regulations for South Dakota have been focused on private and state salmonid facilities in the Black Hills. Recently, the emphasis on fish health testing has expanded to include cool and warm water hatcheries, natural rearing ponds, and baitfish production across the entire state.

## **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Statewide Bait and Private Aquaculture program, those tasks include processing applications and working with GFP licensing to issue annual licenses, filing reports submitted by producers, compiling records, answering questions from the public and licensees, providing information and services to licensees and permit holders, inspecting facilities and ponds and approving or denying applications, meeting with licensees as needed, biannually reviewing bait, private aquaculture and fish importations rules and recommending changes or new rules to GFP Administrators and the GFP Commission, communicating and consulting with GFP Law and Licensing staff, and sending out annual license renewal letters and applications to Bait and Aquaculture licensees.

## **Management Issues**

1. Harvest of bait and game species from natural public waters by the bait and aquaculture industry must be balanced with the need to protect fisheries from disease and AIS.
2. The importation of diseased fish and eggs could negatively impact wild fish populations in South Dakota.
3. Management actions and regulation changes to protect public aquatic resources and recreational fisheries are impacting bait and private aquaculture industries operations.
4. Changes in statewide fish health management are impacting the harvest of wild baitfish.



5. The spread of AIS throughout the state has and will continue to affect the harvest of baitfish in specific areas and water bodies throughout the state.
6. Staff resources are currently not available to compile bait and private aquaculture records, nor generate usable reports.
7. Fish rearing facility inspections are not uniformly conducted and standard criteria to pass or fail an inspection do not exist.
8. The diversity of fish rearing types (recirculation, single-pass water, extensive culture, natural rearing ponds) is not accounted for in current fish health testing requirements or in hatchery regulations.
9. Testing of specific lots of baitfish is impractical given current operations making detection and monitoring of fish health and AIS parameters ineffective at best.
10. Some private hatcheries have come to rely upon Aquatics staff for rearing recommendations and assistance creating liability and fairness issues for GFP.
11. Current hatchery regulations may not address recent and rapidly changing advances in commercial aquaculture (such as transgenic species).
12. Aquatics staff time for conducting fish health inspections at private aquaculture facilities is limited and there is a lack of local veterinarians knowledgeable in fish health who can conduct inspections.
13. A review of GFP permitting requirements and regulations governing private aquaculture in South Dakota has not been recently conducted though major changes in the aquaculture industry, especially with regards to fish health requirements, have occurred.
14. Aquatics Section staff conducting annual hatchery inspections may lack the qualifications or skills needed to adequately evaluate hatchery design, ascertain escapement risk, evaluate fish health issues, or identify aquatic nuisance species.
15. The South Dakota Department of Agriculture provides limited, if any, assistance for private aquaculture, placing the responsibility on Aquatics Section staff to provide extension-type services.
16. Bait and private aquaculture records are often inaccurate and may not provide the information needed for effective regulation.



## **Goals, Objectives, Strategies**

### **Goal:**

1. *To protect aquatic resources and recreational fisheries in South Dakota, while minimizing negative impacts to the bait and private aquaculture industry.*
2. *Guide the responsible development of commercial aquaculture in South Dakota.*

### **Objectives and Strategies**

Not all objectives will be met due to brushfires, unforeseen obstacles, and changes in needs or priorities as a part of the adaptive management process.

#### **1. Objective:**

Move from paper to electronic reporting for annual reports from license holders to facilitate creation of annual reports by 2023.

#### **Strategies:**

- a) Continue to compile annual report data from BPA operations.
- b) Modify administrative rules to correspond with any changes in reporting requirements associated with the use of electronic reporting.
- c) Conduct annual BPA team meetings to discuss industry issues and potential regulation changes.

#### **2. Objective:**

Design and implement a BPA regulation development process by 2023.

#### **Strategies:**

- a) Create a BPA issues and regulation team consisting of relevant GFP staff, BPA licensees and other potentially affected interests, as needed.
- b) Conduct an annual BPA team meeting so discuss industry issues and potential regulation changes.



- c) Every other year, if needed, insert BPA regulation ideas into the Aquatics Commission Regulation Development (CRD) process.
- d) Meet with BPA licensees as needed to discuss current and potential regulation changes.

### 3. Objective:

Develop criteria for the inspection of private hatchery facilities.

#### ***Strategies:***

- a) Task the BPA Team to develop criteria for private hatchery facilities hatchery inspections through a review of other states, brainstorming, and input of selected licensees.
- b) Review and adopt criteria and present them to licensees.
- c) Train staff on completing inspections.

### **Aquatic Invasive Species**

The State of South Dakota Aquatic Nuisance Species Management Plan was approved by Governor Rounds in 2008 (Burgess and Bertrand 2008), as a prerequisite to receiving federal funds to cover a portion of the cost of the GFP Aquatic Invasive Species (AIS) management program. A GFP AIS Strategic Management Plan (SDGFP 2016a) was adopted by the GFP Commission in 2016 and directs AIS management activities in the department.

#### **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Statewide AIS program, those tasks include annual sampling to detect the spread of AIS, development of annual education and outreach plans and strategies; development of annual work direction for the fish management area supervisors; communication and coordination with GFP Law Staff; status updates to GFP Administration and Commissioners, communicating with other states and governmental organizations; and attending regional and national AIS conferences.



## **Health and Contaminants**

### **Inventory**

#### ***Statewide Fish Health Manual***

A Statewide Fish Health manual exists, containing standard tasks and direction for addressing fish health as a part of fisheries and aquatic resources management (South Dakota Department of Game Fish and Parks 2016b).

#### ***Statewide Fish Importation and Private Hatchery Regulations***

Regulations pertaining to the importation of fish and annual fish health sampling of aquaculture facilities within South Dakota are in administrative rule to reduce the potential introduction of pathogens of concern into South Dakota waters.

#### ***Statewide Fish Flesh Contaminant Testing***

The South Dakota Departments of Health (DOH), Environment & Natural Resources (DENR), and GFP cooperate to test fish for mercury, selenium, cadmium, pesticides and polychlorinated biphenyls (PCBs). Since 1993, 147 of South Dakota's most popular fishing waters have been tested. Testing revealed the majority of fish in South Dakota waters are safe to eat, with the exception of fish from a small number of lakes with elevated mercury levels. Only 22 fish consumption advisories have been issued due to elevated mercury levels. Currently, mercury advisories are based on the Food and Drug Administration threshold value of 1.0 ppm. The purpose of fish consumption advisories is to serve as a guide to help anglers and the public continue to enjoy the benefits of eating fish by harvesting the sizes and species of fish that are low in mercury.

### **Standard Tasks**

In addition to expenditure of resources on strategies to accomplish specific management objectives, there are standard work tasks that are annually conducted as part of standard operations. With regards to the Fish Health and Contaminants Program, those tasks include yearly fish health inspections of Cleghorn Springs and McNenny State Fish Hatcheries, fish health sampling of feral Chinook salmon from Lake Oahe used as broodstock, fish health sampling from waters planned for future use as egg sources for walleye and trap and transfer operations, issuance of importation permits for fish and eggs to be allowed into the State of South Dakota, conducting fish flesh contaminant sampling from a minimum of 10 waterbodies annually, and coordinating with the South Dakota Department of Health and DENR regarding fish contaminant sampling budgets, locations and results.



## **Management Issues**

1. Adequate staffing is not available to conduct extensive fish health pathogen sampling in the public waters of South Dakota.
2. Fisheries staff who conduct standard fish population assessments are not trained in identifying fish parasites or external signs of fish diseases and pathogens.
3. Department activities, such as trap and transfer, spawning of wild fish and the use of natural rearing ponds, are conducted with minimal or no fish health sampling.
4. Fish health testing prior to spawning of natural populations is difficult and frequently cannot be conducted quickly enough to have results back in time to meet the importation requirements of states with whom we exchange fish and eggs
5. In general, the public is either unaware or complacent regarding active fish consumption advisories.

## **Goals, Objectives, Strategies**

### **Goal:**

1. *Ensure healthy fish populations by preventing the introduction and spread of fish pathogens of concern in South Dakota.*
2. *Inform the public about how to select sizes and species of fish low in contaminants while promoting the healthy consumption of fish harvested from South Dakota waters.*

### **Objectives and Strategies**

Not all objectives will be met due to brushfires, unforeseen obstacles, and changes in needs or priorities as a part of the adaptive management process.

#### **1. Objective:**

Maintain an up-to-date statewide fish health procedural manual.



**Strategies:**

- a) Annually review statewide status of diseases and pathogens of concern and changes in administrative rules and incorporate changes in the manual.

**2. Objective:**

Maintain current fish flesh contaminant monitoring and reporting protocols and determine how to best inform potentially vulnerable consumers how to select fish low in contaminants.

**Strategies:**

- a) Work with DOH and DENR to ensure appropriate consumption advisory thresholds are used.
- b) Continue to partner with DOH and DENR to sample fish flesh for contaminants from a minimum of 10 public water bodies annually.
- c) Improve public outreach efforts about fish flesh contaminants and fish consumption recommendations.



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## Appendices

### **Appendix 1. 2014 – 2018 Statewide program management issues and completion status for objectives and strategies.**

#### **Fisheries Surveys**

##### ***2014-2018 Management Issues***

1. Lack of standardization in data collection and sampling methodologies reduces the ability to compare data among similar waters statewide.
2. Data is not stored in a consistent manner often making it difficult to access.
3. A process to prioritize waters for both fish population and angler use surveys has not been implemented and is needed to effectively allocate limited resources.
4. Opportunities to collect important information during a creel survey are often missed because survey objectives are not identified in advance.
5. Creel survey designs or protocols to potentially increase the precision of estimates or reduced sampling effort are not always implemented.
6. There is inconsistent utilization of survey data to make management decisions, making the survey process inefficient.
7. Criteria for determining when, or if, surveys are needed to manage or monitor fish populations or fisheries is lacking.
8. Gear biases for sampling are not well understood.



## **2014-2018 Objectives and Completion Status:**

### **1. Objective:**

Standardize fish population survey protocols statewide by January 1, 2018.

#### **Status:**

Ongoing. A statewide comparison between South Dakota and North American standard sampling gears (i.e., gill nets and modified fyke nets; Bonar et al. 2009) was completed in 2013 and 2014 (Smith 2015). Comparisons were divided between the Missouri River reservoirs and non-Missouri River waters because standard Missouri River gill nets were longer than gill nets used in other waters and were made of multifilament twine instead of monofilament. Conversion factors were developed to convert catch per unit effort for both gill nets and modified fyke nets. Additional research estimated gill net mesh-specific selectivity and compared restricted and unrestricted throat configurations of modified-fyke nets. Results of the various studies indicated that the transition to North American Standard gill nets and modified-fyke nets was feasible. In 2017, the North American standard gill net and modified fyke net configurations were adopted as a standard fish sampling gears in South Dakota lakes. The North American modified-fyke net style was abandoned as the statewide standard in 2018 and the previous South Dakota standard modified-fyke net was reinstated.

### **2. Objective:**

Create a database management system for storing, analyzing, and reporting fisheries-related data by January 1, 2018.

#### **Status:**

Ongoing. SDGFP Aquatics and GIS staff worked with a GIS consultant, ESRI, to develop a statewide database to store, analyze and report fisheries data (creel and fisheries survey, stocking, spawning and some research). Data is now stored in a Sequel Server database, fisheries and creel survey data are analyzed using programs coded in Sequel Server language, and reports are generated using Sequel Server Reporting Services (SSRS). Scripts were developed to auto-generate survey statistics which are placed into tables/reports located on our website.



### **3. Objective:**

Develop a process for selecting and prioritizing waters for fish population and angler use surveys by July 1, 2014 and identify essential surveys by January 1, 2015.

#### **Status:**

Various measures were taken by FMAs to prioritize waters and adjust the frequency of surveys in order to reduce the number of surveys conducted annually. Examples of measures taken to improve efficiency include aligning survey frequency with fisheries importance (Ft. Pierre, Webster), developing a 3-year rotation for small impoundment surveys and elimination of catfish surveys (Chamberlain), and developing a standardized survey schedule (Rapid City).

### **4. Objective:**

Require specific objectives for all creel surveys conducted after January 1, 2015.

#### **Status:**

Partially completed. Proposals for conducting creel surveys were submitted for review in several fish management areas (MRFMA and SEFMA). MRFMA included their Lake Sharpe creel survey as part of a research proposal. SEFMA staff submitted a proposal for review prior to conducting their community fish pond creel survey, and utilized the assistance of Cindy Longmire, SDGFP Human Dimensions Specialist, when drafting angler preference and satisfaction questions. BHFMA routinely utilizes Longmire to produce creel survey questions, and their survey timing and purpose are guided by strategic plans.

### **5. Objective:**

Reduce the number of surveys conducted annually by identifying management needs to eliminate extraneous data collection.

#### **Status:**

Completed. Ongoing. The total number of fish population surveys conducted was reduced from roughly 163 in 2012 to 104 in 2018. Other measures to eliminate the collection of extraneous data included eliminating low fishing pressure months from creel surveys on Lakes Oahe (April, Aug, Sept and Oct), Sharpe (April and Sept) and Francis Case (Aug and Sept), aligning survey frequency with fisheries importance (Ft. Pierre, Webster), developing a 3-year



rotation for small impoundment surveys and elimination of catfish surveys (Chamberlain). Surveys are now done on an alternate-year schedule at Pactola Reservoir (Rapid City) to reduce netting pressure on the lake trout population. Surveys were streamlined in the SEFMA by eliminating the collection of aging structures from largemouth bass (growth not an issue) and not taking weights on most non-game species (data was seldom used).

## **Fisheries Research**

### ***2014-2018 Management Issues***

1. Long-term benefits of research many not be as immediately evident as other management actions such as stocking and access improvements.
2. Fisheries and hatchery management actions fail to incorporate research results.
3. Research results are sometime not appropriately documented or fully disseminated.
4. Staff with research responsibilities may lack necessary skill and training to conduct statistically valid research.
5. Decreasing federal aid monies may cause a research funding shortfall.
6. Information exchange at the regional and national level may be limited due to a variety of factors.
7. Opportunities to participate in large collaborative projects on a regional or national scale with other resource agencies to improve fisheries science within South Dakota are limited.

### ***2014-2018 Objectives and Completion Status:***

#### ***1. Objective:***

Develop written communication standards and implement publication expectations by 2018.

#### ***Status:***

Ongoing. Staff members have participated in educational opportunities (e.g., Program MARK, R) and the research review committee was organized and has reviewed proposals and



potential publications. The number of peer-reviewed publications staff members have authored or coauthored has increased.

**2. Objective:**

Continue to refine protocol for research development annually.

**Status:**

Ongoing, Dingell-Johnson research funding is prioritized.

**3. Objective:**

Identify and implement three new avenues to increase internal and external customer knowledge of Aquatics Section research by 2016.

**Status:**

Ongoing. Lead Line was published in spring 2017 and highlighted GFP aquatic research activities. Use of social media to disseminate information has increased. Articles concerning fisheries research have been more frequent (e.g., Capitol Journal, Dakota Country).

## **Fishing Access**

### ***2014-2018 Management Issues***

1. The current inventory of existing fishing access sites is outdated and fragmented, making it of little use when prioritizing where future access dollars should be spent.
2. Short and long term water fluctuations often make it difficult to design fishing access facilities usable under all conditions.
3. Budget planning for proposed projects sometimes do not include enough engineering input on costs and design.
4. GFP budget cycles often conflict with the project development schedules of Federal, municipal, and private partners.
5. Federal funding available for access projects via Sportfish Restoration fluctuates from year to year.
6. There are no lifts systems installed to facilitate disabled anglers entrance into boats.



## **2014-2018 Objectives and Completion Status:**

### **1. Objective:**

Modify the existing inventory of access areas to include human dimensions information, including demographics, and use this inventory to assess needs and prioritize future access projects by December 31, 2015.

#### **Status:**

An angler survey was completed to evaluate the use of urban fisheries in the South East Fish Management Area and questions about fishing access are included in other angler surveys.

### **2. Objective:**

Survey anglers concerning access needs and satisfaction with existing access areas and facilities by January 2016.

#### **Status:**

Completed where anglers surveys were done.

### **3. Objective:**

Develop access structure designs that remain functional with fluctuating water conditions by December 31, 2014.

#### **Status:**

Partially completed. The development of floating fishing piers has solved this problem for fishing access on lakes and ponds but not for tailrace areas.

### **4. Objective:**

Develop a checklist that will need to be submitted during the approval process for access projects by January 2015,

#### **Status:**

Completed. Use and refinement of WorkZone and the Capital Development process accomplished this objective.

### **5. Objective:**

Develop materials to explain the access development process and project development considerations to staff and cooperators by January 2015.



**Status:**

Completed. Development and continued modification and upgrades to fishing access map has really aided in this area.

**6. Objective:**

Develop a plan to obtain alternative funding for access projects by January 2018.

**Status:**

Objective was partially completed by putting greater emphasis on partnerships with municipalities, sportsman's groups, and private individuals.

## **Fish Habitat**

### ***2014-2018 Management Issues***

1. Habitat enhancement projects are expensive and rely heavily on federal budgets and short term funding sources.
2. The role of the Wildlife Division and other South Dakota natural resource agencies in relation to aquatic habitat impacts due to increased demands for water from expanding municipal, agricultural and industrial interests is not well defined. .
3. Public understanding of aquatic habitat issues is limited.
4. Information concerning the amount and types of aquatic habitat is often lacking or difficult to access.
5. Participation in resource conservation efforts on a watershed level is difficult because of incomplete knowledge of the entities and funding sources involved in restoration efforts.
6. Conservation Reserve Program acreage, and other land use changes negatively impact water quality and aquatic habitats through increased rates of sedimentation and nutrient loading.
7. Small impoundments created during the 1930's are important fisheries resources and are experiencing significant issues with sediment deposition and structural integrity.



## **2014-2018 Objectives and Completion Status:**

### **1. Objective:**

Develop partnerships with other governmental entities, Non-governmental Organizations, and private citizens to complete six aquatic habitat enhancement projects by December 2015.

#### **Status:**

Completed by December of 2018 and included installation of artificial fish habitat structures, dredging to improve water quality, and stream habitat restorations.

### **2. Objective:**

Complete ten cost-shared lake shore restoration projects by 2018.

#### **Status:**

Lakeshore restoration projects continue to be completed annually. Ten shoreline restoration projects were completed during the 2014 – 2018 plan period and four more were in progress during the Fall of 2018.

### **3. Objective:**

Develop a comprehensive plan to maintain and enhance aquatic habitats in South Dakota by December 31, 2018.

#### **Status:**

Ongoing. The plan is currently in development. A statewide aquatic habitat and access coordinator was hired in 2018 to oversee completion of this project.

### **4. Objective:**

Develop outreach and education programs to promote the conservation and enhancement of aquatic habitats by December 2016.

#### **Status:**

Not completed.

### **5. Objective:**

Develop a comprehensive database of aquatic habitat enhancement efforts in South Dakota by 2017.



**Status:**

Ongoing. Capturing project information for future use will be incorporated into development of the statewide aquatic habitat plan and file director will likely be used as a repository for information

**6. Objective:**

Continually review potential threats to aquatic habitats in order to refine work direction to best utilize aquatic habitat staff.

**Status:**

Ongoing. This process will be associated with implementation of the habitat plan currently in development.

**7. Objective:**

Develop additional sources of funding for habitat projects and renovations of small impoundments by December 2018.

**Status:**

Partially completed. Additional funding sources have been secured for specific habitat projects but not for projects such as complete renovations of small impoundments.

## **Non-Game Aquatic Species**

### ***2014-2018 Management Issues***

1. A lack of up-to-date information on the distribution, status, and the role that aquatic species play in ecological processes impedes effective prioritization of work efforts to prevent future listings.
2. Many large river species native to the Missouri River are declining in abundance. (This issue was originally in the Missouri River Fish Management Plan 2014-2018 and it was removed from that plan and included in the current revision of the statewide aquatic resources plan).
3. Aquatic habitat alteration and degradation are major management issues for all South Dakota aquatic species. However, the greatest impact is often on aquatic threatened, endangered, and species of greatest conservation need, and the needs of non-game species are typically not considered in land management decisions. Specific issues related to habitat alterations and degradation are described in the Habitat Management Section of this plan.



4. Non-native aquatic species introductions, which include Aquatic Invasive Species (AIS) and recreational fish stockings into non-native water bodies, often negatively impact non-game species. However, the total impact is typically not fully known. Specific issues related to AIS and recreational fish introductions are described in the Aquatic Invasive Species Management and Fish Production and Stocking Sections of this plan.
5. Less emphasis and prioritization has been placed on the management of non-game species than game species in South Dakota.
6. Coordination and information sharing on non-game species management among stakeholders, partners, staff, and other state and federal agencies are limited, restricting the ability of limited personnel to maximize the benefits of conservation efforts.
7. Funding for non-game aquatic species research and management is limited and less reliable than recreational fisheries funding. Often, these funds are appropriated annually or as one-time allocations.
8. (This management issue was removed due to public survey responses suggesting that there is public interest in non-game aquatic species and their management. Additionally, a new version of the Fishes of South Dakota was generated in 2018 incorporating several non-game and threatened and endangered species, depicting more than the 1990 version which was predominantly sport fish). There is a need for a standardized reporting system and centralized database to record all non-game species occurrences and detailed habitat information. The current non-game database, provided through NatureServe, is useful for the Natural Heritage Program but does not allow for the full functionality and ease of use necessary for effective non-game management.

### ***2014-2018 Objectives and Completion Status:***

#### ***1. Objective:***

Annually review, revise, and determine status of rare species with an emphasis on SGCN.

#### ***Status:***

This objective and associated strategies were removed from the current plan revision and are now included in the standard tasks portion of the Non-Game Aquatic Species Management Program.



## **2. Objective:**

Develop a series of standardized survey programs to reduce knowledge gaps by updating information on specific aquatic communities and habitats within watersheds (i.e., Topeka shiner monitoring, pallid sturgeon sampling, State-wide mussel survey) by December 31, 2016.

### **Status:**

Ongoing. This objective and associated strategies have been modified and are now broken into Objectives 1 and 2 within the current plan revision. Due to a lack of a federal recovery plan for Topeka shiner, SDGFP conducts presence/absence sampling at sites in need of current survey information within Topeka shiner streams. The tally of occupied streams occupied since 2014 is 38 (28-HUC\_10 watersheds). SDGFP is no longer conducting pallid sturgeon monitoring/surveys below Gavins under contract with the Corps of Engineers. The comprehensive statewide mussel survey of wadeable streams was completed December 2016 demonstrating that unionid occurrences have declined in wadeable streams throughout eastern South Dakota. Remaining grant funds are being used to continue sampling efforts on publicly owned and managed eastern South Dakota pothole basins.

## **3. Objective:**

Improve coordination amongst natural resource agencies, public land management agencies, and other partners to facilitate more effective conservation planning and increase plan implementation for non-game species.

### **Status:**

This objective and associated strategies are ongoing.

## **4. Objective:**

Identify and obtain alternative funding sources for non-game management efforts.

### **Status:**

This objective and associated strategies are ongoing.



## **5. Objective:**

Develop an outreach plan to increase public understanding, support, and participation in non-game management activities by December 31, 2015.

### **Status:**

Recent public survey responses suggested that there is public interest in non-game aquatic species and their management, therefore the management issue and associated objectives and strategies were removed from the current plan revision. A recent public outreach in the form of a new version of the Fishes of South Dakota poster was generated in 2018 incorporating several non-game and threatened and endangered species, depicting more than the original 1990 version, which was predominantly sport fish.

## **Fish Production and Stocking**

### ***2014-2018 Management Issues***

1. A complete and accurate record of annual stocking events can be difficult to obtain because numerous individuals enter fish stocking data into the statewide database.
2. Fisheries managers must plan well in advance when requesting coldwater fish due to long hatchery rearing times and the operation of coldwater hatcheries at full capacity.
3. Stocking and rearing strategies must be continually streamlined to accommodate increased production demands within the existing hatchery system.
4. An unreliable annual source of eggs for coolwater fish, Paddlefish, and Chinook Salmon impacts the ability to meet stocking requests.
5. Trap and transfer operations produce highly variable numbers of fish, can be very costly to undertake, and have a high risk of spreading fish pathogens and aquatic nuisance species.
6. Egg sources for fish species like Chinook Salmon are limited due to disease concerns.
7. Diseases at state hatcheries can limit or significantly interfere with production.



8. Production capacities remain constant while requests for stocked fish are highly variable.
9. Maintenance and improvement of hatchery infrastructure is continually needed for hatcheries to operate at full potential.
10. Fish production using extensive culture is unpredictable.
11. Hatchery production techniques can dramatically influence post-stocking survival, angler harvest, and angler satisfaction.
12. Hatchery influences on post-stocking performance and angler satisfaction are not typically considered by fisheries managers when making stocking requests.
13. Hatchery staff are challenged to keep up with rapid change and considerable innovation as a result of the explosive world-wide growth of commercial aquaculture.
14. Fish food is increasingly made using least cost production methods and novel ingredients, making it difficult to develop specifications, bid contracts, and to compare the effects of various feeds on hatchery and post-stocking performance.
15. Communication and interaction among personnel at all three state hatcheries is negatively affected by geography.

**2014-2018 Objectives and Completion Status:**

**1. Objective:**

Incorporate the fish stocking database into the statewide fisheries database, and develop a system of remote stocking data entry using portable devices by 2016.

**Status:**

Completed.

**2. Objective:**

Include stocking strategies and stocking justifications for individual waters in water-specific management plans by 2016.

**Status:**

This objective was not completed. This objective is no longer relevant because water-specific management plans are no longer



written. A mechanism for documenting stocking strategies and justifications has not yet been created under the new management scheme.

**3. Objective:**

Develop procedures and plans to ensure hatchery operations trap and transfer activities, and fish stockings do not contribute to the spread of aquatic invasive species or fish pathogens of concern by 2018.

**Status:**

On-going. Steps taken include development of the fish health manual, disinfection procedures, and increased staff awareness. In addition, proactive research has been undertaken to develop safe disinfection procedures for salmonid eggs from possibly contaminated waters.

**4. Objective:**

Assess long term needs for the use of cultured fish to meet fisheries management objectives by 2018.

**Status:**

This was not completed by production staff because it falls outside of their responsibilities. Production only responds to stocking requests by Fisheries Management Area Supervisors, making completion of this objective totally dependent on fish managers. This objective should have been included in the Fisheries Management Area plans.

**5. Objective:**

Increase both internal and external awareness of the benefits, capabilities, and limitations of the state hatchery system and stocked fish by 2018.

**Status:**

Partially-completed. Hatchery staff worked with communications staff to produce news releases and also responded to requests for interviews by local media. Internal discussions between hatchery, management, and administrative staff are repeatedly held at fisheries meetings.

**6. Objective:**

Improve hatchery staff knowledge of recent advancements in aquaculture science by 2018.



**Status:**

On-going. Hatchery staff participated at scientific meetings, workshops, and continuing education courses. Several collaborations with university staff were initiated and continue to the present. Some production personnel completed formal aquaculture coursework. Hatchery staff published over 65 scientific articles from 2014 to 2018.

**7. Objective:**

Identify long term hatchery infrastructure and maintenance needs, set priorities, and develop a hatchery infrastructure needs plan by December, 2018.

**Status:**

On-going. A consulting engineer has been hired to complete a whole facility evaluation for Blue Dog hatchery, including a prioritization list and estimated costs. Cleghorn and McNenny needs have been identified by hatchery management.

**8. Objective:**

Establish a process to prioritize and coordinate hatchery research to increase rearing efficiencies, production capabilities, post-stocking survival, and angler satisfaction by 2018.

**Status:**

Completed. A process has been established for the coldwater hatcheries that includes annual meetings involving both hatcheries and coldwater managers and collaborative decision making. A similar process has been established for coldwater production related research involving Missouri River fisheries and Whitlocks Spawning Station. The process identified and used at Blue Dog hatchery is more internal.

## **Bait and Private Aquaculture**

### ***2014-2018 Management Issues***

1. Wild harvest of bait and game species by the bait and aquaculture industry must be balanced with the need to protect public fisheries from disease and aquatic nuisance species.
2. The importation of diseased fish and eggs could negatively impact wild fish populations in South Dakota.



3. States receiving commercially-produced fish or trapped baitfish from South Dakota have non-uniform fish disease testing and importation requirements, creating difficulties for the bait and aquaculture industry.
4. Management actions and regulation changes to protect public aquatic resources and recreational fisheries may affect bait and private aquaculture industries operations.
5. Changes in statewide fish health management may impact the harvest of wild baitfish.
6. The spread of aquatic invasive species throughout the state may affect the harvest of baitfish in specific areas and water bodies throughout the state.
7. Staff resources are currently not available to compile bait and private aquaculture records, nor generate usable reports.
8. Fish rearing facility inspections are not uniformly conducted and standard criteria to pass or fail an inspection do not exist.
9. The diversity of fish rearing types (recirculation, single-pass water, extensive culture, natural rearing ponds) is not accounted for in current fish health testing requirements or in hatchery regulations.
10. Testing of specific lots of baitfish is impractical given current operations, making detection and monitoring of fish health and ANS parameters ineffective at best.
11. Some private hatcheries have come to rely upon Aquatics staff for rearing recommendations and assistance, creating liability and fairness issues for GFP.
12. Current hatchery regulations may not address recent and rapidly changing advances in commercial aquaculture (such as transgenic species).
13. Aquatics staff time for conducting fish health inspections at private aquaculture facilities is limited and there is a lack of local veterinarians knowledgeable in fish health, who can conduct inspections.
14. A review of GFP permitting requirements and regulations governing private aquaculture in South Dakota has not been recently conducted though major changes in the aquaculture industry, especially with regards to fish health requirements, have occurred.
15. Aquatics Section staff conducting annual hatchery inspections may lack the qualifications or skills needed to adequately evaluate hatchery design, ascertain escapement risk, evaluate fish health issues, or identify aquatic nuisance species.



16. The South Dakota Department of Agriculture provides limited, if any, assistance for private aquaculture, placing the responsibility on Aquatics Section staff to provide extension-type services.

17. Bait and private aquaculture records are often inaccurate and may not provide the information needed for effective regulation.

**2014-2018 Objectives and Completion Status:**

**1. Objective:**

Develop and uniformly apply regulations for all public and private fish hatcheries within South Dakota by 2018.

**Status:**

Regulations were reviewed biannually and no new regulations were developed. The uniformity of enforcement efforts was not evaluated by fisheries staff.

**2. Objective:**

Develop a course and/or materials to train staff conducting Aquaculture facilities and waters inspections by 2018.

**Status:**

Not completed. Training of staff is handled by Area Fisheries Supervisors and the Fish Health Coordinator.

**3. Objective:**

Develop specific and measurable criteria to be used during a hatchery inspection by 2018.

**Status:**

Completed. The South Dakota Game Fish and Parks Fish Health Manual established these criteria.

**4. Objective:**

Create a usable and easily accessible database to store information from bait and commercial aquaculture operations reports by 2018.



**Status:**

Partially completed. A database has been developed for these reports but the data needs to be entered. The backlog of records will be entered in 2019 by interns.

**5. Objective:**

Develop a Bait and Private Aquaculture management plan by 2018.

**Status:**

Removed. This objective was considered redundant, as a Bait and Private Aquaculture Program plan is incorporated into the statewide components of the Fisheries and Aquatic Resources Adaptive Management System.

**6. Objective:**

Ensure that private aquaculture and bait regulations comply with AIS and fish health regulations by 2018.

**Status:**

There has been no evaluation of compliance with AIS and fish health regulations nor has there been significant effort to enforce water transportation regulations regarding the bait or private aquaculture industries.

**7. Objective:**

Develop a process for standardizing importation requirements among states and Canadian provinces by 2018.

**Status:**

Not completed. This is an unrealistic objective.

## **Aquatic Invasive Species**

### ***2014-2018 Management Issues***

1. The threat of new AIS introductions to South Dakota (interstate transfer) is high because of encroachment of AIS in neighboring states (e.g. zebra mussels in Red River).



2. Preventing the spread and eradication of existing AIS is costly and time-consuming.
3. Wildlife staff and the public are not fully aware of the negative impacts that AIS can have on aquatic systems.
4. Public complacency towards AIS rules and outreach is likely due to lack of observable significant impacts of AIS infestations in South Dakota.
5. Implementing outreach efforts is challenging due to the growing number of species and the increasing number of vectors for transfer.
6. Boat wash facilities are lacking in South Dakota, increasing the likelihood that an AIS infestation will be spread from one water body to another.
7. Anglers intentionally and illegally introduce new species to waters. .
8. Funding for AIS management is insufficient.

***2014-2018 Objectives and Completion Status:***

***1. Objective:***

Update the Aquatic Invasive Species Management Plan by 2014.

***Status:***

Completed. A Department of Game, Fish and Parks AIS management plan was adopted by the GFP Commission in June 2016 and now serves as the statewide AIS program plan.

***2. Objective:***

Develop and implement an outreach and marketing program by 2016.

***Status:***

Ongoing. Annual outreach and marketing campaigns have been conducted each year during the 2014-2018 period.

***3. Objective:***

Monitor for AIS every public water body in SD actively managed as a fishery a minimum of once every three years.



**Status:**

Ongoing. A stratified sampling system is established for AIS sampling in water bodies, based on the level of boater use.

**4. Objective:**

Annually review and recommend necessary changes to Aquatic Invasive Species regulations.

**Status:**

Ongoing. AIS regulation recommendations are scheduled for Commission consideration every other year but recommended changes can be recommended at any time if the change is important and immediately needs to be in effect.

## **Health and Contaminants**

### ***2014-2018 Fish Health and Contaminants Management Issues***

1. The rough draft of a fish health management plan completed many years ago needs to be updated and expanded in scope to include routine sampling of wild populations, including brood stocks.
2. Fish health information must be gathered from brood stock lakes many months prior to egg take operations so that testing results are available in time to meet importation requirements of states with which we exchange fish and eggs.
3. Procedures and processes for annual fish health inspections at both public and private aquaculture facilities are not uniform and need better definition.
4. Fisheries staff who conduct standard fish population assessments are not trained in identifying fish parasites or external signs of fish diseases and pathogens.
5. National and international regulations require licensed veterinarians to conduct sampling for facilities that export fish across state and national boundaries, and there are very few such veterinarians in South Dakota.
6. The variety of fish production strategies, including completely closed systems using reuse water, have historically been treated differently with regard to regulation and sampling.
7. There are two sets of fish health sampling standards currently in use by fish health professionals and the standard that best suits the needs of South Dakota needs to be identified and applied.



8. State aquaculture facility inspections and fish health protocols need to be standardized.
9. Department activities, such as trap and transfer and the use of natural rearing ponds, are conducted with minimal or non-existent fish health sampling.
10. Fish health, importation, and permitting regulations do not currently address all fish health concerns.
11. Staff have limited knowledge on how to properly investigate and document fish kills.
12. A portion of the public is not aware of fish consumption advisories while another portion of the public has become complacent in regards to fish consumption advisories.
13. If a reduction in the mercury threshold is required, the increase in the number of advisories might alarm the public and reduce angling activity and fish consumption.

***2014-2018 Objectives and Completion Status:***

***1. Objective:***

Develop and implement a fish health management plan for South Dakota that covers wild populations and aquaculture facilities and recommend appropriate changes to aquaculture and importation regulations by August 31, 2014.

***Status:***

Completed with the completion of the Fish Health Manual.

***2. Objective:***

Develop criteria for fish health regulations that are consistent and uniformly applied by 2016.

***Status:***

Completed. Fish health manual completed as a guidance document and regulations are reviewed every other year.

***3. Objective:***

Identify and implement strategies to improve communication about fish health issues and regulations with fisheries staff, licensed bait dealers,



licensed private aquaculturalists, and other potentially affected individuals by 2017.

**Status:**

The completed fish health manual has a compilation of fish health regulation that can be shared with fisheries staff members. There has been no concerted attempt to educate fisheries staff on fish health issues. A program was not developed to educate the bait and private aquaculture industries about fish health issues.

**4. Objective:**

Annually review and evaluate current fish flesh contaminant monitoring and reporting protocols to ensure current requirements for South Dakota are met.

**Status:**

Completed. Regulations and advisories are annually reviewed and modified as contaminate levels change.