FINAL
ENVIRONMENTAL ASSESSMENT

for

The Rehabilitation of Lake Henry
Through Reconstruction of the Lake Henry Dam

Bon Homme County
South Dakota

August 2002

Prepared by

Division of Federal Aid, U.S. Fish and Wildlife Service
Region 6

and

South Dakota Department of Game, Fish and Parks
Pierre, South Dakota

EXECUTIVE SUMMARY

The South Dakota Department of Game, Fish and Parks (Department) proposes to reconstruct Lake Henry at Scotland in Bon Homme County, South Dakota, to provide fishing and other outdoor recreation opportunities. The project would be funded through multiple sources including local contributions, a Community Development Block Grant through the 3rd Planning District, and the Federal Aid in Sportfish Restoration Program.

The Lake Henry dam was originally constructed in 1937 by the Public Works Administration and the Department and was breached for safety reasons in 1994 by the Department. The dam would be relocated 1,350 feet downstream from the original dam embankment to the next geomorphologically available narrow site on Dawson Creek. The new location would result in a lake surface area of 163 acres at elevation 1,290 feet mean sea level.

Approximately 1.13 acres of Palustrine Emergent/ Riverine Intermittent wetlands would be converted to approximately 30 acres of littoral habitat, including at least 15 acres of Palustrine Emergent wetlands and 130 acres of Lacustrine habitat. Two acres of Palustrine Emergent wetlands, created by the City of Scotland Sewage Treatment Plant tertiary outfall pipe below the old spillway would be inundated by the project. This wetland would be recreated downstream of the new dam site where the new outfall pipe would be located.

A survey was conducted to determine the presence of Topeka shiners (a Federally-listed species) in the area of Dawson Creek to be affected by the project. More than 9,000 fish were handled and identified during this survey. No Topeka shiners or suitable habitat were located at any of the 19 sites sampled above or below the project site.

A permit pursuant to Section 404 of the Clean Water Act is required by the U.S. Army Corps of Engineers (Corps) and an application has been submitted to the Corps. The South Dakota Department of Environment and Natural Resources (SDDENR) granted a Section 401 of the Clean Water Act water quality certification on May 23, 2002.

No significant adverse environmental impacts were identified through the National Environmental Policy Act environmental compliance process.

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PURPOSE AND NEED

The purpose of this project is to reconstruct Lake Henry on the Dawson Creek drainage near the town of Scotland in Bon Homme County, South Dakota, to provide fishing and other outdoor recreation opportunities to area residents and visitors.

The proposed project area is located within 55 miles of two major population centers in southeast South Dakota including Mitchell and Yankton. The local communities of Tyndall, Kaylor, Beardlsey, Wolf Creek, Utica, Tabor, Avon, Olivet, Trip, Menno, Freeman, Tschetter Colony and Maxwell Colony occur within a 22 mile radius of Scotland. They represent those communities that would be best served by the project benefits. Sioux Falls, Vermillion, and Yankton represent approximately 135,000 people within 80 miles of the project who would also benefit from the proposed project.

Seventy-eight percent of South Dakota anglers reported that fishing small lakes and ponds is either their first or second choice for angling opportunity (Gigliotti, 1999). Forty-three percent identified small lakes and ponds as their first choice for fishing (Gigliotti, 1999). In 1994, the South Dakota Department of Game, Fish, and Parks (Department) also reported that 51% of South Dakota anglers do not use a boat to fish. Boats are almost a requirement to fish the Missouri River as shore fishing opportunities are very limited. Anglers also reported that yellow perch and sunfish surpass walleye as the most commonly harvested game fish by anglers (Gigliotti, 1999).

This region of the state has few public fishing lakes. Tyndall's 2-acre kids fishing pond is the only other public lake in Bon Homme County apart from the Missouri River. The Missouri River, however, requires greater transportation range and significant boating equipment investment to afford public use. Public fishing access sites in Hutchinson County include the shallow 13 acre Tripp Dam (which is prone to winterkill); three limited-access sites along the shores of the James River; Dimock Lake, a 70 acre, warm water fishery 42 miles from Scotland; and Lake Menno (47 acres), a permanent warm water fishery. Menno Dam was relocated approximately 1,200 feet downstream and reconstructed in 1994 by the Department and the Lake Menno Dam Association. Lake Mitchell is 50 plus miles north in Davison County.

With the exception of Lake Menno, 13 miles away, the scarcity of local, public, preferred small fishing waters in these two counties forces anglers to either travel long distances or give up angling in favor of other recreational pursuits. For young and elderly anglers, the lack of accessible local fishing waters limits their ability to participate. The proposed development represents a positive step in responding to continual, long term demands for local angling opportunities and improving the quality of life for the residents of the region and its visitors.

Background

The Lake Henry dam and impoundment was developed by the Federal Works Progress Administration in 1937 in cooperation with the Department. Lake Henry is located on Dawson Creek about four miles southwest of its confluence with the James River and approximately one mile southeast of the community of Scotland.

Historically, Lake Henry consisted of 72-80 surface acres of water with a maximum depth of 20 feet and an average depth of 8 feet at spillway elevation 1,281 mean sea level (msl). The original earthen dam was approximately 560 feet long and 38 feet high. A maximum section had a 12 foot wide crest. The 60 foot wide, primary spillway was uncontrolled, concrete lined with an ogee crest, and vertical chute walls. Spillway crest was elevation 1281.0 feet msl and the chute was approximately 25 feet on 1.5:1 slope. No secondary spillway was constructed due to insufficient room or topography. This inundated approximately 6,865 feet of Dawson Creek, the equivalent of 0.94 acres of riparian area.

Lake Henry supported a warm water fishery and was a popular fishing and aquatic recreation area for Scotland residents. It also attracted anglers from 13 small communities within 25 miles of Scotland.

Local land use practices of the 1930's through the 1980's, including the historically dry "dirty thirties", included wetland drainage and extensive livestock grazing adjacent to the water. These activities encouraged runoff of topsoil, nutrients, and agricultural chemicals to enter Lake Henry which, consequently, promoted eutrophication and silt load deposition.

Ultimately, and in conjunction with insufficient engineering, these factors contributed to the demise of the original lake. The resultant heavy silt deposit reduced water depths at the spillway from 22 feet to 10 feet and from 8 feet to 4 feet at the inlet end of the impoundment (Flannery Engineering, 1993). This reduction in depth resulted in an inability to over-winter fish stocks and added additional pressure to the already under-engineered spillway and embankment (Banner Associates, Inc., 1990).

Lake Henry Dam was seriously impacted by floodwaters after record levels of precipitation in 1984. Several other local lakes (Menno and Dimock) were also damaged at this time. Water flowed behind and under the spillway rather than over it. Additionally, the embankment was jeopardized by unengineered seepage and piping. This was due to tree root systems growing on the embankment and unsuitable core material that had been used in the original construction.

Results of an engineering study (Banner Associates, Inc.,1990) indicated that the spillway was inadequate to handle the 50% Probable Maximum Flood (PMF). Of greater importance, the spillway did not include any means to dissipate hydraulic energy at the base of the structure, there was no secondary spillway, and no low-level outlet works for water management purposes. Water below the crest could not be released and the discharge capacity was not adequate to avoid overtopping of the dam from the 100 year event as required by South Dakota Law.

The Department breached the embankment at Lake Henry in September of 1994 due to flood damage, insufficient maintenance, and inadequate design to handle flood waters. The Department has been planning to reconstruct the lake since then. It does so under various authorities including South Dakota Codified Law chapter 41-2-18 (4) which empowers the Department to manage, control traffic on, and improve access to the public waters of South Dakota. Additionally, providing public fishing and boating access to the citizens of Scotland at Lake Henry or a suitable, nearby location in an environmentally responsible manner, is consistent with the Department's Mission Statement, which states:

"The Wildlife Division 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".

Based on input from the 75 citizens in attendance at the Annual Meeting of the Local Scotland Lake Henry Association on March 25, 2002, support and interest in reconstructing Lake Henry remains high (Personal Communication, Craig Winkler). In addition, funding sources are available to rebuild Lake Henry and reestablish fishing and boating opportunities in this community.

ALTERNATIVES

Alternative 1. No Action

No construction activities would take place and any site under consideration would be left in its current state.

Alternative 2. Reconstruct the Existing Dam

The existing spillway and dam embankment would be removed. The silt on the bottom of the old lake bed would be excavated, removed and deposited on private agricultural fields (Flannery, 1993). The dam at the existing site would be reconstructed using locally available, native materials.

Alternative 3. Construct a New Dam and Lake on Dawson Creek

Approximately 263 acres of property, which would surround about 98% of the new proposed lake, would be purchased from willing sellers (Appendix H). This acreage would be sufficient to provide for construction of a new dam embankment and spillways, and associated structures and public use facilities (Appendix I).

The old Lake Henry spillway structure would be removed and the elevation of the old dam embankment would be lowered to eliminate navigation hazards but conserved to act as an upper basin silt trap. Spoil and rubble from the old spillway and embankment would be deposited in the new proposed reservoir to serve as fish habitat. Shell materials from the old dam embankment would be incorporated into the new embankment or would be redistributed over areas used for borrow during reclamation.

The Department would design and construct all proposed structures and facilities to require minimal maintenance, yield desired public access benefits, minimize impacts to adjoining landowners, and have a project life of at least 50 years. Design of a new dam embankment and spillway would be governed by SDCL, Safety of Dams Rules, Chapter 74:02:08 and Category 2 Dams Standards under 74:02:08:07.02.

A new dam embankment would be constructed approximately 1,350 feet downstream of the original dam. This proposed site is the optimal spot in the Dawson Creek drainage nearest to the original dam location that would provide sufficient area for construction of the new proposed embankment while limiting the amount of ground disturbance. The proposed earthen embankment would be 885' long by 338' at the base, 15' wide at the crest, and 45' high. It would be "keyed" into the native substrate and the core would be constructed of clay loam material acquired from adjacent approved borrow areas. Shell materials from the old embankment would be salvaged and used to cover the new embankment core. The embankment would be then seeded or armored with Class III granite riprap. The new lake basin would be approximately 163 surface acres when filled to 1290' in elevation.

A 60' wide primary spillway would be constructed of concrete at elevation 1290' msl and would be capable of handling the 50% PMF. A 125' wide by 425' long secondary/emergency grass spillway would be constructed and seeded or armored with riprap.

The proposed dam would be classified as Category 2. The standards for this category are located in Section 74:02:08:07.02 which states:

> *"Unless the reservoir of a Category 2 dam serves as the sole water supply source for a water distribution system, the spillway design flood for a new or rebuilt intermediate size Category 2 dam may be lowered to a design flood between the 0.5 PMF (40,000 cfs) and 100-year spillway design flood based upon a risk assessment. The risk assessment must be submitted to and approved by the chief engineer (General Authority: SDCL 46-2-5, 46-7-3)."*

The capacity of the primary and secondary/emergency spillways combined would pass a total of 8,914 cfs without overtopping the dam embankment. Based on breach analysis, this capacity would exceed the 100-year flood of 1,900 cfs by a factor of 4.7, and represents 11% of the 50% PMF (approximately 40,000 cfs).

A low level water outlet works would be constructed at elevation 1,258' msl and would permit control of the water level below the spillway for management purposes. Seepage from the proposed dam embankment dam would be concentrated on either side of the low water outlet. A low level bypass weir would be constructed at 1289.8' msl and centrally located on the embankment. Additional low level spillage would be concentrated through this weir. Seepage from the outlet work and spillage from the weir would contribute to downstream flow of Dawson Creek. Seep water would be concentrated.

The City of Scotland's sanitary sewer outfall pipe would be rerouted to a site below the new dam embankment. (A permit pursuant to Section 402 of the federal Clean Water Act has been issued for this by the South Dakota Department of Environment and Natural Resources [SDDENR]).

The Broin Ethanol Plant, which is located about one mile upstream of the project site, will be converted to a reverse osmosis system in July of 2002. Reject water from the plant will be cycled through the Scotland Sanitary Sewage System (Personal Communication, Lonnie Steinke, Sanitary Sewer Section, SDDENR, July 2, 2002).

The existing 225' trail would be upgraded to an all weather gravel road on the south side of the lake north to the southern extent of the old dam embankment, and the existing 425' two track trail would be upgraded to an all weather gravel surface road.

A new single-lane, 20' wide, concrete boat ramp would be constructed off the southwest corner of the proposed dam embankment and installed so that access is available as the water elevation fluctuates. A slide-in, 6' wide, handicap accessible boat dock with transition plate would be installed. An accessible fishing pier would be constructed along the south shore of the new lake. Work on all boating and fishing access facilities would be completed prior to closure of the new spillway.

A 100'x 200' ten boat/trailer capacity parking lot would be constructed and a self-contained accessible concrete vault toilet would be installed adjacent to the parking lot. The toilet would be 6' long by 6' wide and would be placed at an elevation that would be protected from lake water. A pole mounted security light would be installed in the parking lot, and the entire fishing access area would be fenced.

Construction would be scheduled during Dawson Creek's low flow months of late summer and fall and would be conducted in full compliance with South Dakota Water Quality Standards. During construction, any stream flow would be routed around the construction area until the low level water works had been constructed and could handle passage of water. During construction, to prevent soil erosion and to contain particulate matter from entering Dawson Creek, existing trails would be used and construction access would be appropriately created. A Section 404 permit would be obtained from the U.S. Army Corps of Engineers (Corps) prior to construction. The project would conform and comply with this and all local, state, and federal guidelines and regulations. All sites used for borrow would be returned to topography that smoothly adjoins adjacent areas and seeded in a manner approved and identified by the Department and would comply with all local, state, and federal guidelines and regulations.

Dam closure would be delayed until spring to take advantage of peak spring runoff and minimize time to fill the impoundment. (A similar dam at Lake Menno filled to the spillway in only two weeks by timing the fill with spring thaw). Once the impoundment is full, additional water would pass over the primary spillway which could reduce the impacts from no flows in Dawson Creek.

The lake would be managed as a permanent warmwater fishery, primarily for largemouth bass and yellow perch, and the impoundment elevations would be maintained at the highest level possible to maintain this fishery (Appendix T).

The property surrounding the proposed lake to be purchased by the Department would be considered a "green" buffer zone (Appendix H). The width of the buffer zone around the lake would vary and would be managed to benefit fish and wildlife populations, protect the lake basin from degradation, and preserve water quality.

The Lake Henry Fishing Access Area would be managed to protect shoreline wetland values, upland habitat, tree plantings, and recreational values (Appendix S). On areas upstream and adjacent to the Fishing Access area, the Department would employ best management practices to protect existing natural resources. Regular maintenance activities would include trash and litter removal.

The Game Production Area, including the downstream area, would be fenced and protected from grazing and off-road vehicle passage. Adjacent uplands would be managed to maximize fish and wildlife benefits and protect water quality which would thereby benefit adjacent wetland and lacustrine areas.

In the future, the Department would pursue establishment of conservation easements or management agreements with local landowners to provide for continued protection of the area's natural resources.

Alternative 4. Construct a New Lake at an Upland Location

Willing sellers would be located that possess upland property with soils suitable for lake construction. A lake would be excavated on the site. Excavated materials would be deposited on an approved area. A well permit would be secured for a water supply.

Alternative 5. Construct a New Dam in a Different Floodplain

A dam would be constructed and a lake created within a floodplain other than the Dawson Creek drainage but in the vicinity of the city of Scotland.

Discussion and Selection of the Preferred Alternative

Selection Standards

The alternatives were evaluated using the following criteria to determine the feasibility of each.

1. Department Goals - The preferred alternative must provide for a public fishing area for Scotland residents and visitors within the funding that is currently available to the Department.

2. Recreational Demands - The preferred alternative must be able to meet current and future recreational demands of residents and visitors to the Scotland area.

3. Environmental Consequences - The preferred alternative must give consideration to both on-site and off-site environmental affects, must not cause irreparable damage to the environment, must not result in unmitigable impacts, and must not jeopardize any Federally-listed endangered, threatened, proposed, or candidate species or critical habitat.

4. Time Frame - Approximately one-third of the funds identified for this project are available only until November 2002. Therefore, the preferred alternative must allow for commencement and completion of the project so that these funds may be used.

5. Technological Feasibility - The preferred alternative must follow sound engineering and construction principles meeting all safety standards and time constraints.

6. Economic Feasibility - Project cost must not exceed available funds.

7. Site Feasibility - The Department must have management control of the preferred site through either fee title ownership or a long-term legal agreement such as an easement.

Comparative Analysis of Alternatives

All alternatives were evaluated based upon the selection criteria described above. The analysis is summarized in Table 1 and discussed in detail below.

Table 1. Alternative Analysis Summary

Alternative	1	2	3	4	5
Department Goals	—	0	+++	+	+
Recreational Demands	—	-	+++	-	-
Environmental Consequences	-	+	+	—-	—-
Time Frame	N/A	+	+	—	—
Technical Feasibility	0	+	+++	0	0
Economic Feasibility	N/A	—	+++	-	+
Site Feasibility	N/A	+	+++	+	-

Symbol Key: +++ Exceeds Standards + Meets Standards 0 Neutral - Does Not Meet Standards — Serious Deficit

Alternative 1. No Action

This alternative does not meet the Department Goals or Recreational Demands. The other selection standards were not applicable.

Alternative 2. Reconstruct the Existing Dam

This alternative would probably meet the Department Goal, Recreational Demand, Time Frame, and Site Feasibility selection standards. Although the original site would allow for the restoration of a public fishing area, the significant silt within the old basin would need to be excavated and properly disposed before a viable fishery could be re-created. This may result in adverse environmental consequences. Also, space at the existing site may not be sufficient to provide for the construction of an emergency spillway which was absent from the original design, but would be required today. The cost of this alternative would be approximately $2,300,000 so the available funding would be adequate (South Dakota Department of Game, Fish and Parks).

Alternative 3. Construct a New Dam and Lake on Dawson Creek

This alternative meets all of the selection standards. It would provide the recreation needed near the city of Scotland at a cost acceptable to the Department within the necessary time frame, but without significant adverse environmental effects (refer to section *Environmental Consequences*). Because the Department originally owned the property on which the previous Lake Henry was located, purchase of additional property would be minimal, and willing sellers and the required water rights are available. The topography and structure of the project site renders the proposed construction technically feasible. The cost of this alternative would be approximately $2,300,000 so the available funding would be adequate (South Dakota Department of Game, Fish and Parks).

Alternative 4. Construct a New Lake at an Upland Location

This alternative would meet the Department Goal and Recreational Demand standards. Prime and Unique Farmland (as defined by the Natural Resources Conservation Service), a sensitive natural resource, is common and widely distributed throughout Bon Homme County, would be difficult to avoid and may result in unacceptable environmental consequences. The Department does not own a sufficient amount of upland property in the Scotland area to accomplish this alternative. Locating willing sellers, purchasing land, securing the required water rights, and completing the necessary environmental compliance would require more time than is available to take advantage of existing funding. Additionally, it is not

known whether an upland site could be located that would provide the area and topographic and soil characteristics required for the creation of a lake and viable fishery. This alternative is not economically feasible as construction, excluding purchase of the required property, would be $44,000,000 (South Dakota Department of Game, Fish and Parks).

Alternative 5. Construct a New Dam in a Different Floodplain

This alternative may meet the Recreational Demand or Department Goal if the Department could secure the property required, but would not meet the other selection standards. The Department does not own a sufficient amount of land in a floodplain in the vicinity of Scotland. Purchase of a greater amount of land than for Alternatives 2 and 3 would be required; therefore, the cost of this alternative would undoubtedly be higher than the funding available. Construction within another floodplain could pose unacceptable environmental consequences.

Selection of the Preferred Alternative

Alternatives 1, 2, 4, and 5 were all dismissed because none fully met the selection criteria. Alternative 3 was therefore selected as the *Preferred Alternative*.

AFFECTED ENVIRONMENT

Location

The proposed project site is located on Dawson Creek, Bon Homme County, a tributary of the James River, South Dakota. Lake Henry is located in Section 9, Township 96 North, Range 58 West, Bon Homme County, South Dakota.

Topography and Soils

The 40 square mile Lake Henry watershed is flat to gently undulating except for the Dawson Creek channel and associated bluffs. The existing topography of the project site is characterized by a distinct drainage, Dawson Creek, with varying side wall and bank heights that generally flows east to its confluence with the James River. The upper reaches of Dawson Creek are relatively flat which is typical of headwaters on the prairie. Well defined side walls are typical of the mid-reach of the drainage. Some areas, especially outside turns, are characterized by sheer cut banks. There is a distinct demarcation of substrates between the area downstream of the existing embankment and the old lake bottom.

Upstream soil conservation measures have already been initiated by the National Resources Conservation Service (NRCS) in the upper reaches of Dawson Creek. The NRCS has also indicated that additional grants are available to continue these activities to protect the proposed lake.

Prime or Unique Farmland

Form AD -1006 *Farmland Conversion Impact Rating* was completed to evaluate the prime and unique farmlands associated with the project site. The total score fell below the 160-point threshold which is defined as posing "little adverse effect" to important farmland (Appendix A).

Air Quality

Air quality is generally good in this agricultural area. Dust levels can be elevated due to high winds and active tilling as normal agricultural practices. Some dust is regularly raised by traffic on the county gravel road on the south side of the proposed impoundment. However, there are no residences within a mile of the proposed project.

Water Resources

Dawson Creek is described as a varying marshy, slow moving, limited gradient stream. It traverses at least 40 sections in Hutchinson and Bon Homme County and drains approximately 40 square miles upstream of the project. About six miles downstream from the project site, it flows into the James River which then feeds into the Missouri River. At the U.S. Geological Survey Gauging Station 06478500 just upstream of the confluence of Dawson Creek and the James River, annual mean flow has averaged as low as 15 cubic feet per second in 1934 to a high of 4,045 cubic feet per second in 1997. The 70 year annual mean, from 1929 through 1999, is 594 cfs (Appendix P).

At the project site, Dawson Creek winds its way through the old channel and through the breach in the old dam embankment. Usually, it only runs during spring runoff and heavy rainfall events and does not flow during most of the summer months, early fall, or during times of drought. The creek's intermittent flows provide varying amounts of water, sediment, and organic materials to the James River and Missouri River systems. The significance or benefits of this function, however, have not been evaluated and may be affected by ongoing cattle grazing. When the previous lake was in existence, the spillway ran several times each spring, but was generally dry for the remainder of the summer months (Personal Communication, LeRoy Sorenson, Retired Wildlife Conservation Officer, SD, April 27, 2002).

There is no evidence that Dawson Creek is spring or seep influenced, it is not a source of drinking water, and no other impoundments exist on it.

In its May 13, 2002, letter to the Corps, the SDDENR indicated that Dawson Creek has been classified for the following uses: warmwater marginal fish life propagation; limited contact recreation; fish and wildlife propagation, recreation, and stock watering waters; and irrigation waters (Appendix Q and R).

Floodplains and Wetlands

The National Wetlands Inventory (NWI) mapping system classifies Dawson Creek as either Palustrine Emergent or Riverine Intermittent environments (Appendix G). The accuracy of these classifications was verified by Department biologist Dave Lucchesi and consultant biologist Steve S. Wall of South Dakota State University. Due to the effects of continual grazing and disturbance from the previous dam and lake, the riparian habitat and associated wetlands that exist along Dawson Creek in the project area are not considered high quality.

Five acres of Palustrine Emergent system wetlands are identifiable at the upper reaches of the old Lake Henry basin on the NWI map. These wetlands were dependent upon water stored by the previous dam. Consequently, after the dam was breached, these wetlands were dewatered and no longer exist. Two acres of Palustrine Emergent wetland on the downstream face of the old dam at the southern extent are also identified on the NWI map. These are dependant on the City of Scotland's sanitary sewer outfall pipe. Wetland areas outside the reach of the old Lake Henry basin are described as Intermittent Riverine.

Vegetation

Dawson Creek is typically vegetated to the edge in the bottom of the drainage where not overgrazed. The vegetation here is typical of a narrow ribbon Intermittent Riverine wetland zone. Establishment of upland vegetation forms close to the stream bank downstream of the old spillway appears to indicate that the intermittent and temporal nature of the stream results in limited hydric impact on the adjacent environment. Limited stands of cattails have established along the Dawson Creek drainage downstream of the old spillway .

The old lake bottom is covered by up to 12 feet of silt that, although dry, has been colonized primarily by invaders and invasive species, including kochia and reed canary grass. Some limited stands of cattail also occur there.

Downstream of the old spillway, upland areas are colonized by various terrestrial plant species including upland grasses, limited stands of eastern red cedar on the north facing slopes, and Russian elm and burr oak on the drier slopes.

Grassy areas throughout the project vicinity, both upland and on the old lake bottom, were being intensively grazed prior to purchase by the Department.

Invasive Species

There are currently some noxious weeds in the old lake bed that are controlled by the Department. There is a significant seed source in the silt deposited in the lake bed that requires regular spot chemical control.

Wildlife and Habitat

Mammals

White-tailed deer may occasionally traverse the Dawson Creek drainage as they travel the creek bottom corridor. There is significant livestock disturbance to preclude use. Limited habitat represents escape or loafing cover.

Small mammals (mice, moles, voles, pocket mice, and jumping mice) are ubiquitous throughout this part of the state and Bon Homme County in particular. Evidence of pocket gophers was found in the elevations above the old spillway where cattle are grazing. Due to the extensive grazing use, small mammal populations would be expected to differ considerably from similar areas that are not intensively grazed as is this area.

Birds

Pheasant numbers are concentrated in the kochia of the old lake bed and some cattail at the upper most reach of the old lake bed. Pheasants may use the lower elevations of the Dawson Creek drainage to avoid high wind and harsh winter conditions. Pheasants have been harvested from the old lake basin during the hunting season.

Passerines (non-game birds) including ground feeding seed eaters or insect feeders may be present at different times of the year and take advantage of the ground disturbance caused by hoof action of grazing cattle. Limited habitat exists that would support tree or shrub nesting (arboreal) species apart from the limited established cedars which might be attractive to mourning doves.

Fish and Aquatic Species

Nineteen sites were sampled in the Dawson Creek drainage to assess fish stocks. Forage species represented almost the entire catch. Fathead minnow (*Pimophales promelas*) and brassy minnow (*Hybognathus hankinsoni*), both broadly tolerant species, comprised more than 90% of the more than 9,000 fish handled. Other forage species and a few rough fishes were reported, but represented a limited proportion of the total (Wall, 2002). No game fish were identified in the test netting samples. Species present are ubiquitous across and throughout the streams of eastern South Dakota, including the James River.

Federally-listed Endangered, Threatened, Proposed, or Candidate Species and Critical Habitat

The following species are listed for the State of South Dakota and were considered for the project area:
Black-footed Ferret, Black-tailed Prairie Dog, Gray Wolf, Lynx, Bald Eagle, Whooping Crane, Interior Least Tern, Piping Plover, Eskimo Curlew, Mountain Plover, Topeka Shiner, Sicklefin Chub, Sturgeon Chub, Pallid Sturgeon, American Burying Beetle, Scaleshell Mussel, and Prairie-fringed Orchid.

Bald eagles, whooping cranes, interior least terns, piping plovers, and Eskimo curlews may migrate through the general vicinity of this project as seasonal migrants.

No gray wolves have been detected in this part of the state for more than 50 years. No prairie dog towns are present at the proposed site so presence of black-footed ferrets would not be expected.

American burying beetles may be found in appropriate habitats all across western, southeast South Dakota. However, a communication with Doug Backlund, Resource Biologist and South Dakota Heritage Database Manager for the Department, indicated that locating beetles at the Lake Henry area would be unlikely (Appendix B).

As this site has been historically disturbed and heavily grazed, occurrences of Western prairie-fringed orchids would not be expected and none have been found.

Topeka Shiner

The Topeka shiner (*Notropis topeka*) or its potential habitat conducive to the recovery of this species have been found in other tributaries of the James River and may exist in area drainages. Therefore, a) Topeka shiners and their absence or presence at any potential dam site must be assessed; b) The construction of a dam may impact potential habitat necessary for recovery of the species and adverse affects to Topeka shiner habitat or populations must be assessed; and c) existing or potential Topeka shiner populations may be affected by the reintroduction of game fishes that are not compatible with survival of Topeka shiners.

The model described by Wall et. al., 2001, identified two reaches of Dawson Creek as areas as potentially holding Topeka shiners. Two historical samples revealed no shiners. Despite the relatively low efficacy of the model in the James River drainage (60%), an independent contractor was hired to conduct an intensive inventory of fishes in Dawson Creek. The complete results of the study are available in a report by Wall (2002) and are summarized below.

No Topeka shiners were found. Nineteen sites were sampled and more than 9,000 fish handled and identified. This number represents more fish handled during this inventory than were reported in the Wall et. al., 2001, study which involved sampling of all three river drainages in eastern South Dakota (the James River, Vermillion River, and the Big Sioux River). The fish community found consisted primarily of the more tolerant Brassy and Fathead minnows. These species are not normally associated with Topeka shiners.

Although physical habitat features were similar to where Topeka shiners have been found, some fundamental characteristics, including riffle pool sequences and favorable bottom substrate, were absent. Intensive grazing occurs adjacent to Dawson Creek and there have been numerous modifications to the stream itself.

The 60% accuracy rate (Wall et. al, 2001) of the model to predict Topeka shiner presence in the Lower James River drainage may be an indication that the actual stream morphology preferred by Topeka shiners is not readily available in this area. No significant populations of shiners have been found in the lower reach tributaries of the James River. The accuracy of the model and the existence of significant Topeka shiner numbers, however, have been documented in the Vermillion River and the Big Sioux River drainages. The James River is characterized by significant silt movement whereas the Vermillion, Big Sioux, and their tributaries more commonly exhibit the kinds of substrates preferred by Topeka shiners and are more successfully predicted by the model.

The present fish populations and the existing stream characteristics do not represent those found in conjunction with the Topeka shiner. Dawson Creek and all other drainages in Bon Homme County will not be included in the proposed Topeka shiner Critical Habitat Listing Package which will be published in the Federal Register (Personal Communication, Vernon Tabor, Kansas Ecological Services Field Office, FWS).

Historic, Cultural, and Archaeological Resources

An intensive pedestrian cultural resources inventory of the proposed project area was completed by a contract archeologist in response to a recommendation by the State Historical Preservation Office (SHPO). The inventory uncovered several potential resources including the old spillway structure; however, this structure lacks the necessary structural integrity and has been deemed ineligible for listing in the National Registry of Historic Places (Appendix C).

Noise

The project site is currently being used as a spring calving location by more than one cow/calf operator. Major sources of noise include traditional noise levels of farm machinery operating at elevations above the project site and vehicles traversing the adjacent gravel road.

Socioeconomic Resources

Land use is primarily agricultural with a mix of cultivated and pasture lands. Cultivated lands are used primarily for row crop production. The creek basins are intensively utilized for livestock grazing.

Water based recreation has historically played an important role in the lives of Scotland residents who enjoyed the nearby lake from 1937 to 1994. The desire for restoration of a sport fishery in this area is tightly held by the local populace and community leaders as witnessed by their continued interest and persistence in the pursuit of reconstruction of the dam since 1994. The original lake was managed as a permanent warm water fishery until 1994.

Historically, Lake Henry was the center of local recreation and water based activities for 13 communities. Currently, there is no lake and no potential for fishing or water based recreation.

Based on the 1999 census by the U.S. Census Bureau, the population of Scotland is 1000. Few minority populations reside in the project area.

ENVIRONMENTAL CONSEQUENCES

Alternative 1. No Action

No effects to any resources within and adjacent to the Dawson Creek drainage from construction would occur. Dawson Creek would continue to persist as an intermittent stream subject to disturbance by cattle grazing and pasturing on adjacent lands. Vegetation and habitat would be expected to succeed over time, however, this would also be limited by these agricultural disturbances. Other existing environmental conditions as described in the *Affected Environment* would remain and the city of Scotland's desire for a local public fishing area would go unfulfilled.

Alternative 3. Construct a New Dam and Lake on Dawson Creek (Preferred)

Topography and Soils

Soil erosion would be prevented or minimized during construction by utilizing best management practices, creating construction access with erosion prevention features, and using existing trails. All sites used for borrow would be reclaimed and seeded which would also minimize potential erosion. The upstream side of the dam embankment, the secondary/emergency spillway, and the sides of the boat ramp would be re-seeded or armored with riprap which would limit or prevent future erosion.

Topographic impacts to borrow sites would involve the reduction of the existing elevations by approximately two feet and reclamation of the site contours to blend into adjoining pasture lands. Natural features and aesthetics would be preserved as much as possible.

Air Quality

Impacts to existing air quality are not expected (Appendix D).

Water Resources

The Dawson Creek channel would be disturbed by excavation for keying in the new dam core and construction of the secondary/emergency spillway. A total of 8,215 feet of the creek would be inundated and converted to a lacustrine system.

Above the dam, Dawson Creek would continue to experience spring and intermittent flushing due to seasonal high water events and low or no flows during late summer and times of drought. The new Lake Henry would also experience fluctuating water levels in conjunction with seasonal high water events and periods of low and no flows from the drainage.

Below the dam, high water events such as spring runoff would be regulated in Dawson Creek. During times of drought, Dawson Creek below the dam to its confluence with the South Branch, approximately 1,400 feet, may be partially de-watered as there would not be sufficient water to result in spillway overrun. However, opportunities for the Department to make releases into Dawson Creek below the dam may occur during times the creek would normally experience low or no flows. These occasions may facilitate the continued establishment and maturation of the riparian habitat associated with the drainage. Whether or not water may be available for release to Dawson Creek, since the stream typically experiences periods of low or no flow during late summer or drought, the effects of dewatering the 1,400' stretch below the dam would be no greater than those that currently occur. Further, some flows in Dawson Creek would be augmented via seepage from the dam at the low level outlet works and mid-dam weir. Consequently, only minimal, limited changes to the drainage system would be expected after the dam has been constructed and the lake has filled.

Potential effects to the water quality of Dawson Creek from construction would be avoided or minimized by scheduling construction activities during the low-flow months of late summer and fall; conducting the work in full compliance with South Dakota Water Quality Standards and the conditions of the Clean Water Act Section 401 Water Quality Certification (Appendix Q and R); and routing any stream flow around the construction area until the low level water works had been constructed and could handle passage of water.

Only surface water from Dawson Creek would be collected in the lake; consequently no ground water supplies would be affected (Appendix E). Sewage leakage from the vault toilet into ground and surface water would be prevented by its water-tight design. The toilet would also be pumped as needed.

Floodplains and Wetlands

The proposed action involves disturbance of both the floodplain of Dawson Creek and associated Palustrine Emergent/Riverine Intermittent wetlands; therefore, the project is subject to the provisions of Executive Order 11988 *Floodplain Management*, and Executive Order 11990 *Protection of Wetlands*.

The proposed action would result in temporary disturbance and permanent inundation of approximately 8,215 feet of the Dawson Creek floodplain. The 100-year flood event for Dawson Creek is estimated to be approximately 1,900 cfs. The new spillways would have a combined capacity of 8,914 cfs. Consequently, it would be expected that maximum flood waters of Dawson Creek could be safely passed. Construction of the dam and lake, therefore, would not be expected to result in significant changes in flood heights or flood stages, frequency of flooding, or floodwater distribution patterns.

The width of Dawson Creek through the area that would undergo inundation (8,215 feet) averages six feet. Consequently, about 1.13 surface acres of Palustrine Emergent/Riverine Intermittent wetland would be lost. This loss would be mitigated in two ways. First, development of the new lake would result in the establishment of a 30-acre littoral zone, of which at least 15 acres would be new Palustrine Emergent wetlands along the upper reaches of the basin. Additionally, approximately 950 feet of Intermittent Riverine habitat on Dawson Creek downstream of the new embankment would be protected and enhanced by revegetating the area with native species and fencing to eliminate grazing and off-road vehicle impacts (Appendix S, T, U, and V). Consequently, the conversion of the wetlands along Dawson Creek would be considered sufficiently mitigated.

Relocation of the City of Scotland's sanitary sewer outfall pipe downstream of the new dam would dewater an existing two acres of Palustrine Emergent wetland that currently exist on the downstream face of the old dam. However, the loss of these two acres would be mitigated by new Palustrine Emergent wetlands that would be expected to develop at or adjacent to the downstream face of the dam embankment on either side of the low level outlet works.

Vegetation

A total of 163 acres of the vegetation (some cattails, kochia, canary reed grass, and other grasses) on the old lake bottom and along a short segment of Dawson Creek would be lost via inundation. After inundation, these plants would provide nutrients for and structure essential to phytoplankton and zooplankton survival that support the prey base upon which sport fish rely. Woody growth consisting primarily of red cedar, Russian elm, and a few burr oak between the old spillway and the proposed dam would be inundated and would provide fish habitat and escape cover for prey species.

During construction, removal of vegetation would be limited to only those areas critical to work activities. Disturbed areas and borrow sites would be re-seeded as appropriate. The species that would be disturbed by construction or inundated by the proposed lake are common to southeast South Dakota and their loss would not be expected to result in significant impacts on associated natural resources.

Invasive Species

Existing noxious weeds in the old lake bed would be eliminated during inundation. Construction activities would temporarily create disturbed areas where noxious weeds could become established. To remedy this, contractor(s) would be required to re-seed disturbed areas and Department land management crews would control noxious weeds on Department lands. Therefore, this project is not expected to promote the spread of noxious and/or invasive species.

Wildlife and Habitat

Approximately 163 acres of terrestrial habitat would be lost via inundation and converted to a lacustrine environment. Following completion of the dam and lake, the Game Production Area, including the downstream area, would be fenced and protected from grazing and off-road vehicle passage. Adjacent uplands would be managed to maximize fish and wildlife benefits and protect water quality and the adjacent wetland and lacustrine environments.

Mammals

White-tailed deer may benefit from the expected increase in cattail establishment at the upper reaches of the lake. This shallow end where water enters the lake would widen the area that exhibits conditions favorable to cattail proliferation. Inundation would exclude deer from the lower elevations of the creek channel, the old lake bed, and the newly formed lake bed downstream of the old embankment. This project would not eliminate the lakeshore as a functional travel corridor. The cattail growth in the upper end may serve as escape and winter cover for deer.

Small mammals (mice, moles, voles, pocket mice, and jumping mice) would be temporarily displaced from the area under construction. Similar habitat occurs to the project site to accommodate their dispersal during construction and after the

dam closing. After construction, mammals would be permanently displaced from approximately 163 acres of reestablished lake pool to available adjacent habitats. Therefore, this action would have little, if any, effect on these species.

Birds

Pheasant numbers associated with the proposed project site are restricted by available habitat. Habitat is limited to the upper reaches of the old lake basin where some cattails and kochia are established. Pheasants would be displaced upon inundation until new shallow areas are recolonized by cattail. There is sufficient habitat outside and adjacent to the proposed lake basin area to accommodate dispersion of displaced birds, especially on the bluffs overlooking Dawson Creek.

Passerines (non-game birds), ground feeding seed eaters specifically, may be displaced from the area cleared for parking and the inundated lake basin. As in the case of small mammals, suitable and sufficient habitat is available directly adjacent to the parking area and contiguous with the area under construction to handle those few passerines that are displaced.

Fish and Aquatic Species

The creation of a 163 acre lake would benefit aquatic organisms from an increase in available habitat. The lake would be managed as a permanent warmwater fishery, primarily for largemouth bass and yellow perch, and the impoundment elevations would be maintained at the highest level possible to maintain this fishery (Appendix T and U). Fish and other aquatic organisms indigenous to the area would flourish due to the expansion of total shoreline length and edge habitat. The littoral zone that would be created in conjunction with the new lake would be critical to pelagic fish stocks, plankton production, and all other aquatic dependant organisms. Consequently, impacts to fish species which exist in Dawson Creek upstream of the proposed dam and within the reach that would be inundated are expected to be minimal.

Due to insufficient water for spillway overrun during times of drought, Dawson Creek may be dewatered for approximately 1400 feet from the proposed dam to the confluence of the creek with the South Branch. While low flows or dewatering may adversely affect aquatic organisms in this reach, the condition would not differ significantly from that prior to the dam breach in 1994, nor from the existing circumstances during late summer or drought when there are no flows.

Clams and mussels that may be present during periods of dewatering may be forced to burrow into the mud to await returning wet conditions. Bivalves may perish if dry conditions persist longer than these organisms can tolerate. Bivalves commonly found in streams such as Dawson Creek, however, should be quickly repopulated when sufficient water resumes and fish, which serve as hosts for glochidia, repopulate the stream (Personal Communication, Doug Backlund, Department Wildlife Biologist). Therefore, it appears that dewatering impacts, if any, on these species should be short-term and minimal.

The Broin Ethanol Plant conversion to reverse osmosis water treatment would enhance the aquatic habitat of Dawson Creek by eliminating the 80 degree discharge water.

Invertebrates

The restored and expanded lacustrine environment would provide increased habitat for aquatic invertebrate organisms. Terrestrial invertebrates would be displaced to the upland area which surrounds the project site as the water levels rise. This displacement would not be considered significant as ample additional habitat is available.

Federally-listed Endangered, Threatened, Proposed and Candidate Species and Critical Habitat

No Federally-listed species are known to exist in the immediate area of the proposed project site (Appendix B). However, bald eagles, whooping cranes, interior least terns, piping plovers, and Eskimo curlews may seasonally migrate through the general vicinity of this project. These species would tend to avoid areas where construction activities are under way. Additionally, construction activities would be temporary. Consequently, the proposed project would not have an effect on any of these Federally-listed species.

Topeka Shiner

Potential conflicts and interactions may occur between introduced warm water predators and Topeka shiners (Schrank et al., 2001). To date, however, Topeka shiners have not been found in Dawson Creek despite considerable sampling efforts (Wall, 2002).

There are a number permanent warm water reservoirs on tributaries in South Dakota that contain populations of Topeka shiners or where Topeka shiners have been collected. For example, "University Pond" which occurs in Brookings County contains numerous species of warm water piscivorous predators. Six Mile Creek, which runs through the pond, contains a healthy population of Topeka shiners.

Another example occurs closer to the proposed project site on tributaries of the James River. Wilmarth Lake and Lake Mitchell are both examples of permanent, warm water fisheries stocked with centrarchids and perch. These piscivores are redistributed by high flow overspills which allow them access to Firesteel Creek where Topeka shiners have been found. More importantly, these escaped centrarchids which include crappie, green sunfish, and large mouth bass gain access to the main channel of the James River and are thereby free to access other tributaries of the James River where Topeka shiners are known to exist. Survival of large mouth bass and other centrarchids outside of these impoundments is limited to the James River proper and questionable at best, as they do not attain sufficient size. Additionally, largemouth bass are rare in small tributaries due to tributary size and extreme winter conditions (Personal Communication, Dr. Chuck Berry, Unit Leader, Combined Fish and Wildlife Research Unit at South Dakota State University, and Jeff Shearer, Department Biologist in Pierre, April 26, 2002).

These bodies of water have been managed in this manner for 30 years or more. More importantly, however, there are tributaries between the confluence of Firesteel Creek and the James River and Dawson Creek that contain populations of Topeka shiners.

Historic, Cultural, and Archaeological Resources

The SHPO concurred with the contract archeologist and the Department determination of "No Historic Properties Affected" by the demolition of the aged spillway and other associated construction (Appendix C).

Noise

Major sources of noise associated with the construction would result from the use of heavy equipment during construction. The work would occur during the normal 8-12 hour construction work day. Based on final engineering plans, actual construction time should not exceed 45 days for earth work. Therefore, any construction noise disturbance would be short term. Additional noise over the life of the project would result from access area traffic. These sources of noise, both temporary and long-term, and should not pose unacceptable levels of impact relative to the historic levels of noise caused by regular agricultural field practices.

Socioeconomic Resources

Area aesthetics would be temporarily effected by the presence of large equipment and earth disturbance during construction, but would later be enhanced by reclamation of the site including revegetation with native trees, shrubs and grasses.

Land use would change from agricultural activities to the protection and propagation of fish and wildlife resources and their associated habitats. No significant impacts to the local economy or residents have been identified as a result of this proposed change in land use.

This project would restore water-based recreational benefits, primarily boating and fishing, previously provided by Lake Henry. Area access has been restricted since the embankment was breached in September 1994. Restoration of this local body of water would result in enhanced fishing access in a convenient and economical manner. Intense use is expected immediately upon project completion. The increase in accessible public fishing areas through restoration of this lake would improve the quality of life for local residents and visitors.

This project would provide people of all income levels and minorities access to free, local, public recreation. Because all facilities would be designed to be accessible, no barriers to using this new recreational resource would be present for people with limited physical mobility. The project could also benefit low-income families that use hunting and fishing to support their families.

Cumulative Effects

Drainages such as Dawson Creek are common to Bon Homme County. The 8,215 foot reach involved in this project represents less than 4.0% of the 40-mile segment of Dawson Creek above the dam and 0.4% of the approximately 390 miles of Intermittent Riverine stream systems in all of Bon Homme County. All of these stream systems, including Dawson Creek, feed into the Missouri River system. The Missouri has undergone dramatic changes from a wide variety of human activities. Sediment transport and deposition are critical to maintaining the Missouri's form and dynamics (National Research Council, Committee on Missouri River Ecosystem Science. 2002). This process has been greatly reduced in the past 100 years. The construction of the proposed dam and lake on Dawson Creek would moderate its flood flows, and trap sediment, preventing its transport into the Missouri system downstream. However, since this stream reach represents such a small area in relation to similar stream systems in Bon Homme County and the State, the effect of the proposed action on the Missouri River system would be considered insignificant.

CONSULTATION AND COORDINATION

The Lake Henry Dam Restoration Project proposed in this document has been developed through coordination between the Department, Third South Dakota Planning District, Scotland Lake Henry Association, U.S. Fish and Wildlife Service Ecological Services Office (Pierre, SD), U.S. Fish and Wildlife Service - Office of Federal Aid, South Dakota Department of Environment and Natural Resources, U.S. Environmental Protection Agency, and many interested private persons.

The cost of the project would be funded in part by the following sources:

1) South Dakota Game, Fish and Parks license revenue
2) Community Development Block Grant funds
3) U.S. Fish and Wildlife Service, Federal Aid in Sport Fish Restoration Act funds
4) Scotland Lake Henry Association funds

Project coordinators met with representatives of the Scotland, Lake Henry Association and Third Planning District at Scotland, South Dakota - March 27, 2002. Public support has been high and in favor of the restoration of Lake Henry.

Department representatives met with US Fish and Wildlife Service, Office of Ecological Services, Pierre, regarding potential wildlife/project considerations, April 5, 2002.

The US Fish and Wildlife Service, Office of Federal Aid, met with DEPARTMENT representatives at the project site for review and consultation April 25, 2002.

FWS and Department project coordinators met with Region 8, U.S. Environmental Protection Agency staff to discuss the project - June 27, 2002 in Denver.

Public Notices

A Public Notice of the preparation of a draft Environmental Assessment was published by the South Dakota Department of Game, Fish and Parks in area legal newspapers not later than June 1, 2002 requesting comment on the proposed alternatives expiring April 30, 2002.
No responses were received.

A Public Notice of the availability of the Draft EA was published by the US Fish and Wildlife Service, Region 6, Denver, Federal Aid Office in area legal newspapers not later than June 21, 2002 requesting comment on the proposed alternatives expiring June 21, 2002. More than 150 responses in support of the project were received. The Environmental Protection Agency raised issues of concern in its response (Appendix L). Those issues have been addressed and are attached in Appendices L and M.

Public Comment Summary

Agency/Organization/Public	Number of Respondents	Comments	Response to Comments
Scotland Mayor	One	In Favor of Reconstruction of Lake Henry	No Action
County Commissioners	Five	In Favor of Reconstruction of Lake Henry	No Action
City Council	One	In Favor of Reconstruction of Lake Henry	No Action
Scotland Lake Henry Association	Board Members	In Favor of Reconstruction of Lake Henry	No Action
South Dakota B.A.S.S. Federation	One	In Favor of Reconstruction of Lake Henry	No Action
Lake Menno Development Association	One	In Favor of Reconstruction of Lake Henry	No Action
Scotland Journal	One	In Favor of Reconstruction of Lake Henry	No Action
Randall Resource Conservation and Development Association	One	In Favor of Reconstruction of Lake Henry	No Action
Bon Homme Conservation District	One	In Favor of Reconstruction of Lake Henry	No Action
Local Citizens	150 +	In Favor of Reconstruction of Lake Henry	No Action
U.S. Environmental Protection Agency	One	Appendix L	Responses addressed in the Final EA

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