

Fisheries and Aquatic Resources Adaptive Management System

2014 - 2018

Statewide Strategic Plan Components

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



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DIVISION OF WILDLIFE



Agency Mission

The purpose of the Department of Game, Fish and Parks is to perpetuate, conserve, manage, protect, and enhance South Dakota's wildlife resources, parks, and outdoor recreational opportunities for the use, benefit, and enjoyment of the people of this state and its visitors, and to give the highest priority to the welfare of this state's wildlife and parks, and their environment, in planning and decisions.

Wildlife Division 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 benefits, welfare, and enjoyment of the citizens of the state and its visitors.

Wildlife Division Motto

"Serving People, Managing Wildlife"

Introduction

The Wildlife Division of Game, Fish and Parks (GFP) is charged with managing the fish and wildlife resources of South Dakota for the public. Management of the fisheries and aquatic resources of the State of South Dakota includes many facets, from maintaining populations of recreational and native fish species, to enhancing habitats and providing access for anglers. Personnel, equipment, and financial resources will always be limited, making planning essential to guide the best use of these resources. Fisheries and aquatic resource management practices must be continually evaluated in light of our mission to optimally manage these resources for the public. We believe that by employing the process of adaptive management, we can better maintain the quality of aquatic resources for current and future users.

Previous fisheries strategic planning efforts divided fisheries resources by water type, such as large lakes and reservoirs, small lakes and impoundments, rivers and streams, and Missouri River reservoirs (SDGFP 1994). While this system has merit, it was decided to use a landscape approach for current planning efforts, because connectivity with the landscape is a crucial factor influencing aquatic ecosystems. These management units will be referred to as fisheries management areas.

This plan includes an inventory that briefly presents our aquatic resources, the fisheries and aquatics program staff structure and infrastructure, and our programs. Issues potentially impacting fisheries and aquatic resources, and effective management, are discussed. Objectives with accompanying strategies to address those issues are also identified. Finally, we provide a methodology to develop a feedback loop, whereby the effectiveness of various strategies is evaluated and the inventory is updated. We anticipate updating this plan every five years.

The statewide section of the plan discusses components common to all fisheries management areas, as well as the management goals, objectives, and strategies for these components. A plan for each fisheries management area will follow, discussing area-specific inventories and issues, goals, objectives, and strategies to meet objectives.

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Statewide Inventory Components

Before determining what needs to be done and the highest priorities for expenditures of staff, equipment, and monetary resources, we need to know:

1. The history and current status of aquatic resources and management efforts.
2. The availability of staff, equipment, and monetary resources.
3. The challenges or issues which may affect the ability to satisfy the Wildlife Division mission.

Aquatic Habitats of Management Areas

Physical attributes of a landscape, such as topography or soil composition, were the most important features used to delineate management areas. After referencing the 2006 State Wildlife Action Plan for South Dakota (SDCWCP, SDGFP 2006), we decided to use similar management area delineations for the fisheries and aquatics plan. Ecoregions, or Fisheries Management Areas, used for fisheries and aquatics planning purposes include East River, Missouri River, West River, and Black Hills (Figure 1).

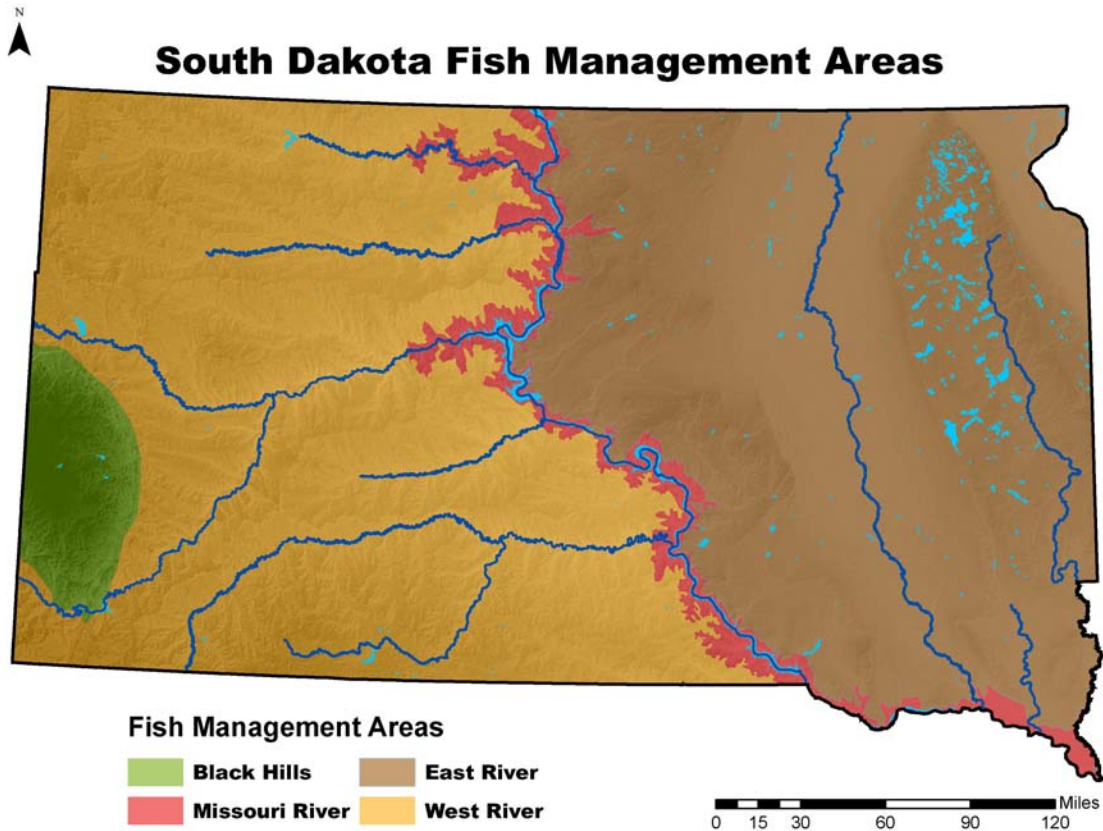
General descriptions of each management area are presented in this statewide overview of aquatic habitats. A more detailed description of habitats can be found in each individual management area plan.

Eastern South Dakota

The landscape in eastern South Dakota is defined by the most recent glacial event which left rolling glacial plains and potholes. Moraines are found close to the Missouri river while prairie coteaus exist further east. Eastern South Dakota is dominated by grasslands with only limited areas covered by trees and shrubs. Wetlands are common, and agriculture is the dominant land-use.

The three major aquatic ecosystems are the James, Vermillion, and Big Sioux River drainages (Figure 2) with their tributary creeks, associated glacial lakes, depressional wetlands, and small impoundments. The Prairie Coteau along the eastern end of the management area contains the majority of the natural lakes found in South Dakota. Some dams, typically built during the 1930's by the Civilian Conservation Corps (CCC) or Works Progress Administration (WPA), also exist, mostly along intermittent streams in rural areas.

Figure 1. Fisheries Management Areas modified from 2006 Wildlife Action Plan ecoregions by combining the eastern subregions.



Data from the National Wetland Inventory show that wetlands and deep-water habitats account for over 2.2 million acres or nearly 10% of the landscape within the 35,400 square mile area of the East River management area (Johnson and Higgins 1997). Shallow and seasonal wetlands comprise 80% (1,780,859 acres), lake systems comprise 17% (371,982 acres), and riverine systems comprise 3% (69,273 acres; Johnson and Higgins, 1997) of this total wetland acreage. Of the estimated 24,408 historic stream and river miles in this management area (SDGFP 2006), 21,559 miles are classified as intermittent streams while 1,164 miles are small and large rivers (Table 1).

Figure 2. Major river systems in South Dakota.

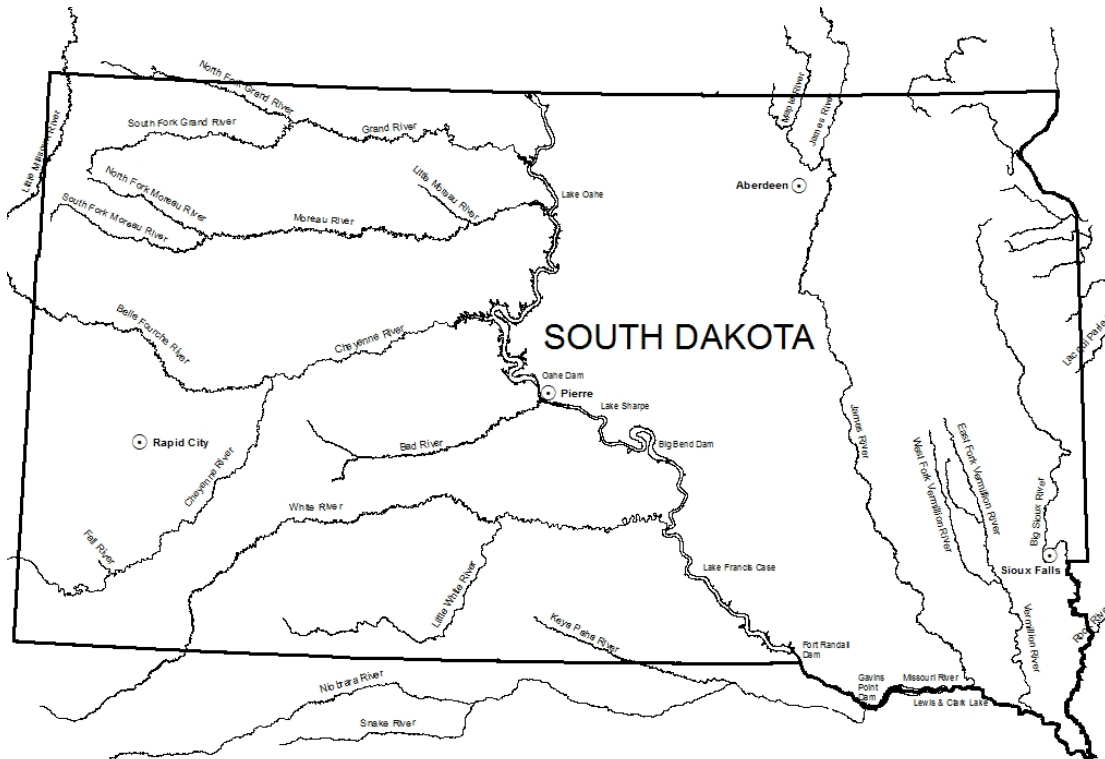


Table 1. Total approximate historical stream miles for fisheries management areas, based on data collected and analyzed in the South Dakota State Wildlife Action Plan (2006).

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. From north to south, these are the Grand, Moreau, Belle Fourche, Cheyenne, Bad, White, and Niobrara Rivers (Figure 2). These tributaries and the small rivers, streams, 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 row crop acreage is continually increasing.

Historic river miles are dominated by intermittent streams, with the West River management area having more than twice as many intermittent stream miles as the East River management area (Table 1). Stock dams or ponds, constructed on intermittent streams for watering cattle and other livestock, provide a substantial portion of the fishing opportunity in the management area. The large Bureau of Reclamation reservoirs found on the upper reaches of the Grand (Shadehill), Cheyenne (Angustora), and Belle Fourche (Orman) Rivers also provide an important source of fishing opportunity.

Black Hills Region

The Black Hills were elevated by volcanic activity during the Tertiary period. This upheaval caused the concentric rings of sedimentary and volcanic rocks that can be seen today. The region has numerous narrow valleys, high plateaus, and well defined drainages. Much of the land lying within the Black Hills is covered with trees, but the region still has areas of prairie.

Several dams provide lakes for recreational use and also control spring run-off. Aquatic systems in the Black Hills do not hold the diversity of plants and animals found in other management areas. Like other areas in unglaciated western South Dakota, wetlands in the Black Hills are primarily related to streams (riverine systems) and associated riparian areas.

Missouri River

The Missouri River is the longest river system in North America, with the total area drained (529,350 square miles) being the third largest of any river in North America. 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 finding its way to the Mississippi river system. The width of the river averages about a mile. It typically transports 20 to 25 million tons of sediments a year, lending to its nickname of "the big muddy."

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 and associated aquatic species assemblages. Stretches of free-flowing river only exist below Fort Randall Dam and Gavin's Point Dam in South Dakota.

Staff Structure

Fisheries staff are employed across four management regions in South Dakota (Figure 3 and Figure 4). Regional fisheries staff (Operations) typically consist of a Program Manager, Resource Biologists, a Conservation Foreman, and Conservation Technicians. The primary responsibility of regional fisheries staff is to manage the recreational component of aquatic resources and duties include fish spawning, fish trap and transfer, fish population surveys, stocking, regulation recommendations, and habitat and access improvements.

Figure 3. Wildlife Division management regions. Regions 1 through 4 are referred to as the West River, Missouri River, Southeast, and Northeast Regions, respectively.



The Aquatics Section of the Wildlife Division is overseen by the Section Chief for Fisheries and Aquatic Resources. Administrators of the Research and Management program and Fish Production and Fisheries Development program are supervised by the Section Chief.

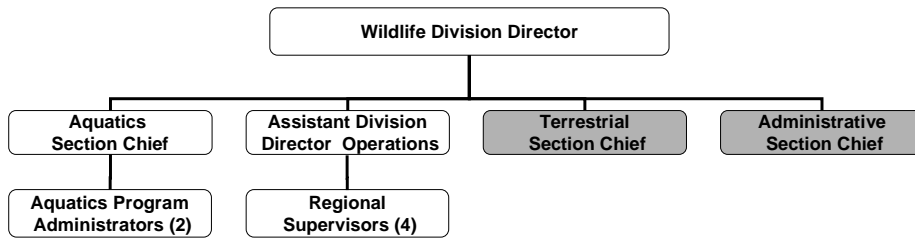
Environmental reviews are coordinated through the Section Chief, as are inter-agency responsibilities of staff. The Production and Development Program Administrator oversees the state fish hatchery system, fish spawning operations, and the fishing access and fish habitat programs. The Management and Research Program Administrator supervises research and management activities, including the process of recommending fisheries regulations.

Fisheries research biologists located around the state provide technical support for regional and statewide fisheries management teams. Duties include conducting and assisting with research projects, conducting angler use, harvest and preference surveys, monitoring and managing non-game fishes and other aquatic organisms, implementing fishing access and habitat projects, and assisting with management efforts. Regional fisheries staff conduct the majority of the fish population assessments and trap and transfer activities, and all staff actively participate in spawning activities. While individual staff have specific responsibilities, work assignments can involve anything dealing with fisheries and aquatic resources management.

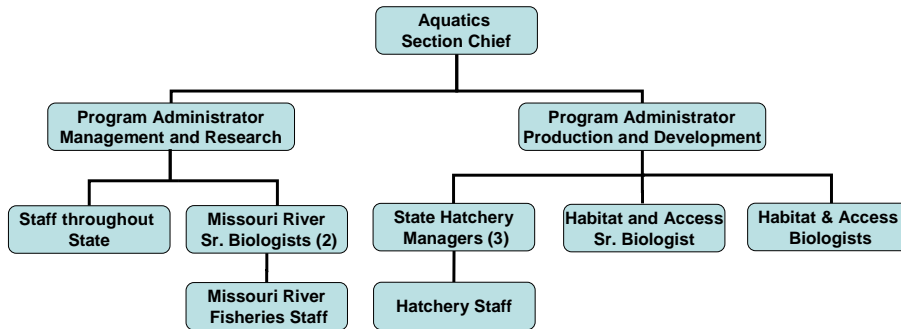
Seasonal employees and interns assist with management and research activities. Geographic boundaries for the management regions are provided in Figure 3, while organizational charts for positions related to the fisheries and aquatic resources program are provided in Figure 4.

Figure 4. Wildlife Division staff structures highlighting fisheries and aquatics staff as of January 1, 2014.

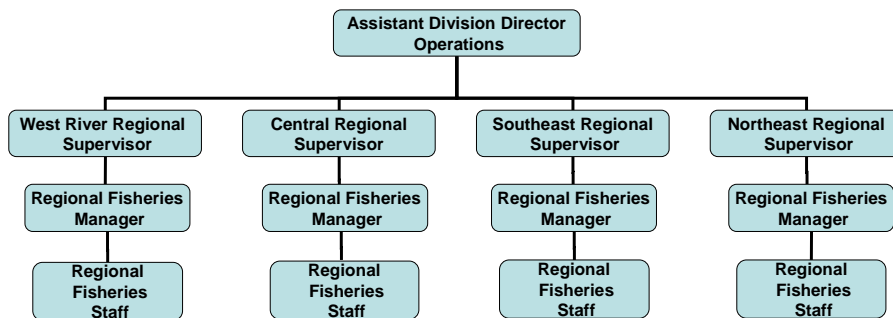
Wildlife Division Administrative Staff Structure



Aquatics Staff Structure



Regional Fisheries 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 money from the State of South Dakota. Federal funds come from a number of sources, with the primary source being Sportfish Restoration or Dingell-Johnson 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. They are distributed among all states based on the number of licensed anglers and the surface area of land and water. There are other sources of Federal funding. State Wildlife Grants are 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 1999 through 2011 and Sportfish Restoration apportionments from 1999 through 2013 are provided in Figures 5 and 6, respectively.

Figure 5. Fishing license revenue for South Dakota Game, Fish and Parks from 1999-2010. For the purpose of calculating fishing license revenue, 45% of combination license revenue was attributed to the fishing license component.

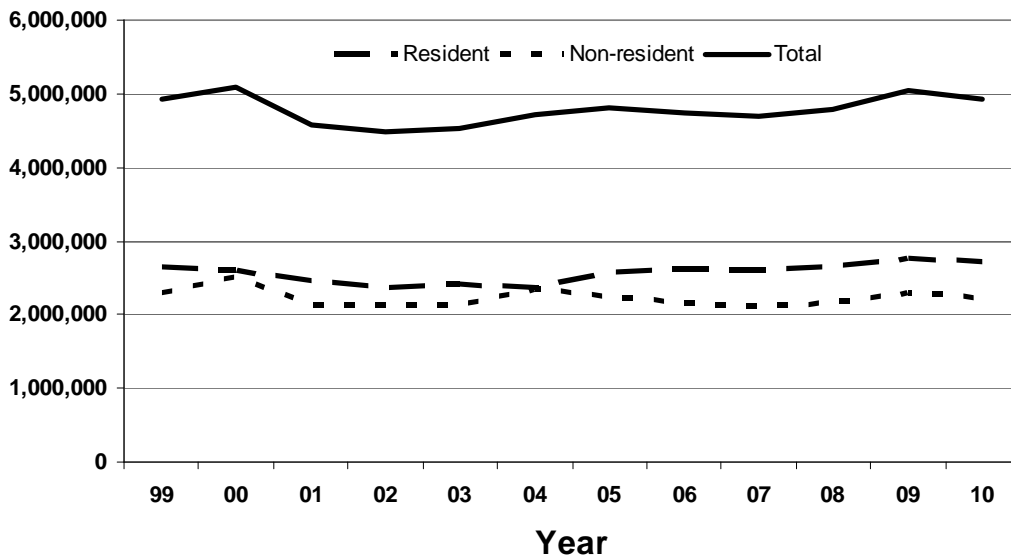
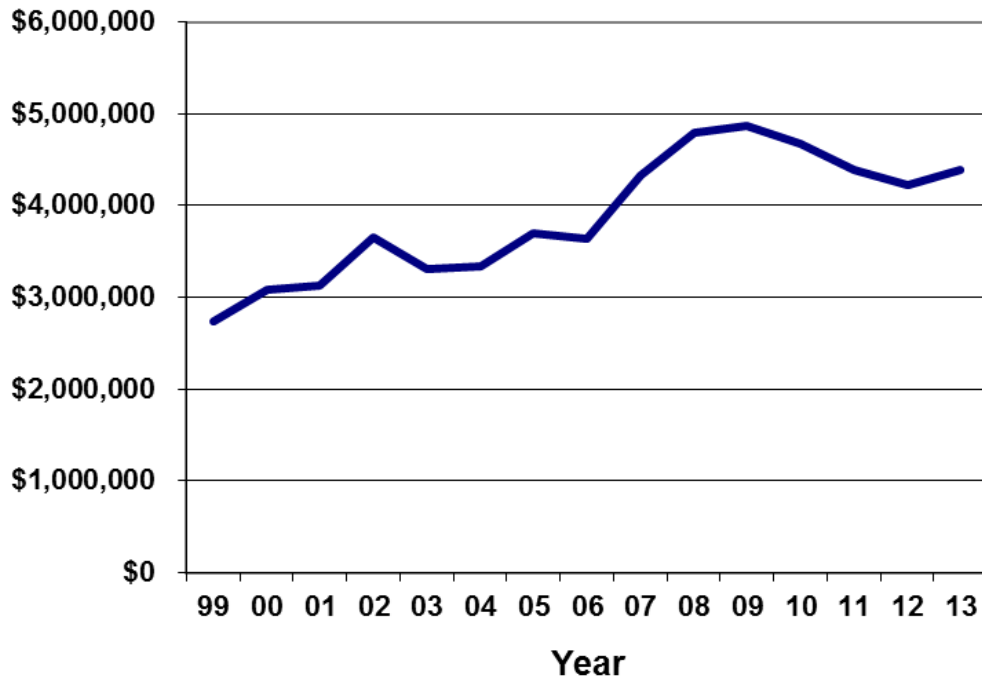


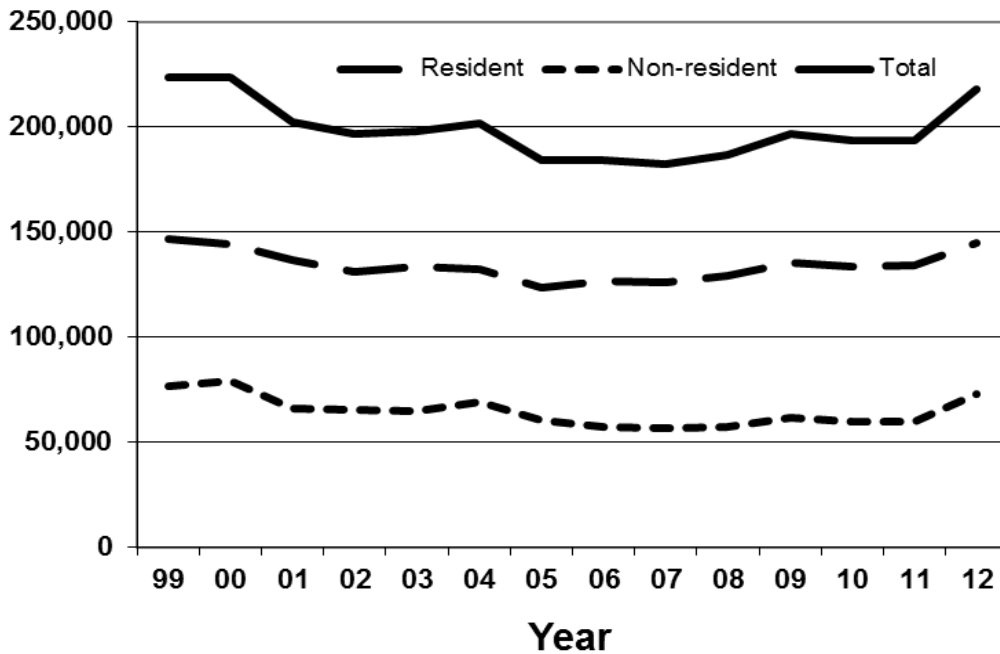
Figure 6. Annual Sportfish Restoration apportionments for the State of South Dakota, 1999-2013.



License revenue is used to match Federal funds for eligible work activities and to fund work activities not eligible for federal dollars. During 2007, over 122,000 residents (age 16 and older) and 51,000 non-residents purchased fishing licenses (Figure 7). In addition, an estimated 38,000 resident anglers 6-16 years of age participated in fishing during 2006 (U.S. Department of Interior, 2007).

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, and subsequently on fishing pressure and the sale of fishing licenses. During the 1999-2012 period, annual fishing license sales ranged from a low of 182,000 in 2007, during the height of a prolonged drought, to a high of 223,000 in 1999, during the middle of a wet cycle (Figure 7).

Figure 7. Total fishing license sale numbers for the 1999-2012 period, including sale of resident combination licenses.



Expenditures

A distribution of expenditures for 2011 Sportfish Restoration dollars is provided in Figure 8. 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 9). Budgets for the state hatchery system and major habitat and access projects are listed separately from Regional and Aquatics Section budgets in Figure 9. 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 expenditures.

Figure 8. Percent distribution of Dingell-Johnson Sportfish Restoration Funds for 2011. The 2011 D-J apportionment was \$4,392,285.

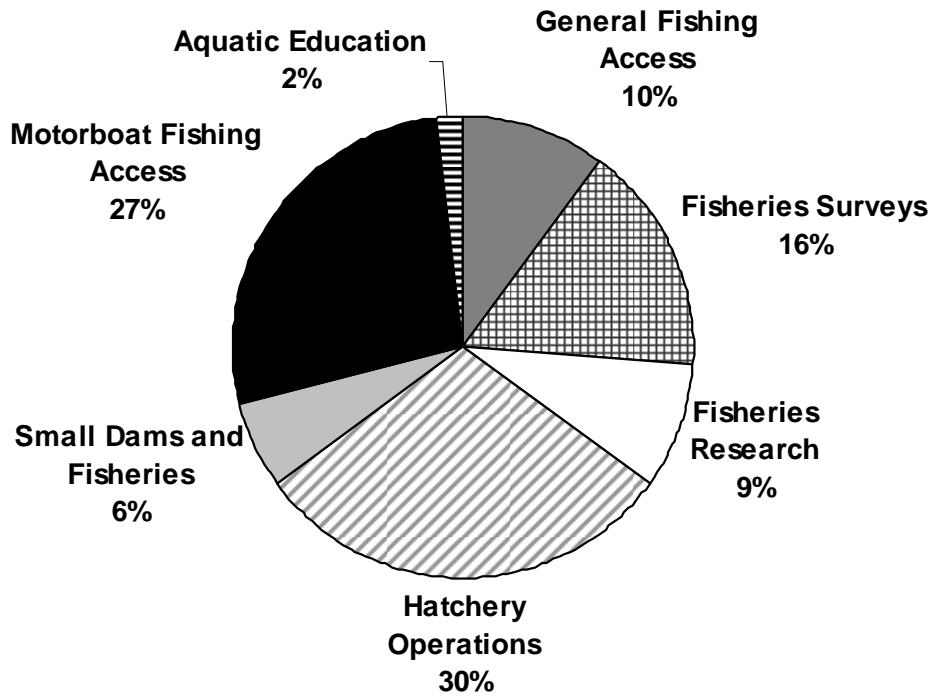
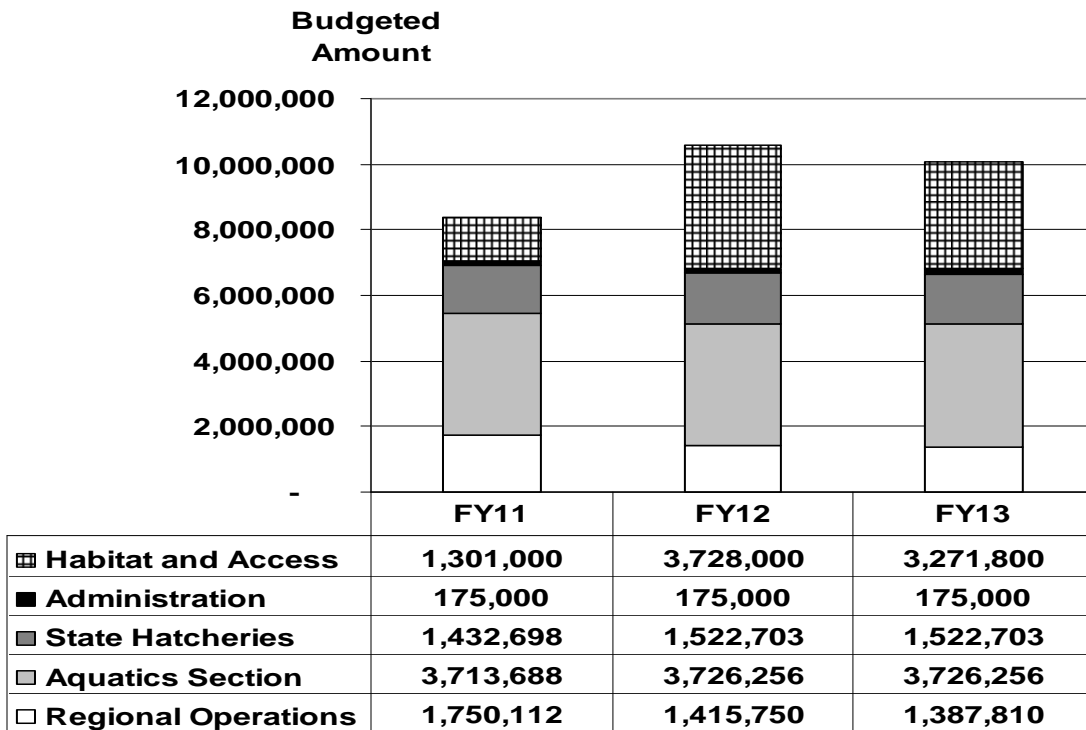


Figure 9. Budgeted amounts for various components of the Aquatics Resources Management program for FY11 through FY13.



Fisheries and Aquatics Infrastructure

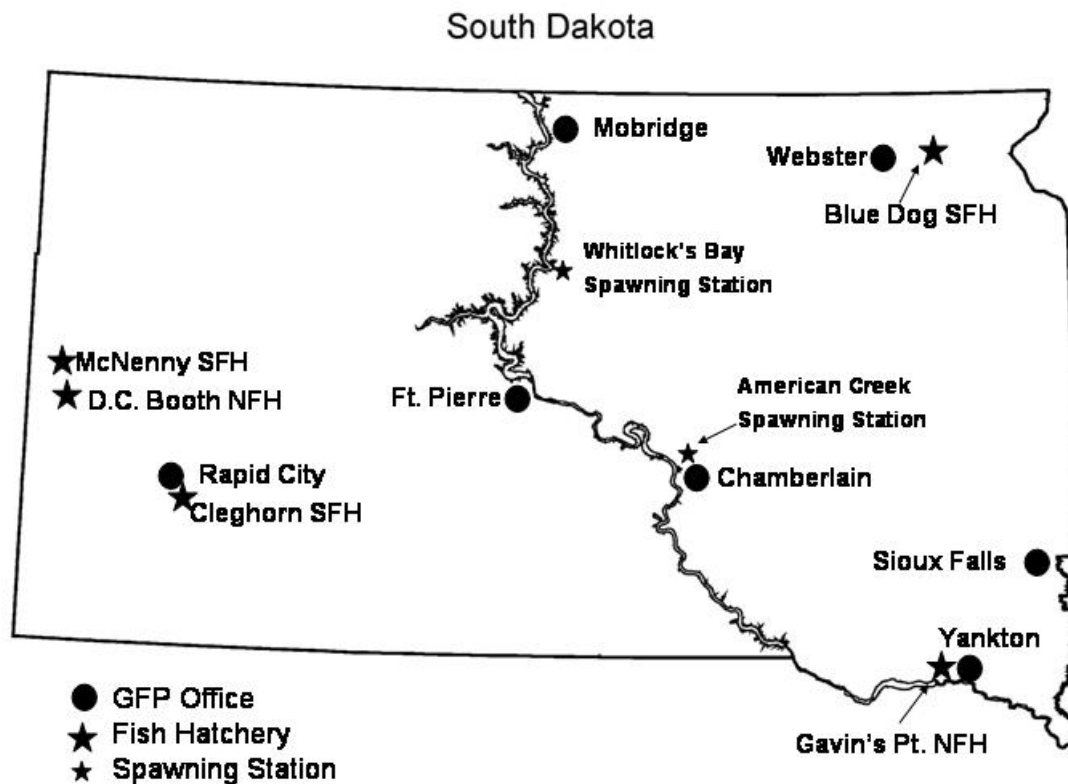
Field Offices

Wildlife Division fisheries and aquatics section staff are stationed at seven locations throughout the state, including Rapid City, Mobridge, Fort Pierre, Chamberlain, Yankton, Webster, and Sioux Falls (Figure 10). Work space includes offices, laboratory work areas, and equipment storage and maintenance areas.

Hatchery Infrastructure

The Division of Wildlife currently maintains three full production 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 and D.C. Booth National Fish Hatcheries (NFH) provide fish for stocking into waters of the State (Figure 10).

Figure 10. Geographic locations of GF&P offices, State fish hatcheries (SFH) and spawning stations and Federal hatcheries (NHF).



Blue Dog State Fish Hatchery

Blue Dog Lake SFH is the State's only warm water (e.g., Largemouth and Smallmouth Black bass, Bluegill, Crappie and Channel Catfish) and coolwater (e.g., Walleye, Yellow Perch and Muskellunge) fish production facility and is located on Blue Dog Lake in Waubay, South Dakota. Walleye, largemouth bass 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 and brown trout and Chinook salmon.

McNenny State Fish Hatchery

McNenny State Fish Hatchery is located approximately 10 miles west of Spearfish, South Dakota. Rearing water is supplied by three artesian wells and numerous free-flowing springs. McNenny also uses the rearing ponds and raceways at the D.C. Booth Historical Fish Hatchery for fish production. Species raised at McNenny SFH include rainbow and brown trout and Chinook salmon.

Whitlock Bay Spawning Station

This facility, located west of Gettysburg on Lake Oahe, is used to collect the eggs from spawning adult Chinook salmon required to maintain a salmon fishery 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 September 15th through the first week of November.

American Creek Spawning Station

The main use of this station is for paddlefish spawning. Water is pumped into the facility from Lake Francis Case. Adult paddlefish are captured near the White River confluence with floating gill nets during May, transported to the station, held in tanks, and injected with hormones to stimulate egg ripening and milt generation. Fertilized eggs are placed in hatching jars prior to transport to Gavin's Point NFH.

Statewide Fisheries and Fish Management Programs

Fisheries Surveys

Fish population and angler use surveys sample a fish population or fishery and serve as an evaluation tool for fisheries management practices. Survey values are often compared to performance measures to determine if management objectives are being met.

Fish Population Surveys

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

Surveys may be conducted to collect information on a specific species, a certain life stage, or a fish community. Information collected includes relative abundance, sizes, ages, growth rates, and body conditions. Survey results are incorporated into water-specific reports that include both planned management activities and recommendations. A total of 163 fish population surveys were conducted on 145 different waters in 2012.

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 and were conducted on 20 different waters in 2012. Surveys provide estimates of fishing pressure, catch and harvest, angler satisfaction, and other information required to evaluate stocking success, special regulations, or other management activities.

Statewide surveys of licensed anglers provide broad-scale information. They were initially conducted through the mail, but are now administered using internet and email (Gigliotti 2000, 2004, 2006, 2011).

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 satisfaction.

Data Management, Standardization, and Utility

Fisheries surveys generate a large amount of data. The current methods to collect, record, and store data are inefficient and need to be updated to both improve work efficiencies and also provide for maximum use of the data collected. For example, survey data is recorded on paper, manually entered into various computer applications, and then locally-stored. Data management and analysis methods vary by location. Outdated software with little-to-no-technical support, such as WinFin (Francis 2000), Creel Analysis Software (CAS, Soupir and Brown 2002), and Fisheries Analysis and Simulation Tools (FAST, Slipke and Maceina 2001) are used for both data entry and analysis. After data entry and analysis, tables and figures must be manually-generated and combined with text to report survey results prior to being manually uploaded onto SDGFP webpages.

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 reduce 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.

Goals

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

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

Strategy 1.1 Compare current fish population sampling methodologies and efforts with American Fisheries Society standards to determine future standard sampling protocols for South Dakota

Objective 2. Create a database management system for storing, analyzing, and reporting fisheries-related data by January 1, 2018.

Strategy 2.1 Determine need, if any, for outside assistance from BIT or external consultants

Strategy 2.2 Determine data storage needs and reports, including those detailing annual performance measures, desired from a centralized database.

Strategy 2.3 Develop central database and conduct training for fisheries staff.

Objective 3. 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.

Strategy 3.1 Create, prioritize and assign points based on importance to a list of reasons for conducting fish population and angler use surveys.

Strategy 3.2 Use total points to determine rank and generate a survey schedule with rankings influencing how often waters are surveyed.

Objective 4. Require specific objectives for all creel surveys conducted after January 1, 2015.

Strategy 4.1 Require submission of a short annual proposal outlining the purpose, methodology, and information to be collected for each water (or group of waters) being creel surveyed.

Objective 5. Reduce the number of surveys conducted annually by identifying management needs to eliminate extraneous data collection.

Strategy 5.1 Continually evaluate specific fish population and creel surveys to determine if they provide the information needed to effectively manage fisheries and if information not needed is being collected.

Fisheries Research

The Fisheries and Aquatics Section actively supports research to improve our understanding of the biology and ecology of fishes, and the population and community dynamics of both game and non-game fishes of South Dakota. Research has also led to increased efficiencies in rearing and stocking fish, improvements to sampling methodologies, evaluations of regulation effectiveness, and improvements in processing information. The Wildlife Division conducts research in-house, as well as by funding research projects at universities and other state and federal agencies.

An internal review process is used to prioritize proposed research projects. Project proposals from both internal and external sources are reviewed by the research review committee prior to approval. Projects that attempt to answer timely management issues are typically assigned the highest priority.

Management Issues

1. Long-term benefits of research may not be as immediately evident as other management actions such as stocking and access improvements.
2. Fisheries and hatchery management actions may fail to incorporate research results.
3. Research results are sometimes not appropriately documented or fully disseminated.

4. Staff with research responsibilities may lack necessary skills 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.

Goals

1. Conduct high quality research to improve fisheries and maintain aquatic diversity in South Dakota.
2. Be a leader in fisheries research.
3. Improve efficiency and effectiveness of fish management programs.

Objective 1. Develop written communication standards and implement publication expectations by 2018.

Strategy 1.1 Identify and promote training opportunities in research design, statistical analysis, and scientific writing through continuing education courses and workshops.

Strategy 1.2 Create internal on-line educational modules on research topics for staff use.

Strategy 1.3 Encourage publication of at least one peer-reviewed manuscript every two years by each Aquatics Section researcher.

Strategy 1.4 Use the research committee to review and help select proposals for study, and to provide guidance with project design and implementation.

Strategy 1.5 Use internal peer-review to improve research products.

Objective 2. Continue to refine protocol for research development annually.

Strategy 2.1 Use formal committee review and prioritization in the selection of both in-house and GFP-sponsored research projects.

Strategy 2.2 Identify, formalize, and document existing research review procedures.

Objective 3. Identify and implement three new avenues to increase internal and external customer knowledge of Aquatics Section research by 2016.

Strategy 3.1 Develop an internet-accessible bibliography with links to documents for fisheries and aquatics research published by Aquatics Section staff within the last 20 years.

Strategy 3.2 Work with GFP Educational Services to develop a procedure to publicize research results and their significance.

Strategy 3.3 Require an Aquatics Section researcher to provide at least one popular presentation of research results each year.

Strategy 3.4 Require at least one professional presentation of research results every two years by each Aquatics Section researcher.

Strategy 3.5 Write popular articles highlighting the benefits of fisheries research for print media or online outlets (Facebook, Twitter).

Strategy 3.6 Utilize the fishing handbook to highlight the benefits of research by providing examples of how such research has improved our ability to manage fisheries and subsequently benefit our customers.

Strategy 3.7 Investigate electronic media as an outlet for dissemination of research products.

Strategy 3.8 Pursue avenues to disseminate research findings through non-peer reviewed literature outlets (i.e. American Fisheries Society grey literature).

Fishing Access

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

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 and county and city municipalities. The GFP Parks Division and Wildlife Division are strong partners on developing, maintaining, and improving fishing access.

Funding sources available for fishing access development, improvement, and maintenance include but are not limited to license dollars, the Sportfish Restoration program, 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.

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. There are no criteria for prioritizing fishing access development on a statewide basis.
3. Short and long term water fluctuations often make it difficult to design fishing access facilities usable under all conditions.
4. Budget planning for proposed projects sometimes do not include enough engineering input on costs and design.
5. GFP budget cycles often conflict with the project development schedules of Federal, municipal, and private partners.
6. Federal funding available for access projects via Sportfish Restoration fluctuates from year to year.

Goals

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

Objective 1. 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.

Strategy 1.1. Determine what additional human dimensions information needs to be included in the inventory.

Strategy 1.2 Work with GIS and human dimension staff to modify the existing access inventory to include additional information.

Strategy 1.3. Identify and add access areas that are not included in the existing inventory.

Strategy 1.4 Include project completion dates, projected usable life of structures, and periodic maintenance schedules in inventory to aid in budgeting and planning

Objective 2. Survey anglers concerning access needs and satisfaction with existing access areas and facilities by January 2016.

Strategy 2.1 Work with human dimension staff to include questions concerning fishing access in statewide angler surveys.

Strategy 2.2 Prepare report on access needs and angler satisfaction with existing access areas and facilities.

Strategy 2.3 Incorporate angler survey data in prioritizing access projects.

Objective 3. Develop access structure designs that remain functional with fluctuating water conditions by December 31, 2014.

Strategy 3.1 Research and identify possible designs.

Strategy 3.2 Identify waters with level fluctuations, and select possible test locations.

Strategy 3.3 Place prototype structures in selected waters.

Strategy 3.4 Evaluate structures during different water elevations.

Strategy 3.5 Refine designs as needed.

Objective 4. Develop a checklist that will need to be submitted during the approval process for access projects by January 2015,

Strategy 4.1 Involve state and consultant engineers in determining check list criteria, including engineering review, site selection, costs, and feasibility.

Strategy 4.2 Create checklist and submit for review by administrative, engineering, and field staff.

Strategy 4.3 Adopt use of final check list in project submission and approval process.

Objective 5. Develop a materials to explain the access development process and project development considerations to staff and cooperators by January 2015.

Strategy 5.1 Identify areas that need further explanation to staff and cooperators.

Strategy 5.2 Involve Department Education and Communication staff in creation of a fact sheet outlining the project submission process.

Strategy 5.2 Complete a project development manual providing detailed information on project development for staff use.

Objective 6. Develop a plan to obtain alternative funding for access projects by January 2018.

Strategy 6.1 Work with partners to identify and procure nontraditional funding sources.

Strategy 6.2 Investigate the feasibility of a stamp for fishing access and habitat projects to help fund and maintain projects.

Habitat Management

High quality habitat is essential for healthy and productive fisheries and aquatic ecosystems. Degraded aquatic habitats, with problems such as low dissolved oxygen levels, extreme temperature fluctuations, high turbidity, undesirable substrate, and a lack of desirable aquatic vegetation make it difficult to provide quality fisheries. Native species management is also negatively affected by poor habitat.

Water Rights

Water rights can apply to surface water, in-stream flow, irrigation, flood control, and aquaculture water supplies. The Department of Game, Fish and Parks currently holds over 450 water rights in South Dakota. The stated beneficial uses of most of these water rights are fish and wildlife propagation and public recreation. With regard to these GFP held water rights, the Division of Wildlife also reviews requests for temporary water rights for such purposes like road construction.

Habitat Loss and Degradation

Wetland habitat loss is a significant problem with a potentially large impact on aquatic systems. Removal of wetlands and the loss of grassland habitats can lead to higher nutrient and sediment loads in rivers, streams, lakes, and impoundments. From 2006 to 2011, there were 451,000 acres of grassland converted to corn or soybean production in South Dakota (Wright and Wimberly 2013). High nutrient and sediment loading results in more frequent summer and winter fish kills, limits aquatic vegetation, and contributes to an aquatic environment favorable to non-game species like black bullhead and common carp.

Shoreline alteration on natural lakes and reservoirs contributes to sedimentation and nutrient loading. The removal of natural vegetation and trees, which limit erosion from wave action negatively impacts fish spawning and rearing habitat. Emergent and submergent shoreline vegetation also provides optimal feeding habitat for ambush predators like northern pike, crappie, and black bass.

Alterations like road crossings and dams can serve as effective barriers to fish migration during spawning. Declines in abundance of a fish species and reduced genetic variability are often a result of these obstacles to fish movement. Paddlefish and sturgeon are examples of species negatively impacted by the construction of dams.

Flow is one of the most important habitat components for fish in rivers and streams. Reductions in stream flows due to drought and water withdrawals for

agricultural and domestic use can influence available fish habitat. Flow is also affected by dams which trap otherwise free-flowing water. Dams also can alter downstream water temperatures.

Aquatic Habitat Programs

There are many programs focused on improving land conservation practices. For example, cooperative cost share programs exist with federal agencies and non-governmental organizations to increase, restore, or maintain aquatic habitats. Wildlife Division private lands biologists help landowners participate these conservation programs. In addition, the Wildlife Division partners with County Conservation Districts, Watershed Unit Coordinators, Water Development Districts, and cities, to implement land conservation and wetland restoration projects that improve water quality. The Wildlife Division is a member of the Glacial Lakes, Great Plains, and Reservoir Fish Habitat Partnerships. Each partnership focuses on a specific habitat type or geographic region and provides limited funds each year for projects within its area. In addition, these partnerships help develop and promote best management practices for maintaining, enhancing, and restoring aquatic habitats.

Large-scale watershed projects often involve many Federal and State agencies, including the Department of Game, Fish and Parks. Other state departments include Environment and Natural Resources, Agriculture, and Transportation. Federal agencies include the Fish and Wildlife Service, Forest Service, Geological Service, and the Natural Resource Conservation Service.

Aquatic habitat projects initiated by the Wildlife Division typically focus on protecting shoreline habitats, removing accumulated sediment from small impoundments, reducing nutrient and sediment inputs to small impoundments, and improving stream habitat. Aquatic habitat and fishing access biologists are responsible for permitting lakeshore modifications on meandered waters, commenting on water right requests and modifications, participating in review of Environmental Protection Agency 319 non-point source pollution project proposals, and providing reviews of construction plans for impacts to fish and wildlife as part of the National Environmental Policy Act (NEPA) process.

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.

Goals

1. Conserve, create, and enhance aquatic habitats to benefit fisheries and non-game aquatic communities in South Dakota.

Objective 1. Develop partnerships with other governmental entities, Non-governmental Organizations, and private citizens to complete six aquatic habitat enhancement projects by December 2015.

Strategy 1.1 Develop a list of groups interested in habitat enhancement.

Strategy 1.2 Actively seek involvement from other governmental agencies, non-governmental organizations, and the general public.

Strategy 1.3 Participate as a cooperating agency in watershed and lake shed conservation projects linked to important fisheries and aquatic resources.

Strategy 1.4 Participate in efforts to develop a plan to reduce the loss of grassland habitats in South Dakota in cooperation with other governmental agencies, non-governmental organizations, and the general public.

Objective 2. Complete ten cost-shared lake shore restoration projects by 2018.

Strategy 2.1 Improve information and education efforts to lakeshore property owners concerning shoreline best management practices.

Strategy 2.2 Identify ten lakeshore landowners willing to participate in cost-share habitat restoration projects.

Objective 3. Develop a comprehensive plan to maintain and enhance aquatic habitats in South Dakota by December 31, 2018.

Strategy 3.1 Identify agency staff and other potentially-affected or potentially-interested Individuals, organizations and governmental agencies.

Strategy 3.2 Assemble a work group including Fisheries staff and other partners. .

Strategy 3.3 Determine responsibilities of work group members and develop a timeline for the stages of plan development.

Strategy 3.4 Distribute draft plan for comments by Division of Wildlife staff and other Potentially-Affected or Potentially-Interested Individuals.

Strategy 3.5 Publish and approve comprehensive aquatic habitat plan.

Objective 4. Develop outreach and education programs to promote the conservation and enhancement of aquatic habitats by December 2016.

Strategy 4.1 Work with communications specialists both within and outside of the Department to identify and develop appropriate, effective, and cost-efficient outreach and educational methods.

Strategy 4.2 Develop programs about aquatic habitat ecology and conservation for use at the Outdoor Campuses, Youth Conservation Camp, Becoming an Outdoorswoman, and Step Outside programs and schools.

Objective 5. Develop a comprehensive database of aquatic habitat enhancement efforts in South Dakota by 2017.

Strategy 5.1 Research and compile a list of completed, in-progress, and attempted aquatic habitat enhancement projects.

Strategy 5.2 Identify the current status and projected life-span of prior enhancement projects.

Strategy 5.3 Incorporate information on aquatic habitat enhancement projects into the Aquatics data management system.

Strategy 5.4 Publicize availability of the database to Department staff and other Potentially-Interested Individuals.

Objective 6. Continually review potential threats to aquatic habitats in order to refine work direction to best utilize aquatic habitat staff.

Strategy 6.1 Review all water right applications to determine potential negative impacts to aquatic habitats, suggest methods to reduce such impacts, and seek mitigation if necessary.

Strategy 6.2 Review proposed public or private projects or practices for potential impacts to aquatic habitats.

Objective 7. Develop additional sources of funding for habitat projects and renovations of small impoundments by December 2018.

Strategy 7.1 Conduct a study to determine the economic impact of fisheries to local and statewide economies.

Strategy 7.2 Identify and investigate potential dedicated funding sources for fish habitat improvement projects.

Strategy 7.3 Pursue grant awards from entities with a primary focus on fisheries or aquatic habitats.

Non-Game Aquatic Species Management

Non-game species compose 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 works collectively with other Wildlife Division staff to address wildlife diversity issues. It uses a proactive approach to sustain native species,, with the intention of preventing the future listings of such species as threatened or endangered.

Maintained by the Wildlife Diversity Program, the South Dakota Natural Heritage Program is a member of NatureServe, an international network of biological inventories operating in all fifty states, Canada, Latin America, and the Caribbean. Natural Heritage Programs collect and manage detailed local information on non-game species and ecosystems. Natural Heritage data is uploaded onto NatureServe, where it can be accessed by various organizations to meet local, national, and global conservation needs.

Research and management efforts for aquatic non-game species are focused on rare species tracked by the Natural Heritage Program and species of greatest conservation need (SGCN; Administrative Rules of South Dakota: 41:10:02 Endangered & Threatened Species; 41:10:03 Species of Management Concern). The South Dakota Comprehensive Wildlife Conservation Plan (SDGFP 2006, *in preparation*), a strategic planning document that defines the state's priorities and serves as a framework to direct cooperative projects, was first accepted by the USFWS in 2006 and is currently under revision. The primary objective of this plan is to avoid future listings of species as endangered or threatened, while addressing conservation issues and management needs. In return for developing the SDCWCP, South Dakota is eligible for State Wildlife Grants. These grants are a federal-match funding source which serve as an important tool in the management of many non-game species, including twenty fish, nine mussels, two turtles, and four aquatic macroinvertebrates listed as SGCN in South Dakota. Species-specific plans have been generated for Topeka Shiner (Figure 11; Shearer 2003) and Pallid Sturgeon (Figure 12; Aron 2006), two federally endangered species present in South Dakota. Topeka Shiners occur in small prairie streams of the Big Sioux, Vermillion, and James River drainages located in the East River management area, while Pallid Sturgeon occur primarily within free flowing river stretches of the Missouri River management area.

Recent projects in non-game fish management include monitoring Topeka Shiner and Pallid Sturgeon populations, determining the status and distribution of listed-SGCN turtles (Figure 13), determining the status and distribution of Mountain Sucker in the Black Hills (Figure 14), conducting surveys on glacial relict fishes in the headwater streams of South Dakota's sandhills region (Figure 15), and assessing the effects of the James River Conservation Reserve Enhancement Program (CREP) on aquatic habitats and species assemblages. The current revision of the SDCWCP will include a more detailed aquatics component than the 2006 version. It will also identify aquatic conservation opportunity areas (SDGFP, *in preparation*).

Figure 11. Breeding male Topeka Shiner collected during 2012 Topeka Shiner monitoring at Peg Munky Run, Deuel County.



Figure 12. Pallid Sturgeon collected by the Game, Fish and Parks' Pallid Sturgeon population monitoring team from the Missouri River below Gavin's Point Dam.



Figure 13. False Map Turtle collected by Game, Fish and Parks' Pallid Sturgeon population monitoring team from the Missouri River below Gavin's Point Dam.



Figure 14. Breeding Mountain Sucker collected during Black Hills stream surveys.



Figure 15. Breeding male Northern Redbelly Dace, one of the targeted species of the glacial relict fishes project.



The Wildlife Diversity Program also 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* to share information on current and historic species presence in South Dakota with fisheries staff and the public.

Management Issues

1. A lack of basic 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. 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. Non-game species need to be considered in future land management decisions. Specific issues related to habitat alterations and degradation is described in the Habitat Management Section of this plan.
3. 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.
4. Less emphasis and prioritization has been placed on the management of non-game species than game species in South Dakota.
5. 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.
6. 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.
7. There is little public interest in non-game aquatic species and information and education efforts are lacking.

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 necessary for effective non-game management.

Goals

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

Objective 1. Annually review, revise, and determine status of rare species with an emphasis on SGCN.

Strategy 1.1 Develop a standardized process for listing and updating non-game species status, with an emphasis on SGCN.

Strategy 1.2 Follow the strategies identified within the SDCWCP to meet the goals and objectives for SGCN.

Objective 2. 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.

Strategy 2.1 Support research and monitoring projects providing data for the development of survey programs.

Strategy 2.2. Identify and list existing survey programs.

Strategy 2.3 Identify and involve staff and other individuals that may be affected by standardized survey programs in survey development.

Strategy 2.4 Define standardized survey programs and require their use.

Objective 3. Continually work to increase non-game species management coordination, facilitate more effective conservation planning, and increase plan implementation for non-game species among natural resource agencies, public land management agencies, and other partners.

Strategy 3.1 Identify all potentially-affected and potentially-interested individuals, organizations, and governmental agencies.

Strategy 3.2 Develop a non-game management committee to identify and prioritize research and information needs for non-game species.

Strategy 3.2 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.

Strategy 3.3 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.

Strategy 3.4 Work collaboratively with state and federal agencies and non-governmental conservation partners to implement non-game projects and improve management efforts..

Objective 4. Annually investigate alternative funding sources for non-game management efforts.

Strategy 4.1 Brainstorm possible alternative funding sources.

Strategy 4.2 Research and identify private grant opportunities and novel federal funding sources (i.e. Climate change grants, Landscape Conservation Cooperatives, NatureServe, Nature Conservancy).

Strategy 4.3 Apply for funds from identified alternative sources.

Objective 5. Develop an outreach plan to increase public understanding, support, and participation in non-game management activities by December 31, 2015.

- Strategy 5.1 Identify opportunities to promote non-game management and habitat conservation.
- Strategy 5.2 Implement activities that showcase Wildlife Diversity Program projects and activities.
- Strategy 5.3 Advertise the SDCWCP interactive website which details South Dakota Features, Drivers of Change, SGCN, and Conservation Opportunities.
- Strategy 5.4 Coordinate with aquatic education and outdoor campus staff to develop age-appropriate non-game aquatic education programming.

Fish Production and Stocking

Fish stocking is an important fisheries management tool for introducing new species to lakes and streams, 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, national fish hatcheries, and fisheries staff all play an important role in meeting South Dakota's fish production needs. Hatchery production programming is scheduled to meet stocking needs identified at the regional level, but overall requests for hatchery products must be within the statewide production capabilities of the hatchery system.

Purposes for stocking fish vary from providing a "put and take" fishery in an urban pond to re-establishing fish populations after a winterkill situation. The size of hatchery fish stocked varies accordingly to management needs. Products like 9-11 inch "catchable" rainbow and brown trout are often stocked into "put-and-take" situations, 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. It depends on the species and size of fish requested by fisheries managers, as well as the timing of stocking.

Egg Collection Efforts

Spring egg collection from wild fish populations represents a major annual undertaking for fisheries crews, with eggs from species such as walleye, northern pike, and yellow perch collected from sources across South Dakota for culture at Blue Dog Lake State Fish Hatchery (SFH). Eggs are also provided to other

Federal hatcheries or state hatcheries outside of South Dakota for rearing and stocking, or in exchange for other fish species.

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 enhance fisheries in heavily-used urban waters.

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

Partnerships

National fish hatcheries (NFH) 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. DC Booth National Historic Fish Hatchery rearing units are also used for trout production.

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

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.

Goals

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 ANS and fish pathogens during hatchery rearing, stocking, and trap and transfer operations.
3. Be a leader in hatchery-based research and innovation.
4. Nurture and sustain highly motivated and productive hatchery staff.

Objective 1. Incorporate the fish stocking database into the statewide fisheries database, and develop a system of remote stocking data entry using portable devices by 2016.

Strategy 1.1 Work with BIT and software developers to include fish stocking records in a statewide fisheries data base.

Strategy 1.2 Schedule regular training on data entry and the use of portable data entry devices for all fisheries staff.

Objective 2. Include stocking strategies and stocking justifications for individual waters in water-specific management plans by 2016.

Strategy 2.1 Work with Regional Fisheries Managers to incorporate stocking plans and justifications into water-specific management plans.

Strategy 2.2 Develop criteria for the use of cultured fish as fisheries management tools, considering warm, cool, and cold water habitats, angler satisfaction, fish availability, and angler use and preferences.

Objective 3. 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.

Strategy 3.1 Develop uniform fish health and aquatic nuisance species sampling procedures for hatchery and trap-and-transfer operations in conjunction with fish health and AIS staff.

Strategy 3.2 Review and modify hatchery fish health inspection needs and procedures based on recommendations from the statewide fish health plan.

Strategy 3.3 Review, assess, and modify as needed, existing HACCP plans and gear handling procedures.

Strategy 3.4 Train staff in preventing the spread of AIS and fish pathogens.

Strategy 3.5 Investigate alternatives to trap and transfer operations.

Objective 4. Assess long term needs for the use of cultured fish to meet fisheries management objectives by 2018.

Strategy 4.1 Compile information on current fish production levels and current stocking requests.

Strategy 4.2 In conjunction with management staff, develop likely scenarios for future fish production needs.

Strategy 4.3 Investigate novel techniques to increase hatchery production if management needs exceed production capabilities.

Objective 5. Increase both internal and external awareness of the benefits, capabilities, and limitations of the state hatchery system and stocked fish by 2018.

Strategy 5.1 Identify pertinent information and develop criteria for standardized hatchery annual reports.

Strategy 5.2 Schedule regular interactions among hatchery managers, as well as among all state hatchery staff.

Strategy 5.3 Disseminate hatchery production and research information through presentations at scientific meetings, fisheries meetings, regional meetings, and popular venues.

Strategy 5.4 Include hatchery production reports on hatchery websites.

Strategy 5.5 Brainstorm, compile, and enact methods to improve communication among hatchery staff, as well as information

exchange among hatchery, research, and management staff.

Strategy 5.6 Explore opportunities with communications professionals both within and outside of GFP to expand outreach.

Objective 6. Improve hatchery staff knowledge of recent advancements in aquaculture science by 2018.

Strategy 6.1 Schedule regular interactions among hatchery managers, as well as all state hatchery staff, to discuss recent innovations and research.

Strategy 6.2 Disseminate hatchery research information through in-hatchery presentations and presentations at fisheries meetings.

Strategy 6.3 Compile a listing of formal and informal aquaculture continuing education courses for distribution to hatchery staff.

Strategy 6.4 Encourage hatchery staff to collaborate with fisheries research and management staff on post-stocking evaluations.

Objective 7. Identify long term hatchery infrastructure and maintenance needs, set priorities, and develop a hatchery infrastructure needs plan by December, 2018.

Strategy 7.1 In conjunction with engineering, compile information on the current status and condition of hatchery infrastructure.

Strategy 7.2 Develop a system to track maintenance, repair, and replacement costs of hatchery infrastructure.

Objective 8. Establish a process to prioritize and coordinate hatchery research to increase rearing efficiencies, production capabilities, post-stocking survival, and angler satisfaction by 2018.

Strategy 8.1 Produce criteria to guide the development and prioritization of hatchery-based research projects.

Strategy 8.2 Collaborate with fisheries research and management staff on post-stocking evaluations.

Strategy 8.3 Undertake research projects to improve hatchery rearing efficiencies.

Bait and Private Aquaculture

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, with over 75% of the approximately 170,000 gallons of baitfish netted in South Dakota exported to other states (Ward 2008). In 2007, baitfish were harvested from waters in 25 different counties, with the greatest harvest occurring in Day County (Ward 2008). Fathead minnows comprised 99.7% of the harvest, with much smaller numbers of white suckers, creek chubs, and golden shiners also collected. Bait dealers also import over 20,000 gallons of baitfish each year.

The number of commercial baitfish licenses issued fluctuates yearly. In 2012, 172 resident retail, 22 resident wholesale, 11 export, 7 non-resident retail, and 3 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 13 private aquaculture and 7 fee fishing licenses were issued in 2012. Private aquaculture facilities vary from totally enclosed recirculating systems for producing tilapia, to fish rearing in natural waters. Fish are reared for human consumption, for sale to private landowners, and for export to other states or countries.

The demand for cultured baitfish has recently increased because regulations in some states require that baitfish be farm-raised due to fish health and aquatic invasive species concerns. Another factor driving increased bait production is the use of fathead minnows and white suckers as feed for game fish. One role of GFP in bait production is to license commercial aquaculture facilities. A requirement under the license is an annual inspection to grant approval for the importation of aquatic species and their reproductive products. The regulations

are used to help protect wild fish populations, as well as limit the spread of fish pathogens and aquatic nuisance 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 aquatic nuisance species concerns led to increased fish health testing requirements for fish. Some states have either eliminated, or are working towards eliminating, the importation of bait fish or any fish that will be released within state waters. Historically, fish health inspections and importation regulations for South Dakota were focused on private and state salmonid facilities in the Black Hills. Recently, increased emphasis on fish health has expanded to include cool and warm water hatcheries, natural rearing ponds, and baitfish production across the entire state.

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.

Goals

1. To protect and enhance 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 within South Dakota.

Objective 1. Develop and uniformly apply regulations for all public and private fish hatcheries within South Dakota by 2018.

Strategy 1.1 Review regulations for public and private hatcheries.

Strategy 1.2 Review regulations and inspection requirements from other states.

Strategy 1.3 Meet with regulators from other states to help make regulations as uniform as possible across state lines.

Strategy 1.4 Develop a work group to conduct meetings with Aquatics Section hatchery personnel and administrators.

Strategy 1.5 Identify potentially affected individuals

Strategy 1.6 Conduct meetings with the aquaculture industry, other potentially affected individuals, and other entities to gather input.

Strategy 1.7 Develop and circulate draft regulations to all potentially affected individuals and interested parties.

Strategy 1.8 Create a clear and easily understandable definition of the various private aquaculture operations.

Objective 2. Develop a course and/or materials to train staff conducting Aquaculture facilities and waters inspections by 2018

Strategy 2.1 Define the objectives and purposes of required hatchery inspections.

Strategy 2.2 Develop criteria needed to become an approved aquaculture inspector.

Strategy 2.3 Solicit input from the private aquaculture industry.

Objective 3. Develop specific and measurable criteria to be used during a hatchery inspection by 2018.

Strategy 3.1 Determine the purpose and objective of the required hatchery inspection.

Strategy 3.2 Involve wild bait harvesters, bait wholesalers, and commercial aquaculturists during plan development by in-person meetings, conference calls, open houses, and other appropriate methods.

Strategy 3.3 Develop specific criteria that must be met to pass a hatchery inspection.

Objective 4. Create a usable and easily accessible database to store information from bait and commercial aquaculture operations reports by 2018.

Strategy 4.1 Continue to compile annual report data from bait and commercial aquaculture operations.

Strategy 4.2 Revise annual reporting requirements to include only the data necessary to protect aquatic resources and effectively regulate the industries.

Strategy 4.3 Create a revised annual reporting form to facilitate data input.

Strategy 4.4 Work with BIT as needed to create a database.

Strategy 4.5 Develop a method for bait and commercial aquaculture to enter requested data on-line.

Objective 5. Develop a Bait and Private Aquaculture management plan by 2018.

Strategy 5.1 Identify potentially-affected individuals.

Strategy 5.2 Solicit input from licensed bait dealers, private aquaculturists, industry representatives, and other potentially affected individuals during plan development.

Strategy 5.3 Research similar plans from other states or regulatory agencies..

Strategy 5.4 Create a Bait and Private Aquaculture Management Plan working group consisting of pertinent GFP staff to guide development of the plan.

Strategy 5.5 Consult with academics and aquaculture professionals, the State Fish Health Coordinator, the Aquatic Nuisance Species (ANS) Coordinator, and other agencies such as the Departments of Agriculture, Environment and Natural Resources, and the US Fish and Wildlife Service, when developing the plan.

Strategy 5.6 Use the resources of Professional Societies, such as the World Aquaculture Society and American Fisheries Society, and other organizations and agencies, during plan development.

Objective 6. Ensure that private aquaculture and bait regulations comply with AIS and fish health regulations by 2018.

Strategy 6.1 Review the statewide fish health and ANS plans (after revision) to ensure consistency between plans.

Strategy 6.2 Work with the AIS Biologist, Fish Health Coordinator, and with research partners to conduct a survey of bait purchase by retail bait dealers to determine if there are potential problems with ANS and fish pathogens.

Strategy 6.3 Propose new regulations for consideration by GFP commission.

Objective 7. Develop a process for standardizing importation requirements among states and Canadian provinces by 2018.

Strategy 7.1 Attempt to meet with government entities in states and provinces involved with the exportation and importation of South Dakota bait to work towards regulation uniformity.

Strategy 7.2 Use the resources of the World Aquaculture Society, the American Fisheries Society Fish Health and Fish Administration Sections as well as aquaculture experts to develop sound importation and exportation policies.

Strategy 7.3 Publish a synopsis of various state and provincial bait and aquaculture regulations in Fisheries or the World Aquaculture Magazine.

Aquatic Invasive Species Management

The rate of aquatic nuisance species introductions in South Dakota has increased over time due to improved transportation via water, increased regional and global trade, and economic development. . Aquatic invasive species can be transported in shipments of live fish and plants, through existing waterways where AIS are present, on watercraft and recreational equipment, and even in water left in construction water tanks during job site changes.

The ecological, social, and economic impacts of AIS on fisheries and aquatic resources are difficult to quantify but can be substantial. Some AIS, such as bighead and silver carp, are able to filter and consume nearly all of the plankton in a body of water, leaving few nutrients available for desirable juvenile fish. Waters that are generally nutrient poor, such as the Missouri River reservoirs, could be greatly impacted by these species. Dense stands of invasive plants, such as curly pondweed and Eurasian water-milfoil, can effectively eliminate fishing opportunities by either physically restricting the use of fishing tackle, or by causing fish kills due to large-scale plant decomposition. Many of the smaller, shallower waters throughout South Dakota are susceptible to aquatic invasive plant infestation. Zebra and quagga mussels have been found to completely clog municipal water and hydrologic power intakes, necessitating extensive and costly cleaning and repairs.

Aquatic invasive fish currently found in South Dakota include bighead carp, silver carp, grass carp, common carp, European Rudd, and Western Mosquitofish. South Dakota is also home to AIS plants, including brittle naiad, curly pondweed, Eurasian water-milfoil, purple loosestrife, and flowering rush. Invertebrate AIS, such as rusty crayfish, Asian clam, and red rimmed melania, can also be found in South Dakota.

Many of the AIS impacts found in other areas of the country have not been observed in South Dakota because the invasions are relative recent and research has been limited. Studies on the ecological effects of common carp, Asian carp and didymo have been completed. However, no studies examining the economic or social impacts of AIS in South Dakota have been initiated.

Aquatic nuisance species management in South Dakota is guided by the South Dakota Aquatic Nuisance Species Management Plan (Burgess and Bertrand 2008), which outlines specific AIS management goals, objectives, and strategies. Completion of this plan was a prerequisite to obtaining available federal funds for AIS management efforts.

Management Issues

1. The threat of new AIS introductions to South Dakota (interstate transfer) is high because of encroachment of AIS in neighboring states (eg. 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.

Goals

1. Prevent the introduction of new aquatic invasive species to South Dakota.
2. Control or eradicate AIS already present in the state.

Objective 1. Update the Aquatic Invasive Species Management Plan by 2014.

Strategy 1.1 Coordinate annual meetings of the Aquatic Invasive Species Committee.

Strategy 1.2 Incorporate species specific risk assessments into the management plan.

Strategy 1.3 Develop and integrate rapid response protocols into the plan.

Objective 2. Develop and implement an outreach and marketing program by 2016.

Strategy 2.1 Annually publish AIS information in the SD Fishing Handbook.

Strategy 2.2 Annually make > 6,000 contacts with anglers and recreational boaters.

Strategy 2.3 Continue working with professional marketing agencies on outreach and marketing.

Objective 3. Monitor for AIS every public water body in SD actively managed as a fishery a minimum of once every three years.

Strategy 3.1 Re-evaluate risk designations every three years or as needed in cases of new infestations.

Strategy 3.2 Monitor high risk waters annually, moderate risk waters biennially, and low risk waters triennially.

Strategy 3.3 Define and standardize monitoring protocols.

Objective 4. Annually review and recommend necessary changes to Aquatic Invasive Species regulations.

Strategy 4.1 Follow Aquatics Section rule protocols and timelines to allow for staff evaluation of recommendations

Strategy 4.2 Seek input and evaluate support for existing rules and new recommendations from AIS Committee, angler groups, and the general public.

Fish Health and Contaminants

Fish Health Management

The GFP fish health management program is an integral part of protecting fish populations in the state. Intra-state movement of fish by the Department and private operators, as well as interstate trade, could be dramatically impacted by the introduction of new fish pathogens.

Current fish health rules regulate fish importation by requiring importation permits, annual fish health inspections at aquaculture facilities, and inspection of new waters or facilities intended for use by private aquaculture. Private veterinarians throughout South Dakota are hired by private aquaculturists to conduct sampling for fish parasites and pathogens at facilities to meet annual inspection requirements.

The Wildlife Division is currently working with labs inside and outside of the state to meet the testing needs of both state and private aquaculture facilities. With fish health concerns growing at the same rapid pace as the growth of commercial aquaculture, it is important for South Dakota to have a fish health management plan in place directing regulatory actions.

Fish Flesh Contaminants

The South Dakota Departments of Health (DOH), Environment and Natural Resources (DNR), and Game, Fish and Parks cooperate to test fish for metals, pesticides, and polychlorinated biphenyls (PCBs). Since 1993, 145 of South Dakota's most popular fishing waters have been tested. Testing has revealed that 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 15 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. However, the Environmental Protection Agency (EPA) uses 0.5 ppm as the concentration threshold for advisories. It is possible that South Dakota may need to adopt a lower standard, which would place many additional waters on the mercury advisory list.

The purpose of fish consumption advisories is not to discourage the public from eating fish. They are intended 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.

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 conducting 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.

Goals

1. Insure healthy fish populations by preventing the introduction and spread of fish pathogens of concern in South Dakota.
2. Inform the public about fish flesh contaminate risks while promoting the healthy consumption of fish harvested from South Dakota waters.

Objective 1. 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.

Strategy 1.1 Create a working group to develop the comprehensive fish health management plan.

Strategy 1.2 Identify potentially affected individuals.

Strategy 1.3 Create and implement standard fish health sampling protocols for public hatcheries, private hatcheries, and non-hatchery fish that may be moved within South Dakota.

Strategy 1.4 Create and implement GFP policies on fish health for trap and transfer and the use of natural rearing ponds.

Strategy 1.5 Seek involvement from potentially affected individuals in the development of the fish health plan.

Strategy 1.6 Develop methodologies for documenting and investigating fish kills, in cooperation with DENR, to track probable causes and fish losses.

Objective 2. Develop criteria for fish health regulations that are consistent and uniformly applied by 2016.

Strategy 2.1 Use the approved fish health plan to guide the development of regulations.

Strategy 2.2 Incorporate potentially-affected individuals in the development of revised regulations through the use of invited meetings, open houses, and presentations at commercial aquaculture meetings.

Strategy 2.3 Work with other state and the federal government agencies (USDA, USFWS, NAAHP) to develop sampling protocols and import/export regulations.

Objective 3. 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.

Strategy 3.1 Hold regular meetings with private growers to facilitate communication.

Strategy 3.2 Prepare a handbook of fish health and private hatchery regulations for private growers.

Strategy 3.3 Increase staff knowledge of fish parasites and signs of fish disease and pathogens.

Strategy 3.4 Submit an article about fish health issues for the Department Newsletter.

Strategy 3.5 Develop an information packet including state approved laboratory facilities, veterinarian contacts, and USDA APHIS contacts for distribution to growers

Objective 4. Annually review and evaluate current fish flesh contaminant monitoring and reporting protocols to ensure current requirements for South Dakota are met.

Strategy 4.1 Work with DOH and DENR to develop a plan to incorporate potential changes in mercury concentration thresholds for advisories into South Dakota's monitoring and advisory program.

Strategy 4.2 Continue to partner with DENR and DOH to sample fish flesh for contaminants from a minimum of 10 public water bodies annually.

Strategy 4.3 Improve outreach efforts at sharing information on fish flesh contaminants and fish consumption to help the public make informed decisions on which fish, and how much fish, to consume.

Support Programs for Fisheries Management

Management efforts of the fisheries management and aquatic resources program rely heavily on partnerships with other programs in the Wildlife Division. While partnerships exist with all programs within the Division, three programs stand out as essential to meeting the goals and objectives of fisheries and aquatic resources management. These programs are Communications, Human Dimensions, Law Enforcement, Terrestrial Resources, and the state Division of Parks and Recreation.

Communications

The Wildlife Division's Communications program is an important partner in information exchange and outreach efforts. Major areas where staff partner include information dissemination, gathering public input as a part of the regulation process, increasing angler recruitment and retention, and developing environmental stewardship in the general public.

Information Exchange

Presentations and newspaper and magazine articles have traditionally been used to share information with the public. Technological advances in social media have resulted in an increase of available communication tools. Using the department webpage, Facebook page, and other social media will help reach a younger audience that may not use more traditional media. The annual fishing handbook is also a cooperative project between communications and fisheries and aquatics staff.

Recruitment/Retention of Anglers

Research indicates 90% of adult South Dakota residents have had some experience with and/or have tried fishing (Giglotti 2002). Additionally, 54% of these adult residents are considered active anglers (fished in the past 2 years), 37% are considered inactive (fished in the past, but not the last 2 years) and 10% have never fished (Giglotti 2002).

Because fishing participation has declined slightly in the last 10 years, it is important to consider strategies to retain anglers. It is also important to be cognizant of the current and future impacts of societal and cultural factors that influence fishing participation. Communications staff are active in the implementation of efforts to increase angler recruitment and retention. Lapsed angler marketing campaigns are one tool that has been used to address retention issues.

Development of Environmental Stewardship

The Outdoor Campuses are managed by the Communications program. They are important tools for developing environmental stewardship. A decreased connection of people to land and water has many negative implications for fish and wildlife, as well as society as a whole. Water quality, wetlands, flood plain connectivity, and other related issues are lost to those who have no connection to the environment. Without the stewardship acquired through this environmental connection, issues associated with human-nature interactions such as flooding, ground water depletion, and movement of aquatic nuisance species will likely continue. Outdoor campuses enhance educational opportunities, helping to broaden the environmental knowledge base. Partnering with Communications staff on outreach activities, such as the State Fair, kids fishing events, and classes at Outdoor Campuses, will help develop stewardship.

Human Dimensions

While the Communications program plays an important role in information exchange with the public, the Human Dimensions program helps plan public involvement efforts and conduct surveys aimed at determining who our publics are and how we can better meet their needs. Acting as stewards of a public trust resource, GFP manages fisheries and aquatic resources for the benefit of the citizens of South Dakota and its visitors. The role of human dimensions is to understand how the public would like to manage their fisheries and aquatic resources.

Public involvement plays a critical role in answering the question *are we doing the right things* by providing information regarding the relative importance assigned to the value choices underlying decisions. Involving the public can not only result in decisions responsive to public values but also help to resolve conflicts, build trust, and inform the public about fisheries and aquatic resources management in South Dakota. There is no one-size-fits-all public involvement program. When designing public participation strategies it is vital to clarify the objectives, since participation is best understood as a continuum. Four major objectives along this continuum include: 1) to inform the public; 2) to listen to the public; 3) to engage in problem solving; and 4) to develop agreements (Creighton 2005). The objectives for public participation will drive the selection of which type of participation techniques are best for interacting with the public.

Human dimensions staff conduct surveys of angler use and harvest, as well as collect timely information on important management issues. Survey objectives should be clarified at the outset of the study design process, since the objectives

and theoretical foundation will help to determine the appropriate methodologies used in collecting needed information.

Law Enforcement

The Wildlife Division's Law Enforcement program is an important partner for regulation enforcement, dissemination of information, and improving public safety for anglers and boaters. Law enforcement efforts are an essential part of ensuring compliance for a regulation to be effective. Enforcement staff contacts also serve as an important tool for disseminating fisheries status and regulation information. Input from law staff on common fishing violations and fisheries regulation enforcement issues is also important in the regulation development process.

Law staff input is used to gauge the suitability of potential regulations both from a compliance, and an enforcement, point of view. Moreover, a rule must be written to be enforceable by law staff and easily understood by the public. Local Conservation Officers are often involved in community fishing events and boating and water safety programs. As the point of contact and the local face of the department, their involvement improves public relations, recruitment and retention of anglers, and the development of resource stewardship.

Information on shoreline alterations and water right violations is often observed first-hand by Conservation Officers, or is reported to them by the public. Officers partner with aquatics habitat staff and Regional Fisheries Program managers to address these violations.

Terrestrial Resources

Terrestrial Resources staff in the land and wildlife management programs are important partners for addressing aquatic habitat and fishing access issues. Habitat improvements on upland and riparian areas have a direct effect on water quality and aquatic habitats by reducing nutrient and sediment contributions to aquatic systems. The Wildlife Division employs biologists focusing on habitat improvements on private land including the development of wetlands and landowner assistance in implementing state and federal conservation programs. In addition to Division employees, the Wildlife Division helps support private land biologist positions with several non-governmental organization which also contributes to implementation of conservation programs. Some State Game Production Areas also support important fisheries resources and land and fisheries staff often partner on access development on these areas, providing access for both hunters and anglers.

Division of Parks and Recreation

The Division of Parks and Recreation is the Wildlife Division's principal partner in creation and maintenance of fishing access throughout the state. Parks staff conduct much of the maintenance of fishing access areas and associated facilities and oversee fishing access projects included in the water-based budget of the department. In addition to access work, many state parks host children's or family fishing or outdoors events, serve as the locations for fishing tournaments, and provide anglers with a place to camp while on a fishing trip. Parks naturalist programs help connect the public with the outdoors and contribute to the development of environmental stewardship.

Statewide Fisheries Performance Measures

Statewide recreational fisheries performance measures are based on information annually gathered in the Statewide Angler Survey. While these performance metrics do not encompass all aspects of the fisheries and aquatics program, they do serve as a good check for how GFP is doing statewide on meeting the needs of the angling public.

Table 2 provides estimates of days fished and fish harvested, by species, for the four years for which statewide angler surveys have been conducted. Percentages of anglers satisfied with their fishing trip, for the four years for which a statewide angler survey has been conducted, appear in Table 3.

Table 2. Days of fishing and harvest of selected fish species for residents and nonresidents from statewide angler surveys (Gigliotti 2000, 2004, 2006, 2011, Gigliotti and Henderson 2012).

Year	Resident	Nonresident	Combined
Fishing Days			
1999	2,205,480	299,605	2,505,085
2003	2,541,239	372,410	2,913,649
2006	1,886,390	345,833	2,232,223
2010	2,313,196	381,144	2,694,340
2011	1,941,322	390,018	2,331,340
Harvest			
Walleye/sauger			
1999	1,660,232	430,653	2,090,885
2003	1,421,747	456,329	1,878,076
2006	1,274,516	382,922	1,657,438
2010	1,059,459	308,653	1,368,112
2011	1,372,284	401,681	1,773,965
Northern Pike			
1999	253,667	38,417	292,084
2003	135,885	41,037	176,922
2006	130,460	23,522	153,983
2010	82,845	14,349	97,194
2011	178,836	38,777	217,613
Trout			
1999	264,467	44,679	309,146
2003	233,790	40,382	274,172
2006	180,722	35,922	216,694
2010	117,876	21,666	139,542
2011	106,073	32,375	138,448
Yellow Perch			
1999	1,940,912	201,180	2,142,092
2003	1,593,923	288,897	1,882,820
2006	944,237	175,959	1,120,196
2010	779,062	75,699	854,761
2011	936,189	142,134	1,078,323

Table 3 Percentages of total angler days and anglers satisfied with their fishing trip, considering all factors, from statewide angler surveys (Gigliotti 2000, 2004, 2006, 2010, Gigliotti and Henderson 2012).

Year	Percentage of angler days		Percentage satisfied		
	Resident	Nonresident	Resident	Nonresident	Combined
1999	88	12	73	74	73
2003	87	13	65	69	65
2006	85	15	60	75	62
2010	86	14	62	72	63
2011	83	17	69	82	71

Performance Measures from Annual Statewide Surveys

1. Over a 5-year period, have an average of 70 percent of anglers surveyed during the annual statewide angler survey indicate satisfaction with their fishing during the past year.
2. Have the 5-year average of fishing licenses sold exceed 200,000 per year.
3. Have the 5-year average for estimated angler days from the statewide angler survey equal or exceed 2.7 million days.
4. Have the 5-year average of the percentage of anglers satisfied with available fishing access at 80%.

Fish Harvest Regulations

Regulations are a management tool used to meet management objectives for fisheries, but they are not a separate program in the Fisheries and Aquatics Resources plan. Information gathered through surveys and research, in coordination with supporting programs, is used in regulation recommendation development and evaluation.

The Game, Fish and Parks Commission was given authority by the South Dakota Legislature to promulgate rules (regulations) governing the use of fish, wildlife, and associated activities. While most regulations related to fishing are promulgated by the Commission, some regulations are State law.

The Wildlife Division makes recommendations to the GFP Commission for new rules, and changes to existing rules, which govern various aspects of public fishing and the use of aquatic species. This includes, but is not limited to, licensing requirements, fishing seasons, fishing methods, harvest restrictions, taking of bait, fish importation, and regulation of private aquaculture.

Justification for harvest regulations is based on the interpretation of fish population data, angler survey data, and public input. Another rationale for creating regulations may be to improve the regulatory process for commercial licenses and permits or to address specific resource management issues.

Statewide regulations exist for possession of fish and bait. Water-specific or regional regulations involving size restrictions or unique daily harvest limits are employed to achieve specific fisheries objectives. Regulation frameworks or “toolboxes” have been designed to provide a suite of black bass (Blackwell and Lucchesi 2009) and walleye (Lucchesi and Blackwell 2009) regulations intended to meet specific management objectives. Options used to regulate trout harvest in the Black Hills were developed using results from a 1994-1995 survey of Black Hills anglers (Erickson and Galinat 2005).

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