

Fisheries and Aquatic Resources Adaptive Management System



2019-2023

Northeast Fisheries Management Area

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



Formally adopted by GFP Commission: March 1, 2019



Department Mission

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

Department Vision

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

Division of Wildlife Mission

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

Our Motto *"Serving People, Managing Wildlife"*



Introduction

The purpose of this strategic plan is to guide fisheries management based on the missions of the South Dakota Department of Game, Fish and Parks (GFP) and the Division of Wildlife. This plan is a dynamic tool addressing the issues, challenges, and opportunities in managing the Northeast Fisheries Management Area (NEFMA). The components of this plan include an **Inventory** Section, which describes the resources present in this management area, and reviews both historical and current management activities. This section is subdivided into three categories: **Habitat, Fish, and People**. Following the Inventory Section is the **Issues** Section, listing the current issues involving fisheries for this management area. Lastly, measurable and time-bound **Objectives**, along with specific **Strategies**, are listed. Progress in meeting these objectives will be evaluated prior to developing subsequent plans.

The NEFMA comprises the area east of the Missouri River to the Minnesota border and north of Sully, Hyde, Hand, Beadle, Kingsbury and Brookings Counties to the North Dakota border. More than 150,000 surface acres of lentic water are actively managed for sport fish. These managed waters combined with thousands of additional acres of unmanaged waters provide anglers in northeast South Dakota with a diversity of angling opportunities. Angler use across the NEFMA generates a substantial economic impact to northeast South Dakota.

The NEFMA plan is designed to guide aquatics staff working on fisheries and aquatic resource issues within the NEFMA during 2019 to 2023. Secondly the plan will also provide the public with information on current fisheries management directions and activities. Standard fisheries management tasks (e.g., fish surveys, angler use and harvest surveys, stocking and research) will continue to be part of GFP activities in the NEFMA and will provide support for plan actions.

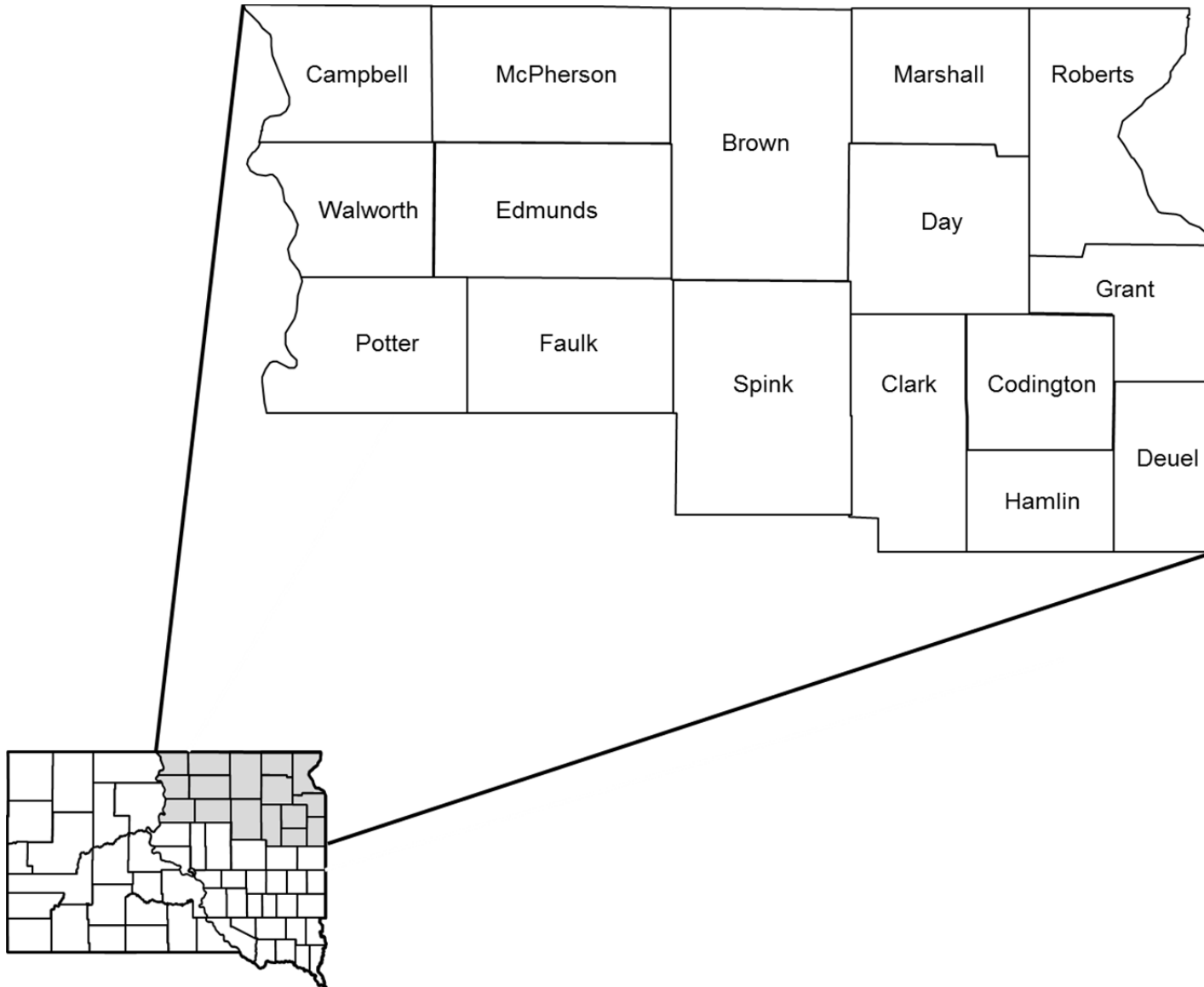


Figure 1. Northeast Fish Management Area.



Inventory

Habitat:

The NEFMA experienced two periods of glaciation, the Illinois Period occurred approximately 400,000 years ago and the Wisconsin Period occurred around 10,000 years ago (Willis et al. 2007). The Prairie Coteau is the most prominent feature within the NEFMA and was formed by materials deposited along a 200-mile stretch east of the James River extending from northern South Dakota to northern Iowa. The Prairie Coteau is characterized as having many lakes and wetlands.

Prairie Coteau lakes were formed by glacial drift and ice. Lakes created over porous substrates generally have stable water levels due to their connection to subsurface aquifers (e.g., Enemy Swim Lake). Lakes created over impermeable substrates are considered closed basins because they lack outlets and there is little connection to aquifers because of the impermeable substrates (e.g., Bitter Lake). Above normal precipitation in the late 1990s and early 2000s filled many of these basins creating highly productive fish habitat. As a result, numerous successful fisheries have been present across the Prairie Coteau for the last 20 years. The amount of fish habitat in the NEFMA is directly related to water levels in these closed basins. Fisheries management (e. g., species) within these basins may change depending on water conditions.

The area west of the Prairie Coteau and extending to Lake Oahe has fewer natural lakes. Manmade impoundments are important sources of fisheries habitat within this region. During periods of above normal precipitation, some of the larger wetlands (e.g., Roscoe) within this region are able to support sport fisheries.

Several drainages are found within the NEFMA. These drainages include: Bois de Sioux River drainage, Minnesota River tributary drainage, Big Sioux River tributary drainage, James River tributary drainage and the Missouri River valley. Historically these drainages served as fish routes for colonization of fishes into the NEFMA. The Bois de Sioux River drainage is found in the far northeast corner of South Dakota. Waters within Bois de Sioux River drainage flow north as part of the Hudson Bay watershed. The remaining drainages are part of the Gulf of Mexico Watershed. Waters within the Minnesota River drainage flow east into the Minnesota River before entering the Mississippi River. Waters in the Big Sioux River drainage, James River drainage, and Missouri River Valley drainage enter the Missouri River before flowing into the Mississippi River.

Lentic waters within the NEFMA have been differentiated by their size (i.e., ≤ 150 acres = small and > 150 acres large) and type (i.e., natural, impoundment and community) with further classifications based on their permanency (i.e., marginal, semi-permanent, permanent). A total of 137 standing waters are actively managed as fisheries by GFP in the NEFMA (Appendix 1). The combined surface acreage of



managed waters in the NEFMA approximates 157,110 acres. Large (>150 acres) natural lakes currently comprise 95.6% of the surface acres of waters managed as fisheries in the NEFMA. Large lakes represent a substantial component of northeast South Dakota fisheries. Lucchesi et al. (2014) indicated that nearly 70% of the large waters in eastern South Dakota occurred in northeast South Dakota. Impoundments are more common in the western half of the NEFMA. More than half of the current community-based fisheries in the NEFMA are located within the Watertown city limits.

Habitat projects:

Habitat structures have been added to select waters in the NEFMA (Appendix 2). At Pickerel Lake and Lake Cochrane plastic structures manufactured by Mossback have been added to waters adjacent to fishing piers. Various habitat structure types have been added to Elm Lake, Richmond Lake, Lake Poinsett and Mina Lake during the last two decades.

Each year several shoreline plantings of native plants are completed to restore shoreline habitat. These plantings are generally a cooperative effort between GFP and the property owner. The plantings that have been completed serve as demonstration plots that hopefully will encourage additional landowners to restore their shorelines to a more natural state.

Habitat degradation has limited trout survival in Gary Creek. Potential habitat improvement projects have been identified and it is anticipated that a plan for implementing habitat improvements will be drafted in the near future.

Fish

Species:

It is believed that only six warm-water fish species persisted in South Dakota during the last glacial period (Blackwell 2007). Following the most recent glacial period, fish were able to move into and across South Dakota through the various river drainages. More recently, high water levels increased connectivity and stocking (authorized and unauthorized) have contributed to the current distribution of fishes throughout South Dakota.

Lakes-

In general, habitat conditions dictate what species can be managed for and waters within the NEFMA are commonly managed for multiple species. Species typically managed for include: black crappie, bluegill, channel catfish, largemouth bass, muskellunge, northern pike, rainbow trout, smallmouth bass, yellow perch, walleye and white bass (Appendix 3).



Natural lakes are primarily managed for walleye, yellow perch, and northern pike. Additionally a limited number of large natural lakes are also managed for black crappie, bluegill, largemouth bass, muskellunge and smallmouth bass.

Impoundments are managed for a variety of species. Black crappie, bluegill, and largemouth bass are the most commonly managed species in impoundments found in the NEFMA.

Community fisheries are often managed for multiple species with adult fish commonly stocked to create a put and take fishery. The species stocked into community fisheries depends on what is available in area lakes for trap and transfer. In recent years, northern pike and white bass have comprised a high percentage of fish stocked into NEFMA community fisheries. Rainbow trout are stocked (spring and fall) into several community fisheries to provide anglers with the opportunity to catch a cold water species.

Streams-

Little management of stream fisheries currently occurs in the NEFMA. Where fisheries occur statewide regulations are enforced. Stream fisheries within the NEFMA are often temporal only occurring in the spring when flows are high and likely are populated with sport fish moving from lakes having stream connections.

Anglers commonly fish the James River and limited angling occurs on the Big Sioux River in the NEFMA. Fish have not been directly stocked into either of these two rivers in more than two decades by GFP. Walleye, northern pike, channel catfish and bullheads are commonly targeted by anglers fishing the James River and the Big Sioux River.

In September 2017, electrofishing was completed at two sites (i.e., Highway 12 and Hitchcock) on the James River within the NEFMA. Species collected included: bigmouth buffalo, channel catfish, common carp, emerald shiner, fathead minnow, flathead catfish, freshwater drum, gizzard shad, grass carp, orangespotted sunfish, red shiner, river carpsucker, shorthead redhorse, shortnose gar and walleye. Silver carp were observed jumping at the Hitchcock site but were not captured.

Gary Creek was previously stocked with rainbow and brown trout providing anglers with an opportunity to catch a cold waters species. Habitat degradation has reduced the ability for fish to survive the winter and stockings have been discontinued. Recent habitat surveys have identified potential habitat improvement projects that could potentially improve trout survival.

Stocking:

Fish stocking is an important management practice in the NEFMA. Fish are stocked to supplement existing populations, introduce a species, reestablish a



fishery following winterkill, or to provide a put and take fishery. Cool and warm water fish comprise the majority of fish stocked within the NEFMA with walleye being the most common species stocked (Appendix 4). Twelve different fish species were stocked in the NEFMA between 2014 and 2018.

Sources of fish for stocking include both state and federal fish hatcheries, natural rearing ponds, and other public waters where adult fish may be collected and transferred to new locations. The size and age of fish stocked depends on management objectives, fish availability, and the fish community in the receiving water.

Limited trap and transfer stocking occurs in the NEFMA. Community-based fisheries have been the primary recipients of trap and transfer operations. However, stockings of pre-spawn adult yellow perch have been made on occasion to introduce or supplement perch populations.

Lake sturgeon reintroduction began in 2014 in Big Stone Lake with the stocking of fingerlings obtained from Genoa National Fish Hatchery, Wisconsin. Annual stockings have been made since 2014 and plans are to continue stocking for up to 20 years. Lake sturgeon have been captured during annual fish community sampling and anglers have caught and released numerous fish.

Fisheries surveys:

Both fish population and angler use and harvest surveys are annually completed within the NEFMA. Fish population surveys are annually completed at approximately 30 waters. Fish populations on some lakes are annually sampled while others are on a rotation of 2 to 5 years. Fish populations are sampled with a variety of gears depending on the species of interest. Gears used to sample fish include experimental gill nets, trap nets and electrofishing.

Since 2016, experimental gill nets have followed the American Fisheries Society gill net recommendation (Bonar et al. 2009). These experimental gill nets consist of eight 10 ft x 6 ft panels of monofilament mesh (0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25, 2.50 in) tied together in a random order. Gill net set locations are randomly selected from grids overlaid onto lake surface area.

The North American standard trap net (50 ft lead, 3 ft depth, 3 x 6 ft frames, 0.50 in mesh; Bonar et al. 2009) was used during 2016 and 2017. However, this net style was abandoned as the statewide standard in 2018 and the previous South Dakota standard trap net (50 ft lead, 3 ft depth, 3 x 5 ft frames, 0.75 in mesh) was reinstated. Similar to gill net placement, trap net placement is random.

In 2018 following the recommendation of Blackwell et al. (2017), smallmouth bass electrofishing was moved to a spring daytime sample. Prior to 2017, smallmouth bass sampling occurred in the spring at night.



Angler use and harvest surveys are annually completed at three to five lakes within the NEFMA. Surveys are roving with two-stage stratification (i.e., day type and time period). Open water surveys are completed during May through August and winter surveys are December through March.

Fisheries research:

Fisheries research has been used to address management issues, to improve the understanding of fish population dynamics and to gain knowledge concerning the user base. Some research projects encompass several years, while others may be completed in a relatively short time. Research may be completed in cooperation with other entities (e.g., South Dakota State University) or may be solely a GFP effort.

Research results are often implemented with management activities and shared with the scientific community through presentations at meetings and through publications (both technical and peer reviewed). Findings are communicated to the public through presentations and articles in various media outlets.

Twenty peer reviewed manuscripts were authored or coauthored by GFP staff in the NEFMA and one staff member completed a Master of Science thesis during 2014-2018 (Appendix 7). Research completed in the NEFMA during 2014-2018 was diverse and will continue to be in future years. Recent research topics have included work on walleye mortality during spawning, assessing walleye recruitment, sampling age-0 and age-1 walleye, smallmouth bass sampling, assessing and reducing western painted turtle mortality in trap nets, North American standard nets, fish age estimation, fish recruitment, yellow perch genetics, yellow perch otolith micro chemistry, assessing fish introductions and fish sampling gear comparisons.

Aquatic Invasive Species (AIS):

Recent new rules and informational campaigns are aimed at preventing or slowing the spread of AIS to waters located within the NEFMA. Unfortunately some AIS species are already present in the NEFMA and the distributions of many species continue to get closer.

Common carp are ubiquitous across the NEFMA and a European rudd population is present in Lake Alice and a single fish was sampled in Mina Lake in the early 1990s. In the James River, silver carp, bighead carp and grass carp are known to occur. Vegetative AIS known to occur in the NEFMA include curlyleaf pondweed (Lakes Alice, Big Stone, Roy and Traverse), flowering rush (Lake Faulkton) and purple loosestrife (Pickerel Lake).

Fish Consumption advisories:

Fish from three to five different waters in the NEFMA are tested each year for various contaminants. The testing is a cooperative effort between GFP, South Dakota Department of Environment and Natural Resources (SDENR) and the South Dakota Department of Health. Consumption advisories are currently in effect



on 13 waters in the NEFMA for elevated mercury levels. Species having consumption advisories include walleye (Elm Lake, Reid Lake, Swan Lake, Long Lake [Codington County], Bitter Lake, Hazeldon Lake, Lake Minnewasta, Lardy Lake, Lynn Lake, Middle Lynn Lake and South Buffalo Lake), northern pike (Bitter Lake and Opitz Lake) and largemouth bass (Lake Hurley).

People

Demographics:

In 2017, approximately 15% (133,079) of South Dakota residents resided in the NEFMA (United States Census Bureau 2018). The most populated communities in the NEFMA are Aberdeen (Brown County) and Watertown (Codington County). Within the NEFMA, 29.4% (39,178) of people live in Brown County and 21.1% (28,099) live in Codington County. Six counties experienced population growth between 2010 and 2017 and 10 counties had population declines; the greatest increases in population growth occurred in Brown and Codington Counties. This mirrors a trend across South Dakota in which population growth has occurred in urban areas and decreased in rural areas.

In addition to South Dakota residents, the NEFMA is a common destination for anglers from surrounding states and beyond. In recent winters, non-resident anglers have comprised $\geq 50\%$ of anglers on many lakes found within the region.

Regulations:

Regulations used to manage fisheries in NEFMA have become more simplified since 2010, when walleye and black bass toolboxes were implemented by GFP. Lake specific fish regulations are annually evaluated making them subject to change. However, the trend in recent years has been simplification of regulations with statewide regulations becoming the standard for most waters. The statewide regulation for muskellunge was changed from a 40-inch minimum length limit to catch and release only in 2018.

An exception to the trend of regulation simplification occurred in July 2018 when the GFP Commission enacted new regulations for Reetz Lake as part of a 1-year access agreement. From May 1st through September 30th, The Reetz Lake daily regulations allow for the harvest of one bluegill ≥ 10 inches, one crappie ≥ 15 inches, one yellow perch ≥ 14 inches and one walleye ≥ 28 inches; all other species are regulated with statewide regulations. Statewide regulations are in effect for all species for the remainder of the year.

In 2019, exceptions to statewide regulations for inland waters in the NEFMA, other than Reetz Lake, include:

15-inch minimum length limit for walleye with a two fish daily limit (Lynn Lake, Middle Lynn Lake and Opitz Lake)



One walleye \geq 28 inches (Horseshoe Lake, Day County)

In 2019, exceptions to statewide regulations for South Dakota-Minnesota border waters include:

Largemouth and Smallmouth Bass (daily limit = 6)

Crappie (daily limit = 10)

Sunfish (daily limit = 10)

Rock bass (daily limit = 20)

Bullhead (daily limit = 100)

Catfish (daily limit = 5 with only one \geq 24 inches)

Angler preferences and satisfaction:

Statewide angler surveys have identified walleye as the most preferred sport fish in South Dakota (Gigliotti 2007, 2014). In general, at least for open water, anglers in the NEFMA target walleyes, but exceptions can and do occur. In the winter, panfish species, generally yellow perch, tend to be the most targeted species. For example, more than 94% of interviewed anglers targeted walleyes during the summer periods of 2007 to 2013 at Bitter Lake; however, during the corresponding winter periods the percentage of anglers targeting walleye ranged from 8.7% to 40.2% (Moos et al. 2014). Yellow perch were not targeted by interviewed anglers at Bitter Lake during the summers of 2007 to 2013, but 17.3% to 78.9% of anglers targeted perch during the corresponding winter periods (Moos et al. 2014). In addition to yellow perch, bluegill and black crappie have been highly targeted species on select waters.

The 2016 South Dakota statewide angler survey found that 60.4% of resident anglers were satisfied with their fishing experience in South Dakota and 64.7% of nonresident anglers were satisfied (Gigliotti 2017). During the last two decades, angler satisfaction in NEFMA has been similar or higher than the level of angler satisfaction identified in the 2016 statewide survey. The recent high angler satisfaction within the NEFMA likely relates to the quality fishing that has resulted following the high precipitation period of the late 1990s and early 2000s. South Dakota angler satisfaction was found to be correlated ($r = 0.67$) with angler ratings of fishing quality in a survey of South Dakota anglers completed during 2011 and 2012 (Henderson and Gigliotti 2015).

Angler access:

In 2017, legislation (HB1001) concerning non-meandered waters set forth rules for angler access to lakes classified as non-meandered. The legislation designated that non-meandered waters are open to fishing if they can be legally accessed and are not marked as closed. However, landowners have the ability to close non-meandered water over their property. To close non-meandered water over private



property a landowner needs to contact GFP and use the appropriate signs and(or) buoys to mark the closed area. Closed areas are viewable on an online map maintained on the GFP website. Landowners can enter into an agreement with GFP to provide public access on non-meandered lakes. A matrix that considers numerous factors including but not limited to, quality of the fishery, access, lake depth and lake size, is used to evaluate each potential fishery. Landowners that enroll in an access agreement can be paid an annual fee by GFP based on the fisheries matrix score. In addition to the annual fee, a bonus payment may be paid to those that enter into long-term agreements. Additionally a group of non-meandered waters where GFP had previously provided access and previously completed fisheries management were classified as Section 8 lakes. Section 8 lakes are open to fishing, but landowners have the ability to petition the GFP Commission and request closure of the portion of a lake that inundates their property.

Shore fishing is available on all of the 137 lakes actively managed in the NEFMA (Appendix 2). However, shore fishing access is generally limited to only a small area adjacent to a boat ramp. Vehicle access to shorelines and site improvements (e.g., mowed area) for shore fishing are more likely to be found on impoundments; few improved shore fishing sites are found on natural lakes. Increasing shore fishing opportunities is frequently identified as a desire by anglers fishing in the NEFMA.

Boat launches are present on the majority of large natural lakes, small impoundments and large impoundments and a dock is frequently present at the launch (Appendix 2). New and expanding waters during the late 1990s and 2000s created the need for additional boat ramps across the region. Continuing to provide boat access at these waters has recently presented challenges as water levels recede.

Fishing piers and hard points are heavily used by anglers at waters where they are present. Most piers occur on large impoundments and community fisheries (Appendix 2). Fish attracting structures have been added to water adjacent to some piers. The number of piers across the region has steadily increased in recent years. Public toilets can be found at approximately one third of the natural lakes, almost half of small impoundments and most large impoundments.

Community fisheries in the NEFMA are most likely to have a nearby park, picnic area, improved fishing site and have Americans with Disabilities Act (ADA) approved access (Appendix 2). Nearly half of the community-based fishing waters in the NEFMA have a fishing pier and an adjacent toilet.



Other management entities:

In the NEFMA, GFP coordinates efforts to establish and evaluate fisheries, create or improve access to various fisheries and establish walleye rearing ponds on lands held by the Sisseton Wahpeton Oyate and the United States Fish and Wildlife Service. The South Dakota Department of Natural Resources (SDDENR) in conjunction with the South Dakota Department of Health, work with GFP to test fish within the NEFMA for various contaminants and to issue fish consumption warnings when necessary. Water quality issues within the NEFMA are handled by the SDDENR. South Dakota-Minnesota border waters are jointly managed with the Minnesota Department of Natural Resources. Staff in the Department of Natural Resource Management at South Dakota State University work closely with GFP staff on research being conducted within the NEFMA and are often queried on technical issues.



Management Issues

1. It is difficult to accurately assess the effects of management actions on fish populations in the face of changing biotic and abiotic conditions.
2. Being able to balance fish population monitoring with management action evaluations and research efforts is difficult.
3. An understanding of bluegill population dynamics is lacking which results in angler expectations not consistently being met.
4. Information on stream and river fisheries is scarce, limiting our understanding of management issues for these fisheries.
5. Poor walleye recruitment, stocking success and growth in aging aquatic environments found in both natural lakes (e.g., Lake Kampeska) and impoundments (e.g., Richmond Lake) prevents management objectives from being met.
6. Limited information on best fish management practices during periods of decreasing water levels reduces the ability to meet management objectives for specific fisheries.
7. Effectiveness of stocking strategies in community-based fisheries in the NEFMA has not been evaluated.
8. Loss of shoreline habitat due to development has the potential to negatively impact aquatic ecosystems.
9. High use of NEFMA waters by anglers and boaters from states with known infestations of aquatic invasive species has increased the likelihood of an unwanted introduction and thus there are potential impacts of exotic plants and animals on area fisheries.
10. Fishing access (boat) and amenities are limited at expanded meandered and non-meandered waters.
11. Shore fishing opportunities are limited at nearly all waters within the NEFMA.
12. Poor communication among staff and between staff and public often results in management inefficiencies and a lack of information transfer.
13. A lack of public awareness, education and outreach concerning issues that potentially impact fisheries can result in limited public understanding and support of management decisions.



14. Limited information exists on angler use and preferences for community-based fisheries within the NEFMA potentially reducing effectiveness of management actions.
15. Decreasing water levels are impacting boat fishing access on several waters (e.g., Antelope Lake).
16. Not knowing which non-meandered waters may be open or closed to public use makes prioritizing management activities and directing the public to waters they can fish difficult.
17. Habitat conditions within Gary Creek potentially are limiting trout survival and preventing it from supporting a fishery.
18. There is a lack of information on the success of muskellunge stockings following the introductory cohorts in Lynn and Middle Lynn Lakes.
19. The past source of muskellunge fingerlings is no longer viable because of AIS concerns; thus a new source of muskellunge for stocking is needed to keep the muskellunge program in place.
20. There is no current information on walleye population genetics, and thus, it is unknown if genetics associated with current stocking practices is having an impact on fish survival.

Goals, Objectives, Strategies

Goal:

Maintain and improve fisheries in the Northeast Fish Management Area to provide anglers with quality fishing experiences.

Objectives and Strategies

1. Objective:

Conduct research projects to more effectively index walleye population status and increase walleye growth in selected waters by 2023.



Strategies:

- a) Evaluate alternative methods (e.g., fall mini-mesh gill nets) to assess walleye recruitment that may be more efficient and (or) feasible than current fall nighttime electrofishing.
- b) Stock and evaluate alternative prey fish species to increase walleye growth in waters where slow growth is an issue and evaluate.

2. Objective:

Evaluate bluegill population dynamics in a minimum of two northeast South Dakota waters to refine or justify current management strategies at meeting fishery objectives by 2023.

Strategies:

- a) Develop bluegill population-dynamics (e.g., size structure and abundance) research projects in lakes (i.e., Enemy Swim and Clear) where bluegill are subjected to high exploitation.
- b) Collect information to determine bluegill length at maturity.
- c) Estimate annual bluegill exploitation.
- d) Model population dynamics to explore possible regulation changes.

3. Objective:

Determine causes of poor recruitment of sport fish and identify possible remedial actions by 2023.



Strategies:

- a) Determine the survival and habitat use of stocked muskellunge fingerlings.
- b) Evaluate success of saugeye stockings in large reservoirs (i.e., Richmond, Mina and Elm).
- c) Quantify genetic makeup of walleyes in eastern South Dakota natural lakes as part of evaluating current stocking practices.

4. Objective:

Develop effective fish stocking strategies for community-based fisheries by 2023.

Strategies:

- a) Conduct angler use and harvest surveys at community-based fisheries to determine angling pressure, angler preferences, catch rates, angler harvest and other metrics.
- b) Determine cost-effective stocking strategies to provide high angler satisfaction.

5. Objective:

Develop a standardized methodology for sampling lotic sport fish communities to gain a better understanding of sport fish populations present by 2023.

Strategies:

- a) Identify river and stream stretches as potential sampling sites.



- b) Develop methodology and sampling schedule for sampling rivers and streams.

6. Objective:

Improve information transfer and education about NEFMA fisheries issues to the public by 2023.

Strategies:

- a) Develop and implement an annual outreach plan and meeting schedule.
- b) Identify information to communicate to the public.
- c) Submit information to communication staff for posting on social media or other outlets.
- d) Work with local media to disseminate information.

7. Objective:

Develop additional shore and boat access or improve existing access and amenities at two locations, annually.

Strategies:

- a) Work with willing landowners to buy or lease property for access on waters with little or no current access.
- b) Enhance shore fishing opportunities (e.g., ADA, piers, hard points).
- c) Complete aquatic weed control at shore fishing locations.
- d) Establish a fish cleaning station near Watertown.



- e) Negotiate agreements with landowners to provide access to closed non-meandered waters.

8. Objective:

Annually implement riparian and in-lake projects to protect and enhance aquatic habitats.

Strategies:

- a) Identify shorelines in greatest need for restoration.
- b) Complete two shoreline enhancement projects per year.
- c) Complete a habitat restoration of Gary Creek.
- d) Add in-lake habitat structures to two waters where aquatic habitat is lacking, annually.



2019 to 2023 Work Priorities

At the beginning of the 2019-2023 plan period, the highest priorities for completion of objectives or strategies include:

- Evaluate alternative methods (e.g., fall mini-mesh gill nets) to assess walleye recruitment that may be more efficient and (or) feasible than current fall nighttime electrofishing.
- Evaluate bluegill population dynamics in a minimum of two northeast South Dakota waters to refine or justify current management strategies at meeting fishery objectives by 2023.
- Conduct angler use and harvest surveys at community-based fisheries to determine angling pressure, angler preferences, catch rates, angler harvest and other metrics.
- Enhance shore fishing opportunities (e.g., ADA, piers, hard points).

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



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Appendices

Appendix 1. Number and acres of lakes, by type and classification, actively managed in the northeast fisheries management area (small lakes are ≤ 150 acres, large lakes are > 150 acres).

Type	Classification	Number	Acres
Small natural lakes	Marginal	5	548
	Permanent & Semi-Permanent	2	265
	Total	7	813
Large natural lakes	Marginal	40	38,781
	Permanent & Semi-Permanent	53	110,570
	Total	92	149,351
Small impoundments	Marginal	7	447
	Permanent & Semi-Permanent	11	553
	Total	18	1,000
Large impoundments	Marginal	1	200
	Permanent & Semi-Permanent	8	5,599
	Total	9	5,799
Community based		11	147
Grand Total		137	157,110



Appendix 2. Percent of lakes by type having various fishing access amenities in the Northeast Fisheries Management Area (small lakes \leq 150 acres, large lakes $>$ 150 acres).

Access	Natural Lakes		Impoundments		Community
	Small	Large	Small	Large	
Number of lakes	7.0	93.0	18.0	9.0	11.0
Boat launch	42.9	66.7	88.9	100	9.1
Shore fishing	100	100	100	100	100
Dock	42.9	54.8	66.7	88.9	9.1
Fishing pier	14.3	8.6	5.6	55.6	45.5
Toilet	28.6	33.3	44.4	88.9	45.5
Picnic area	0.0	14.0	16.7	66.7	90.9
Improved fishing site	0.0	21.5	16.7	44.4	72.7
Park present	14.3	12.9	22.2	66.7	63.6
Near-shore vehicle access	14.3	33.3	66.7	100	18.2
Fish holding structure	0.0	2.2	0.0	33.3	0.0
ADA access	0.0	3.2	0.0	11.1	27.3



Appendix 3. The number of lakes and acres of water managed for a fish species by lake type and classification in the East River Fisheries Management Area (small lakes are ≤ 150 acres, large lakes are > 150 acres). BLC = black crappie, BLG = bluegill, CHC = channel catfish, LMB = largemouth bass, MUE = muskellunge, NOP = northern pike, RBT = rainbow trout, SMB = smallmouth bass, YEP = yellow perch, WAE = walleye, WHB = white bass.

Type	Classification		BLC	BLG	CHC	LMB	MUE	NOP	RBT	SMB	YEP	WAE	WHB	
Small natural lakes	Marginal	Number						3			5	3		
		Acres						295			548	353		
	Permanent & Semi-Permanent	Number									2	2		
		Acres									265	265		
	Total	Number							3			7	5	
		Acres							295			813	618	
Large natural lakes	Marginal	Number	2	3		2	0	22		2	34	27		
		Acres	1,040	1,190		990		27,048		1,240	35,659	28,235		
	Permanent & Semi-Permanent	Number	12	9		7	2	17		10	47	51		
		Acres	18,016	3,009		20,390	1,940	33,346		37,567	103,725	109,730		
	Total	Number	14	12		9	2	39		12	81	78		
		Acres	19,056	4,199		21,380	1,940	60,394		38,807	139,384	137,965		
Small impoundments	Marginal	Number	1	3		3		3			5			
		Acres	77	160		160		247			310			
	Permanent & Semi-Permanent	Number	2	5		8		2			7	4		
		Acres	99	267		445		78			386	222		
	Total	Number	3	8		11		5			12	4		
		Acres	176	427		605		325			696	222		
Large impoundments	Marginal	Number	1										1	
		Acres	200										200	
	Permanent & Semi-Permanent	Number	7	3	1	1		2		1	4	8		
		Acres	5,409	1,864	800	829		2,150		235	2,976	5,599		
	Total	Number	8	3	1	1		2		1	4	9		
		Acres	5,609	1,864	800	829		2,150		235	2,976	5,799		
Community based	Number		5		3		6	4		2		2		
	Acres		45		13		125	12		30		12		
Grand Total	Number		25	28	1	24	2	55	4	13	106	96	2	
	Acres		24,841	6,535	800	22,827	1,940	63,289	12	39,042	143,899	144,604	12	



Appendix 4. Number of fish of each species (includes all sizes) stocked in the Northeast Fisheries Management Area each year from 2014 to 2018 and the total for the period (small lakes are \leq 150 acres, large lakes are $>$ 150 acres).

Type	Classification	Species	2014	2015	2016	2017	2018	Total	
Small Natural Lakes	Marginal	Walleye	100,000					100,000	
	Permanent & Semi-Permanent	Walleye	165,000					165,000	
Large Natural Lakes	Marginal	Saugeye			500,000	200,000	191,240	891,240	
		Yellow Perch	12,500	10,725	11,500			34,725	
		Walleye	13,550,000	5,426,000	3,528,290	2,016,500	9,885,000	34,405,790	
	Permanent & Semi-Permanent	Gizzard Shad				600			600
		Lake Sturgeon	6,500	7,570	3,036	4,068			21,174
		Largemouth Bass				67			67
		Muskie	1,600	1,054	1,577	1,542			5,773
		Saugeye				100,000	255,320		355,320
		Yellow Perch		8,700	40,870	200,000	26,000		275,570
		Walleye	31,331,018	10,304,260	30,316,040	15,413,214	18,338,484		105,703,016
Small Impoundments	Marginal	Black Crappie					206	206	
		Channel Catfish					154	154	
		Largemouth Bass			3,760	115			3,875
		Saugeye				100,000	5300		105,300
		Walleye	100,000						100,000



Appendix 4. Continued.

Type	Classification	Species	2014	2015	2016	2017	2018	Total	
Small Impoundments	Permanent & Semi-Permanent	Channel Catfish	200		120		222	542	
		Largemouth Bass	5,200	584	556	103		6,443	
		Yellow Perch	250	3,240				3,490	
		Saugeye					5,300	5,300	
		Walleye	30,807			31,000		61,807	
		White Crappie	201					201	
Large Impoundments	Marginal	Black Crappie					256	256	
		Yellow Perch			4,800			4,800	
		Walleye				100,000		100,000	
	Permanent & Semi-Permanent	Muskie	505						505
		Saugeye			252,680	217,260	308,940	778,880	
		Yellow Perch		2,225				2,225	
		Walleye	475,646	478,050	120,000	275,000	120,000	1,468,696	
		White Crappie		70				70	
	Community Based		Bluegill				3,730	600	4,330
			Largemouth Bass				330		330
		Northern Pike	1,496	1,445	1,677	1,055	152	5,825	
		Rainbow Trout	3,842	3,929	3,390	4,200	2,700	18,061	
		Saugeye					2,320	2,320	
		Yellow Perch		1,750	14,500			16,250	
		White Bass	300	1,205	730		795	3,030	



Appendix 5. 2014-2018 East River Fisheries Management Plan Issues

Habitat

1. Loss of shoreline habitat.
2. Watershed degradation.
3. Deteriorating quality of impoundments.
4. Introduction of exotic plants and animals.

Fish

1. Problems with accurately assessing the benefits of management actions.
2. Standardization of data collection methods and storage.
3. Balancing the need for monitoring with taking beneficial action.
4. Poor panfish size structure in small impoundments and lakes.
5. High natural mortality of yellow perch and crappie in natural lakes.
6. Lack of stream inventories and monitoring, especially for Natural Heritage-listed and Federally-threatened or endangered species.
7. The lack of current and historical information on river and stream fish populations and sport fisheries.

People

1. Cultural changes causing a decline in the use of fisheries resources.
2. Access issues where waters on private property adjoin public property under high water conditions.



Appendix 6 - 2014-2018 East River Fisheries Management Plan Objectives and Completion Status:

1. Objective:

Identify and participate in watershed maintenance and restoration efforts by 2018.

Status:

Ongoing

Completed projects

Gary Creek habitat assessment

Big Sioux River shoreline restoration within Watertown

2. Objective:

Develop and standardize surveys to inventory and monitor stream and riverine fishes by 2018.

Status:

Ongoing

3. Objective:

Utilize fish community and angler survey information to direct watershed and aquatic habitat work by 2018.

Status:

Ongoing

Completed projects

James River CREP – evaluating local influence of CREP on aquatic resources

4. Objective:

Conduct projects to assess the condition of stream and riverine communities by 2018.

Status:

Ongoing

Completed projects



James River fish community sampling completed in 2017

Topeka shiner sampling

Wadable stream mussel survey

Non-game species status reviews

5. Objective:

Identify critical shoreline habitat around heavily-developed lakes to direct shoreline enhancement and protection efforts by 2018.

Status:

Ongoing

Completed projects

Shoreline restoration projects – Poinsett, Richmond, Traverse, Pickerel and Pelican

6. Objective:

Increase angler use on small impoundment by 2018.

Status:

Ongoing

Completed projects

Reconstructed boat ramp at Hickman Dam, Eureka and Pierpont

7. Objective:

Investigate the cause of high mortality in panfish populations and identify potential mediation methods by 2018.

Status:

Ongoing

Completed projects

Yellow perch population attributes were found to be influenced by biotic and abiotic variables in lakes and not heritable genetic differences (Rosburg 2017)



Rosburg, A. J. 2017. Growth potential and genetic diversity of yellow perch in South Dakota. M.S. Thesis. South Dakota State University, Brookings.

8. Objective:

Evaluate the effectiveness of stocking adult fish into existing fish populations by 2018.

Status:

Ongoing

9. Objective:

Evaluate the effectiveness of hatchery produced yellow perch stocking by 2018.

Status:

Ongoing

Completed projects

Yellow perch overwintered on two dry diets (18% and 10% fat content) had no difference in growth

10. Objective:

Evaluate the feasibility and cost benefit of improving game fish populations in one to three small lakes dominated by nuisance fish species by 2018.

Status:

Ongoing

11. Objective:

Improve game fish populations and fishing opportunity on one to three marginal waters by 2018.

Status:

Ongoing

12. Objective:

Improve angler access on natural lakes.



Status:

Ongoing

Completed projects

New access sites – Goose, Keisz, Blue Dog, John, North Rush, South Rush and Dry #2

New docks - Kampeska, Ketchum, Lynn, Swan (Clark), North Rush, School and Blue Dog

Cleared terrestrial vegetation for shore access – Clear, Big Stone, Traverse and Bullhead (Deuel)

Trail/parking improvements – Bitter, Big Stone, Traverse and Bullhead (Deuel)

Vault toilet – Dry (Codington), Dry #2, Elm and Bitter

Large plank ramp – Traverse, Elm and Enemy Swim

Small plank ramp - 9-Mile

Primitive ramp – Three-Buck and Antelope

Snow removal – various access points

13. Objective:

Improve information transfer about urban and community fisheries to fishery users by 2018.

Status:

Ongoing.

Completed projects

Williams Lecture Series presentation



14. Objective:

Create five additional urban and community fishing opportunities by 2018.

Status:

Ongoing

Additional opportunities

North Redlin and South Redlin

15. Objective:

Improve angler access to four existing urban and community fisheries by 2018.

Status:

Ongoing

Completed projects

Piers – Farley and McLaughlin

Hard points – Eureka

Facility – Lions Park

Terrestrial vegetation removal – Bramble pond and McLaughlin

Restrooms – Redfield Dam and Lions Park

16. Objective:

Determine the most effective fish stocking strategies for urban and community fisheries by 2018.

Status:

Ongoing



Appendix 7 - 2014-2018 Northeast Fisheries Management Area Peer Reviewed Publications and Master of Science Thesis

Ward, M. J. In Press, 2018. Comparison of two alfalfa fertilizers used for walleye fingerling production in lined ponds. Proceedings of the South Dakota Academy of Science.

Blackwell, B. G., M. J. Ermer, T. M. Kaufman, T. S. Moos, S. J. Kennedy, and R. J. Braun. 2018. Assessment of short-term mortality of wild caught female walleye broodstock. *North American Journal of Fisheries Management* 38:803-810.

Grote, J. D., J. D., M. R. Wuellner, B. G. Blackwell, and D. O. Lucchesi. 2018. Evaluation of potential overwinter mortality of age-0 walleye and appropriate Age-1 sampling gear. *Journal of Fish and Wildlife Management* 9:65-74.

Moos, T. S., and B. G. Blackwell. 2018. Comparison of two escapement designs for western painted turtles captured in modified fyke nets. *Journal of Fish and Wildlife Management* 9:228-237.

Kaufman, T. M. 2017. Indexing walleye recruitment in eastern South Dakota natural lakes. Master's thesis. South Dakota State University, Brookings.

Blackwell, B. G., T. M. Kaufman, T. S. Moos and M. J. Ermer. 2017. Comparison of day and night electrofishing to sample smallmouth bass in eastern South Dakota natural lakes. *North American Journal of Fisheries Management* 37:1191-1198.

Smith, B. J., B. G. Blackwell, M. R. Wuellner, B. D. S. Graeb and D.W. Willis. 2017. Contact selectivity for four fish species sampled with North American standard gill nets. *North American Journal of Fisheries Management* 37:149-161.

Blackwell, B. G., D. O. Lucchesi, and M. J. Ward. 2017. Muskellunge in South Dakota. Pages 583-585 in K. L. Kapuscinski, T. D. Simonson, D. P. Crane, S. J. Kerr, J. S. Diana, and J. M. Farrell, editors. *Muskellunge management fifty years of cooperation among anglers, scientists, and fisheries biologists*. American Fisheries Society, Symposium 85, Bethesda, Maryland.

Moos, T. S., and B. G. Blackwell. 2017. Condition and mortality of western painted turtle collected as bycatch in modified fyke nets during fish population assessments. *Journal of Freshwater Ecology* 32:259-272.

Carlson, A. K., M. J. Ward, B. D. S. Graeb. 2016. Using otolith microchemistry to classify yellow perch as stocked or naturally produced. *The Prairie Naturalist* 48:52-55.



- Smith B. J., N. Kruger, N. Voss, and B. G. Blackwell. 2016. Fixed versus random sampling in small South Dakota glacial lakes. *Prairie Naturalist* 47:30-39.
- Blackwell, B. G., T. M. Kaufman, and T. S. Moos. 2016. An assessment of calcified structures for estimating northern pike ages. *North American Journal of Fisheries Management* 36:964-974.
- Copp, G. H., A. S. Tarkan, G. Masson, M. J. Godard, J. Koščo, V. Kováč, A. Novomeská, R. Miranda, J. Cucherousset, G. Pedicillo and B. G. Blackwell. 2016. A review of growth and life-history traits of native and non-native European populations of black bullhead *Ameiurus melas*. *Reviews in Fish Biology and Fisheries* 26:441-469.
- Moos, T. S., and B. G. Blackwell. 2016. Characterization of western painted turtle bycatch in fyke nets during freshwater fish population assessments. *Journal of Fish and Wildlife Management* 7:222-230.
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- Dembkowski, D. J., D. W. Willis, B. G. Blackwell, S. R. Chipps, T. D. Bacula and M. R. Wuellner. 2015. Influence of smallmouth bass predation on recruitment of age-0 yellow perch in South Dakota glacial lakes. *North American Journal of Fisheries Management* 35:736-747.
- Blackwell, B. G., T. M. Kaufman, S. Moos, and D. O. Lucchesi. 2015. Comparison of two trap net sizes for sampling Muskellunge. *Prairie Naturalist* 47:21-25.
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- Weimer, E. J., M. L. Brown, and B. G. Blackwell. 2014. Quantifying differences in habitat use between anglers and large bluegills. *Prairie Naturalist* 46:4-10.
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- VanDeHey, J. A., D.W. Willis, J. M. Harris and B. G. Blackwell. 2014. Effects of gizzard shad introductions on walleye and yellow perch populations in prairie glacial lakes. *Fisheries Research* 150:49-59.