

**Compliance Report for 2017: Biological Opinion for
Stream-Crossing Projects Administered/Funded by the
South Dakota Department of Transportation and the
Federal Highway Administration**

By:

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Environmental Section Office
March 2018

Submitted to:

United States Fish and Wildlife Service
Mountain-Prairie Region 6
South Dakota Ecological Services Office
Pierre, SD

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Introduction:

In August of 2008 a new Biological Opinion (Opinion) was accepted by the United States Fish and Wildlife Service (FWS) for projects implemented by the South Dakota Department of Transportation (SDDOT) and the Federal Highway Administration (FHWA). The new 2008 Opinion replaced a prior 2004 Opinion which had included Terms and Conditions (TCs) that limited timing of construction and caused delays in post-construction site restoration. These TCs were designed to be protective of individual Topeka shiners, but further analysis revealed they were logistically problematic and did not appear to provide significant conservation benefit to Topeka shiner populations. The 2004 Opinion also contained detailed, numerous TCs that were drawn from the SDDOT's *Special Provision for Construction Practices in Streams Inhabited by the Topeka Shiner* (December 9, 2003 version). However, it was later determined that not all of these measures were feasible on every project, thus additional flexibility was needed, resulting in the 2008 Opinion. One aspect of the new 2008 Opinion is incorporation of several Reasonable and Prudent Measures (RPMs) for projects which affect the Topeka shiner and/or American burying beetle. These RPMs are non-discretionary and must be implemented on projects impacting the Topeka shiner and/or American burying beetle so that they become binding conditions of construction activities authorized, funded or carried out by FHWA/SDDOT.

Topeka shiner RPMs:

In this newest 2008 Opinion, policy changes allowed construction projects to proceed during the previous "blackout period" (May to August). However, for implementation of

this “no blackout” construction schedule, some new and additional RPMs were set in place for projects appended to the 2008 Opinion for Topeka shiner:

- 1) Habitat fragmentation/ Fish Passage
- 2) Minimize Fish Mortality
- 3) Sediment and Erosion Controls
- 4) Monitoring
- 5) Training
- 6) Reporting
- 7) Including Current or New Scientific Information

In this document, data will be included for 1) each RPM which can be found in the reporting forms (Appendix I) and in the text to follow, 2) the efforts to implement a monitoring program, 3) turbidity monitoring at construction sites, and 4) a brief section on recent scientific publications.

In addition to the new RPMs, three Conservation Recommendations (CR) were implemented in the Opinion:

- 1) Develop methodology to identify, track, and prioritize, for replacement, any existing structures that are found to fragment Topeka shiner habitat.
- 2) Develop strategies that can enhance riparian habitat along known and potential Topeka shiner streams.
- 3) Develop strategies to improve in-stream habitat for Topeka shiners.

During Type, Size, & Location (TS&L) and preconstruction meetings, riparian habitat protection measures are usually discussed with contractors and engineers.

Typically, this involves recommending bioengineering around the structure, maintaining

a section of natural stream bottom through the structure (if a bridge is going in), and ensuring all erosion and sediment control Best Management Practices (BMPs) will be used and maintained accurately. Development of construction practices which will protect or improve habitat available to stream fish (including the Topeka shiner) is under consideration.

Summary of Construction Activities - Topeka Shiner:

In this Annual Compliance Report, data related to construction completed in 2017 at 11 bridges and culverts will be documented (Tables 1 and 2). This data will relate to Reasonable and Prudent Measures (RPMs) and Conservation Measures (CMs) indicated in the Biological Opinion: Stream-Crossing projects funded/administered by the South Dakota Department of Transportation and the Federal Highway Administration. All structures reported on in this document were completed between January 1st, 2017 and December 31st, 2017. It should be noted that with limited resources and the complications of locating projects, it is possible that a minimal number of “Affect, Not Likely to Adversely Affect” projects may be missing from this document. It is certain that all “Affect, Likely to Adversely Affect” projects have been located and totaled for this report. At present, a way to collect and file documents related to the Biological Assessments (BAs) is being devised.

For nine construction projects completed during 2017 that were “Likely to Adversely Affect” the Topeka shiner, 13.78 acres of riparian area were temporarily affected by vehicles or construction activities. Six of the nine projects listed in the SDDOT Project Reporting Forms affected over 1.0 acre; two of which affected ≥ 2.0

acres. Three of the nine projects affected between 0.27 and 0.80 acres. Observations of projects under construction indicated that the reported 0.40 to 0.80 acres may be greater than the area that is actually affected by activities.

Summary of Problems Encountered During Construction:

Contractors and Project Engineers were informed of requirements listed in the *Biological Opinion* and the *Topeka Shiner Special Provision*. To our knowledge, requirements were followed for projects completed in 2017 with two exceptions. During project inspection, it was observed that erosion control was insufficient and installed incorrectly at structures 06-184/185-218 in Brookings County, and structure 50-208-022 in Minnehaha County (pages 27-28 and 39-40 of this report). The SDDOT Project Engineer and the primary contractor were notified of these problems. Erosion and sediment control BMPs were corrected.

Summary of Habitat Impacts:

Stream-crossing projects completed in 2017 which were listed to “Affect, Likely to Adversely Affect” the Topeka shiner totaled 9; and two projects were listed “Affect, Not Likely to Adversely Affect” the Topeka shiner (Table 1). The RPMs of the Opinion are applied on projects which will “Adversely Affect.” This is due to the assumption that anticipated “take” of Topeka shiner is expected to be zero at sites “Not Likely to Adversely Affect.”

The nine stream crossing projects permanently impacted 1,251.25 total feet of stream channel. This length of channel impact is primarily due to placement of structures, scour protection in and along the stream, and riprap erosion protection along the banks of

the stream. Riprap placement comprised 1,009 feet of the 1,251.25 total feet of stream channel impact. The remaining 242.25 feet of the 1,251.25 feet of total stream channel impact was due to replacing an old structure with a new longer structure, or extending the ends of an existing structure.

The majority of the 1,009 feet of permanent riprap impact to stream channels was accounted for by placement of riprap for scour protection projects at bridge abutments, and upstream and downstream of bridge abutments (924 total feet). The balance of the 1,009 feet of permanent riprap impact to stream channels (85 total feet) occurred at inlets and outlets of box culverts. Additional information on the permanently impacted stream channels due to the nine 2017 stream-crossing projects is provided in Table 2.

Flowlines and Bankfull Width in Relation to Fish Passage

The first RPM for projects affecting the Topeka shiner requires that stream-crossing projects will not impact stream connectivity or fish movement. In general, culvert projects affect more stream channel than bridge projects. Lengths of stream impacts reported in this document do not make any suggestion of the severity of impacts at individual project sites. Although culverts impacted more stream length than bridges, RPMs implemented at culvert projects minimized impacts to stream channels. All new culverts were lowered at least twelve inches based on elevations of the stream channel per the 2008 Opinion's Fish Passage RPM. From these elevations, linear regressions were ran and provided an estimation of flowlines; and the expected depth culverts should be countersunk to allow natural geomorphic processes to occur within the box culvert.

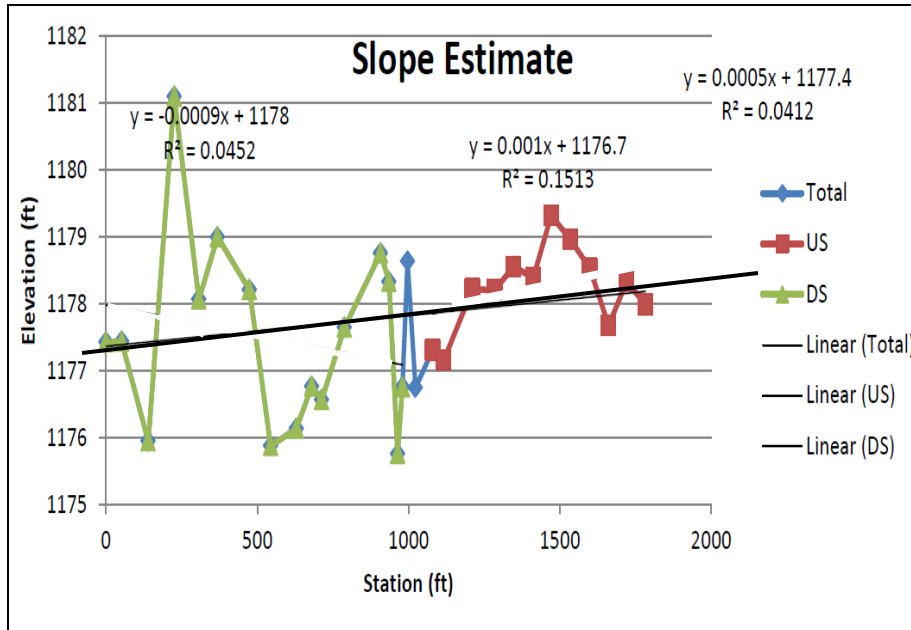


Figure 1: Flowline regression example for a project in Clay County (PCN 025D). Colored points are actual elevations provided by our consultants. With this data a trendline is set (and can be seen in the heavy solid black line). This is the expected flowline given the data and an elevation for the structure can be identified at the roadway station (in this example the roadway is at station 1000). Elevation of culvert floor is set 12” below expected flowline.

Furthermore, the U.S. Army Corps of Engineers (COE) has also required new culverts and pipes at stream-crossing projects to be countersunk a minimum of 12 inches since March 2012.

In addition to ensuring fish passage by sinking the culvert floor, bankfull width of the channel is also measured based on the Q2 (normal discharge elevation) at five locations upstream and five locations downstream of the culvert or bridge. All channel profiles are provided by our consultants and have been standardized to every hundred feet for each measurement. Anomalies in the stream are bypassed, such as the area near the structure or an area in which two streams come together, to give a more accurate representation of the stream channel. From this data, an average bankfull width is

determined, multiplied by 1.2 and then compared to the widths of potential structure options. Structure options typically take this measurement into consideration already; if they have not then SDDOT requires redesign of the structure.

Fish Mortality Minimization

The second RPM for the 2008 Opinion is to minimize fish mortality. RPM 2 is listed for each project in Table 3. Fish rescue/relocation (by seining) was conducted in 2017 at two sites where work was determined 'Likely to Adversely Affect' Topeka shiners (Union 01DY, Sanborn 02EV). Construction activities were completed at both sites in calendar year 2017. It is expected that two unfinished stream-crossing project sites (Minnehaha PCN 021X (westbound I-29 lanes bridge) and Union 01DZ) will be included in the Annual Compliance Report for calendar year 2018. Two sites where seining was conducted in calendar year 2016 (PCN 01W8, structure 63-070-041, and PCN 025C, structure 50-208-022) are also included in this report, since construction activities were completed in calendar year 2017.

Sediment and Erosion Control

The third RPM for the 2008 Opinion is to implement, monitor, and maintain comprehensive and effective sediment/erosion control plans during all phases of construction, including post-construction, until sites are permanently stabilized.

RPM 3 is listed for each project in Table 3.

Turbidity Monitoring:

For projects appended to the Opinion for Topeka shiner, monitoring of turbidity 100 feet downstream of the construction area is required by the *SDDOT Special Provision for Construction Practices in Streams Inhabited by the Topeka Shiner* (2010 version) to ensure that sediment and erosion control BMPs are functioning properly and not significantly raising stream turbidity. The *SDDOT Special Provision for Construction Practices in Streams Inhabited by the Topeka Shiner* requires that stream water measurements remain within 50 NTUs of the background turbidity. All SDDOT Project Engineers have been provided with our Turbidity Reporting Form (DOT-283). Engineers are informed during preconstruction meetings of the need to monitor turbidity at stream crossing construction projects. They are also informed of the need to provide copies of completed Turbidity Reporting Forms to the DOT Environmental Office within 14 days of each measurement.

Observations were made through the field season to check condition of turbidity meters for quality assurance purposes.

Reporting and Monitoring

RPM 4 refers to the monitoring of all replaced structures found to “Adversely Affect” Topeka shiners. During development of the Monitoring Program, numerous data sources were examined. Wayne Stancill (FWS), Nathan Morey (COE), and Ryan Huber (SDDOT) provided necessary information on measurements for such a program. The Monitoring Program Plan “*South Dakota Fish Passage Monitoring Protocol for Projects Regulated by the 2008 Programmatic Biological Opinion: Stream Crossing*

Projects Administered/Funded by the South Dakota Department of Transportation and the Federal Highway Administration” was completed and approved by FWS, FHWA, and SDDOT in July 2012 (Appendix III). After approval of the Monitoring Program Plan, representatives from FWS, FHWA, and SDDOT continued to discuss and revise data collection methods and guidelines. In October 2012, this group agreed upon a set of data collection guidelines and a ‘*SDDOT Fish Passage Assessment Work Sheet*’ for use beginning in 2012.

Scheduled initial post-construction monitoring of nine structures with ‘May Affect, Likely to Adversely Affect’ Topeka shiner determinations; and 2016 completion dates, was conducted in July 2017. Scheduled third-year monitoring was also conducted at nine structures constructed in 2015, as indicated in the Monitoring Plan. Scheduled fifth-year monitoring, as indicated in the Monitoring Plan was also conducted at 21 structures where construction was completed in 2013. In addition, one structure site (Lincoln PCN 6582, structure 42-050-199) was re-monitored specifically because concerns were raised after previous monitoring seasons. As a condition of the Monitoring Plan, the *2017 Monitoring Report* is submitted with the *2017 Annual Compliance Report*. Within one month of distribution of the *2017 Monitoring Report* (or other time agreed to by all parties), the FWS, FHWA, and SDDOT will meet to review the *2017 Monitoring Report* findings. Revisions will be discussed and implemented as needed to meet the terms and conditions of the Opinion.

RPM 6 refers to the requirement that an annual report will be provided which reviews activities conducted under the Opinion. RPM 6 is satisfied by submission of this annual Compliance Report for 2017.

Training

As listed in the Opinion, RPM 5 is carried out at preconstruction meetings where we ensure that contractors are aware of all requirements for fish passage, any diversion channel work, and all erosion control methods. In addition, turbidity meters are also discussed (when, where, and how to use) for quality assurance. Reporting forms for turbidity meters have been covered and a copy is taken to each preconstruction meeting in case Area Engineers or Project Engineers do not have a copy with them. These forms are completed during construction; and observed turbidity, over the background, is double checked for any anomalies.

SDDOT employees and contractors continue to attend Sediment and Erosion Control Training each spring. As of December 31, 2017, approximately 510 people have gone through the Sediment and Erosion Control Training and have maintained their certification.

Maintaining competency in small fish identification is critical during fish rescue (seining) operations at stream crossing projects. On June 6, 2017 the SDDOT wildlife biologist, a summer intern, and three environmental scientists from the SDDOT Environmental Office participated in a small fish identification workshop at Brookings, SD. On August 17, the wildlife biologist and two environmental scientists participated in prairie stream fish identification, as part of a field survey coordinated by Jesse Wilkins (South Dakota Department of Environment and Natural Resources (DENR)) and Chelsea Pasbrig (South Dakota Department of Game, Fish, & Parks (GF&P)). Participating in these workshops improves and reinforces fish identification skills. Continued participation in these types of experiences for all SDDOT Environmental Office staff

who might participate in seining is recommended as a means of developing and maintaining small fish identification skills.

New Scientific Information

RPM 7 states that new scientific information will be integrated as it becomes available. Researchers at South Dakota State University have recently begun conducting research on the use of portable fish ladders for use on perched culverts and pipes. Several SDDOT structures have been used in this research.

The Minnesota DOT recently sponsored research examining effects of longer box culverts on fish passage (MnDOT Technical Report 2017-44). As box culverts become longer, there has been a need to examine the effects of these longer, darker structures on movement of Topeka shiner and other small fishes. Longest and darkest box culverts showed some reduced fish movement, compared to control structures in the study. However, the Minnesota research indicated that the lower light levels in longer culverts did not solely hinder movement of Topeka shiner and other small prairie stream species.

American Burying Beetle RPMs:

As part of the Opinion, Reasonable and Prudent Measures (RPMs) were also set in place for projects affecting the American burying beetle:

- 1) Avoidance or Minimizing Habitat Disturbance (Ground-disturbing Activities) in Riparian and Grassland Habitats
- 2) Training
- 3) Reporting
- 4) Including Current or New Scientific Information

In this document, data is included on each RPM, which can be found in the reporting forms (Appendix II) and in the text to follow.

Summary of Construction Activities - American Burying Beetle:

In this Annual Compliance Report, data related to construction at one structure replacement project built in the State of South Dakota by the Department of Transportation will be documented (Table 5 and 6). This data will relate to Reasonable and Prudent Measures (RPMs) and Conservation Measures (CMs) indicated in the Biological Opinion: Stream-Crossing projects funded/administered by the South Dakota Department of Transportation and the Federal Highway Administration. All structures reported in this document were completed between January 1st, 2017 and December 31st, 2017. It should be noted that with limited resources and the complications of locating projects, it is possible that a minimal number of “Affect, Not Likely to Adversely Affect” projects may be missing from this document. It is certain that all “Affect, Likely to Adversely Affect” projects have been located and totaled for this report. At present, a

way to collect and file documents related to the Biological Assessments (BAs) is being devised.

For one structure replacement project completed within the American burying beetle range during 2017, approximately 1.09 acres were temporarily affected by vehicles or construction activities.

Summary of Habitat Impacts:

One project completed in 2017 was determined to “Affect, Likely to Adversely Affect” the American burying beetle (Table 5). The four RPMs of the Opinion specific to American burying beetle are applied on projects which will affect the American burying beetle.” This is due to the assumption that anticipated “take” of American burying beetle is expected to be zero at sites “Not Likely to Adversely Affect.”

This project did occur in a partially wooded area associated with stream habitat. Project work limits were pulled in to the greatest extent possible to reduce the area impacted by ground-disturbing activities (Table 5).

Avoidance/Minimizing Habitat Disturbance (Ground-disturbing Activities)

The first RPM for the Opinion is to minimize riparian and grassland habitat during construction of stream crossing structures. During the environmental clearance process, we ensure that contractors, Area Engineers, and Project Engineers are aware of all requirements for minimizing ground-disturbing activities in riparian and grassland communities located within Tripp, Todd, Gregory, and Bennett counties. We continue to provide this information at TS&L and preconstruction meetings within known American

burying beetle range. Riparian and grassland habitats are avoided with exception of activities critical to the construction process and that are specified in the project plans. Ground-disturbing activities outside of the project work limits are reviewed by the SDDOT environmental office and are not allowed if those activities may impact the American burying beetle. All efforts are made to minimize the construction footprint at these sites.

Training

As listed in the Opinion, RPM 2 is carried out at preconstruction meetings where we ensure that contractors and Project Engineers are aware of all requirements for minimizing ground-disturbing activities in riparian and grassland communities. Area Engineers and Project Engineers within known American burying beetle range are made aware of all requirements of the 2008 Biological Opinion.

Reporting

RPM 3 refers to the requirement that an annual report will be provided which reviews activities conducted under the Opinion. RPM 3 is satisfied by submission of this annual Compliance Report for 2017.

New Scientific Information

RPM 4 states that new scientific information will be integrated as it becomes available. During 2017, no new scientific information involving American burying beetle was located.

Table 1. Project identification, location, and Topeka shiner determination for stream crossing projects covered that involved construction between January 1, 2017 and December 31, 2017.

PCN	County	Project Number	Structure Number	Stream	Latitude	Longitude	Topeka shiner Status
02E1	Spink	BRO 8058(17)	58-099-251	Turtle Creek	44.8778	-98.5060	ALTAA
021X	Minnehaha	IM 0909(81)406	50-284-166	Split Rock Creek	43.6085	-96.5636	ALTAA
025C	Minnehaha	P 0115(47)102	50-208-022	Big Sioux River	43.8172	-96.7132	ALTAA
01W8	Turner	BRF 6355(09)	63-070-041	West Fork Vermillion River	43.44274	-97.26103	ALTAA
01DY	Union	BRF 6397(03)	64-050-060	East Brule Creek	42.9966	-96.7069	ALTAA
6867	Clay	BRO 8014(26)	14-110-056	Unnamed trib. to Vermillion River	43.0030	-96.9432	ALTAA
02T6	Beadle	BRO 8003(23)	03-055-280	Unnamed Creek	44.2258	-98.5900	ALTAA
02EV	Sanborn	BRO 8056(13)	56-228-070	West Redstone Creek	44.0966	-97.8744	ALTAA
022C	Brookings	IM 0295(35)127	06-184/185-218	Medary Creek	44.2282	-96.7570	ALTAA
01W9	Brookings	BRF 6295(10)	06-120-012	Big Sioux River	44.528402	-96.88890	ANLTAA
03A6	Spink	NH 0212(160)306	58-086-251	Turtle Creek	44.8778	-98.5284	ANLTAA

Only projects affecting the Topeka shiner are included in this table. Projects determined to “Affect, likely to adversely affect” this species are signified by ALTAA. Projects determined to “Affect, not likely to adversely affect” this species are signified by ANLTAA.

Table 2. Stream length impacted by the new stream crossing (2017) and stream length impacted by the previous stream crossing.

PCN	Structure Number	Old Structure Type	Old Structure Length (ft)	Old Structure Width (ft)	New Structure Type	New Structure Length (ft)	New Structure Width (ft)	Total Impacted Length (ft)
02E1	58-099-251	Bridge	26.50	25.00	Bridge	32.00	42.00	150.00
021X	50-284-166	Bridge	42.00	330.00	Bridge	52.75	378.50	160.00
025C	50-208-022	Bridge	40.00	307.50	Bridge	53.50	378.5	110.00
01W8	63-070-041	Bridge	30.10	101.50	Bridge	32.50	114.50	65.00
01DY	64-050-060	Bridge	24.00	67.60	Bridge	30.75	102.75	200.00
6867	14-110-056	Bridge	22.00	25.60	Box Culvert	92.25	20.00	137.25
02T6	03-055-280	Bridge	22.00	33.00	Box Culvert	69.00	24.00	84.00
02EV	56-228-070	Bridge	20.00	39.50	Box Culvert	78.00	36.00	106.00
022C	06-184/185-218	Bridge	70.00	151.50	Scour Protection	NA	NA	239.00
								Ttl 1251.25

Structure width was defined as the opening width of a culvert including all barrels or the opening width of a bridge measured from abutment to abutment. Structure length was defined as the longitudinal length of stream channel impacted by a culvert, bridge abutment, or bridge column. Total impacted length was defined as the longitudinal stream length impacted by both the stream crossings structure and riprap scour protection.

Table 3. A summary of RPMs implemented at 2017 projects that were “Likely to Adversely Affect” the Topeka shiner.

PCN	Structure #	RPM 1	RPM 2	RPM 3	RPM 4	RPM 5	RPM 6	RPM 7
02E1	58-099-251	Yes*	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes
021X	50-284-166	Yes*	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes
025C	50-208-022	Yes*	Yes	Yes	Yes	Yes	Yes	Yes
01W8	63-070-041	Yes*	Yes	Yes	Yes	Yes	Yes	Yes
01DY	64-050-060	Yes*	Yes	Yes	Yes	Yes	Yes	Yes
6867	14-110-056	Yes	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes
02T6	03-055-280	Yes	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes
02EV	56-228-070	Yes	Yes	Yes	Yes	Yes	Yes	Yes
022C	06-184/185-218	Yes*	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes

A description of the RPMs listed in this table is given on page 1 of this report.

‡ Project did not require dewatering or isolating work zones within a stream, therefore, not requiring fish removal. However, all projects did maintain stream connectivity.

* These structures were bridges, which by USFWS permission did not require countersinking but all other fish passage measures were implemented.

Table 4. A summary of seining information at 2017 completed projects that were “Likely to Adversely Affect” the Topeka shiner.

PCN	Structure #	County/Stream	Seined	Topeka Shiners/ Mortality	Comments
02E1	58-099-251	Spink/Turtle Creek	No	NA	Project was bridge. Work zones isolated with floating silt curtain. Dewatering did not occur
021X	50-284-166	Minnehaha/Split Rock Creek	No	NA	Project was bridge. Work zones isolated with floating silt curtain. Dewatering did not occur
025C	50-208-022	Minnehaha/Dells of Big Sioux River	Yes	0/0	No fish were encountered within the cofferdam where dewatering occurred.
01W8	63-070-041	Turner/West Fork of Vermillion River	Yes	0/0	Species: green sunfish, orange-spotted sunfish, common shiner, red shiner, sand shiner, emerald shiner, fathead minnow, brassy minnow, creek chub, Johnny darter, channel catfish, crayfish. Seining was only conducted within cofferdams where dewatering occurred.
01DY	64-050-060	Union/East Brule Creek	Yes	0/0	Species: common shiner, creek chub. Seining was only conducted within cofferdams where dewatering occurred.
6867	14-110-056	Clay/Unnamed Trib. to Vermillion River	No	NA	Stream was dry when diversion installed. No seining was needed.
02T6	03-055-280	Beadle/Unnamed creek	No	NA	Stream was dry when diversion installed. No seining was needed.
02EV	56-228-070	Sanborn/West Redstone Creek	Yes	0/0	No fish were encountered during seining event.
022C	06-184/185-218	Brookings/Medary Creek	No	NA	Project was bridge berm scour protection. Work zones isolated with floating silt curtain. Dewatering did not occur.

Additional information for individual structures listed in this table is provided in Appendix I of this report.

Table 5. Project identification, location, and American burying beetle determination for stream crossing projects covered that involved construction between January 1, 2017 and December 31, 2017.

PCN	County	Project Number	Structure Number	Stream	Section	Township & Range	American Burying Beetle Status
6749	Tripp	BRF 6301(05)	62-141-477	Keya Paha River	Sec. 32 & 33	T96N R77W	ALTAA

Only projects affecting the American burying beetle are included in this table. Projects determined to “Affect, likely to adversely affect” this species are signified by ALTAA. Projects determined to “Affect, not likely to adversely affect” this species are signified by ANLTAA.

Table 6. Stream length impacted by the new stream crossing (2017) and stream length impacted by the previous stream crossing.

PCN	Structure Number	Old Structure Type	Old Structure Length (ft)	Old Structure Width (ft)	New Structure Type	New Structure Length (ft)	New Structure Width (ft)	Total Impacted Length (ft)
6749	62-141-477	Bridge	30.00	115.00	Bridge	32.50	82.00	96.00

Structure width was defined as the opening width of a culvert including all barrels or the opening width of a bridge measured from abutment to abutment. Structure length was defined as the longitudinal length of stream channel impacted by a culvert, bridge abutment, or bridge column. Total impacted length was defined as the longitudinal stream length impacted by both the stream crossings structure and riprap scour protection.

Table 7. A summary of RPMs implemented at 2017 projects that were “Likely to Adversely Affect” the American burying beetle.

PCN	Structure #	RPM 1	RPM 2	RPM 3	RPM 4
6749	62-141-477	Yes	Yes	Yes	Yes

A description of the RPMs listed in this table is given on page 12 of this report.

Appendix I
**Individual stream crossing reporting forms for projects that
were constructed in 2017 and also impacted Topeka shiner.**

SDDOT Project Reporting Form

PCN: 02E1	DOT Region: Aberdeen
Project Number: BRO 8058(17)	DOT Area: Huron
Structure Number: 58-099-251	Project Biologist: Craig Olawsky
Latitude: 44.8778	Project Engineer: Jordan Brown
Longitude: -98.5060	Primary Contractor: Wanzek Constr.
County: Spink	Start Date: 04/20/2017
Stream Name: Turtle Creek	Completion Date: 9/8/2017
Watershed: James	Existing Structure: Bridge
Structure Ownership: City of Redfield	New Structure: Bridge

Stream Habitat

Description of stream habitat: Wide, slow moving stream.

Impacts to Stream Habitat:

Disturbed Area (acres):	0.46
Structure Length (ft):	32.00
Permanent Impacted Length (ft):	150.00
Structure Width (ft):	42.00
Length Previous Structure (ft):	26.50
Width of Previous Structure (ft):	25.00
Countersink Depth (inches):	Not applicable

Comments: This project was a bridge and had minimal impact to the active stream channel. Dewatering of stream habitat did not occur.

Diversion Channel

Diversion channel type: A diversion channel was not used.
 Temporary water barrier type:
 Date installation:
 Date removed:

Description of stream flow: Typical flow.

Comments: Construction zone was isolated with floating silt curtain, which allowed continued stream flow. A riprap work platform was installed across the stream on 5/3/2017, and removed 5/30/2017. Two 24" diameter pipes, running through the riprap work platform, provided fish passage and maintained stream flow.

Erosion and Sediment Control

BMPs implemented: High flow silt fence, floating silt curtain, erosion control wattles, type 2 erosion control blanket, straw mulching, permanent seeding, class B riprap.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: Construction zone was isolated with floating silt curtain. A riprap work platform was installed across the stream, with two 24" diameter pipes running through the riprap work platform to maintain fish passage. No fish rescue was required.

Topeka shiner mortality: Presumed to be zero.

Comments:

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 021X	DOT Region: Mitchell
Project Number: IM 0909(81)406	DOT Area: Sioux Falls
Structure Number: 50-284-166	Project Biologist: Craig Olawsky
Latitude: 43.6085	Project Engineer: Kirk Henderson
Longitude: -96.5675	Primary Contractor: Duininck, Inc
County: Minnehaha	Start Date: 03/20/2017
Stream Name: Split Rock Creek	Completion Date: 11/03/2017
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: State	New Structure: Bridge

Stream Habitat

Description of stream habitat: Wide, slow moving stream.

Impacts to Stream Habitat:

Disturbed Area (acres):	2.00
Structure Length (ft):	52.75
Permanent Impacted Length (ft):	160.00
Structure Width (ft):	378.50
Length Previous Structure (ft):	42.00
Width of Previous Structure (ft):	330.00
Countersink Depth (inches):	Not applicable

Comments: This project was an Interstate 90 bridge and had minimal impact to the active stream channel. Structure 50-284-166 (east-bound lane) was completed in 2017. Work on twin structure 50-284-165 (west-bound lane) will be conducted in 2018.

Diversion Channel

Diversion channel type:	Porta-Dam water barrier
Temporary water barrier type:	Steel sheet pile
Date installation:	04/10/2017
Date removed:	06/16/2017

Description of stream flow: Typical to low flow.

Comments: Construction zone was isolated with floating silt curtain. Instead of an excavated diversion channel, a 'Porta-Dam' was placed in the same manner as a floating silt curtain (pushed out into the stream channel from the shore to avoid fish entrapment) to allow continued stream flow and maintain fish passage.

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, floating silt curtain, erosion control wattles, type 3 erosion control blanket, straw mulching, soil stabilizer, permanent seeding, class B riprap.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: Construction zone was isolated with floating silt curtain and 'Porta-Dam' to maintain fish passage. No fish rescue was required.

Topeka shiner mortality: Presumed to be zero.

Comments:

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 025C	DOT Region: Mitchell
Project Number: P 0115(47)102	DOT Area: Sioux Falls
Structure Number: 50-208-022	Project Biologist: Craig Olawsky
Latitude: 43.8172	Project Engineer: Steve Neumeister
Longitude: -96.7132	Primary Contractor: Reede Construction
County: Minnehaha	Start Date: 04/04/2016
Stream Name: Dells of Big Sioux River	Completion Date: 07/06/2017
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: State	New Structure: Bridge

Stream Habitat

Description of stream habitat: Slow moving river with high turbidity.

Impacts to Stream Habitat:

Disturbed Area (acres):	2.50
Structure Length (ft):	53.50
Permanent Impacted Length (ft):	110.00
Structure Width (ft):	378.50
Length Previous Structure (ft):	40.00
Width of Previous Structure (ft):	307.50
Countersink Depth (inches):	Not applicable

Comments: This project was a bridge and had minimal impact to the active stream channel. Dewatering of stream habitat only occurred within one cofferdam; the second cofferdam was installed when the specific location was dry.

Diversion Channel

Diversion channel type: A diversion channel was not used.
 Temporary water barrier type:
 Date installation:
 Date removed:

Description of stream flow: Average flow.

Comments: Construction zone was isolated with floating silt curtain to allow continued stream flow. Cofferdams were installed around piers, and water was pumped out of the one cofferdam that contained water at the time of cofferdam construction.

Erosion and Sediment Control

BMPs implemented: High flow silt fence, low flow silt fence, floating silt curtain, erosion control wattles, straw mulching, permanent seeding, class B riprap.

Comments: BMPs were not installed or maintained correctly on 9/19/2016 during site visit. Project Engineer was instructed to correct the situation. During site visit the next week, BMPs appeared to have been effective and functional.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining event (9/19/2016) inside cofferdam.

Topeka shiner mortality: Presumed to be zero.

Comments: No fish found during 9/19/2016 seining event at cofferdam.

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 01W8	DOT Region: Mitchell
Project Number: BRF 6355(09)	DOT Area: Yankton
Structure Number: 63-070-041	Project Biologist: Craig Olawsky
Latitude: 43.44274	Project Engineer: Joe Sestak
Longitude: -97.26103	Primary Contractor: Duininck, Inc
County: Turner	Start Date: 08/01/2016
Stream Name: West Fork of Vermillion River	Completion Date: 05/07/2017
Watershed: Vermillion	Existing Structure: Bridge
Structure Ownership: County	New Structure: Bridge

Stream Habitat

Description of stream habitat: Wide, deeply incised, slow moving river with high turbidity, due to upstream production agriculture with few vegetated buffers.

Impacts to Stream Habitat:

Disturbed Area (acres):	3.40
Structure Length (ft):	32.50
Permanent Impacted Length (ft):	65.00
Structure Width (ft):	114.50
Length Previous Structure (ft):	30.10
Width of Previous Structure (ft):	101.50
Countersink Depth (inches):	Not applicable

Comments: This project was a bridge and had minimal impact to the active stream channel. Dewatering of stream habitat only occurred within cofferdams surrounding bridge piers. Plans show riprap associated with the new bridge and scour protection is countersunk 12 inches to prevent fish passage barriers.

Diversion Channel

Diversion channel type:	A diversion channel was not used.
Temporary water barrier type:	Steel sheet pile and corrugated metal pipe were used to direct water through the work area and maintain fish passage during placement of riprap under the stream channel. Cofferdams were installed around the two pier locations.
Date installation:	10/03/2016
Date removed:	01/22/2017

Description of stream flow: Low flow.

Comments: Construction zone was isolated with floating silt curtain to allow continued normal stream flow. Cofferdams were installed around the two piers and at riprap placement sites. Water was then pumped out of the area inside the cofferdams.

Erosion and Sediment Control

BMPs implemented: High flow silt fence, floating silt curtain, erosion control wattles, type 2 erosion control blanket, straw mulching, permanent seeding, class B riprap.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining events (8/2/2016, 8/8/2016, and 10/6/2016) inside cofferdams.

Topeka shiner mortality: Presumed to be zero.

Comments: Other species included green sunfish, orange-spotted sunfish, common shiner, red shiner, sand shiner, emerald shiner, fathead minnow, brassy minnow, creek chub, Johnny darter, channel catfish, crayfish.

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 01DY	DOT Region: Mitchell
Project Number: BRF 6397(03)	DOT Area: Yankton
Structure Number: 64-050-060	Project Biologist: Craig Olawsky
Latitude: 42.9966	Project Engineer: Kevin Heiman
Longitude: -96.7069	Primary Contractor: Grangaard Construction
County: Union	Start Date: 01/03/2017
Stream Name: East Fork - Brule Creek	Completion Date: 09/20/2017
Watershed: Big Sioux River	Existing Structure: Bridge
Structure Ownership: County	New Structure: Bridge

Stream Habitat

Description of stream habitat: Slow moving stream with high turbidity, due to upstream production agriculture with few vegetated buffers.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.26
Structure Length (ft):	30.75
Permanent Impacted Length (ft):	200.00
Structure Width (ft):	102.75
Length Previous Structure (ft):	24.00
Width of Previous Structure (ft):	67.60
Countersink Depth (inches):	Not applicable

Comments: This project was a bridge and had minimal impact to the active stream channel. Dewatering of stream habitat only occurred within the two cofferdams.

Diversion Channel

Diversion channel type: A diversion channel was not used.
 Temporary water barrier type:
 Date installation:
 Date removed:

Description of stream flow: Typical summer flow.

Comments: Construction zone was isolated with floating silt curtain. During construction, a riprap work platform was installed across the stream on 1/20/2017, and removed 7/13/2017. A 60” diameter pipe, running through the riprap work platform, provided fish passage and maintained stream flow. A 50’ x 20’ cofferdam was installed around the pier 2 work area, and water was pumped out of the area inside the cofferdam. After work was completed, the cofferdam was removed; and the process was repeated for pier 3 work area.

Erosion and Sediment Control

BMPs implemented: High flow silt fence, floating silt curtain, erosion control wattles, type 2 erosion control blanket, straw mulching, permanent seeding, class B riprap.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining events (3/30/2017 and 5/5/2017) prior to dewatering inside cofferdams.

Topeka shiner mortality: Presumed to be zero.

Comments: Species included creek chub, common shiner.

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 6867	DOT Region: Mitchell
Project Number: BRO 8014(26)	DOT Area: Yankton
Structure Number: 14-110-056	Project Biologist: Craig Olawsky
Latitude: 43.0030	Project Engineer: Brian Wenisch
Longitude: -96.9432	Primary Contractor: Dakota Contracting
County: Clay	Start Date: 04/03/2017
Stream Name: Unnamed Trib. to Vermillion River	Completion Date: 08/11/2017
Watershed: Vermillion	Existing Structure: Bridge
Structure Ownership: County	New Structure: Box Culvert

Stream Habitat

Description of stream habitat: Intermittent prairie stream habitat. Pasture/hayland is adjacent land use.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.39
Structure Length (ft):	95.25 (57.00 barrel+38.25' wingwalls)
Permanent Impacted Length (ft):	137.25 42' is riprap
Structure Width (ft):	20.00 (2- 10'x10' x 95')
Length Previous Structure (ft):	22.00
Width of Previous Structure (ft):	25.60
Countersink Depth (inches):	12

Comments: The new culvert is wider than the bankfull stream channel width and is not expected to impact channel morphology or fish movement. Dewatering of stream habitat did not occur (stream was dry at time of temporary diversion channel installation).

Diversion Channel

Diversion channel type:	Fabric lined excavated channel with corrugated metal pipe
Temporary water barrier type:	Steel sheet pile
Date installation:	04/27/2017
Date removed:	07/20/2017

Description of stream flow: Dry at time of temporary diversion channel installation.

Comments: Site was dry at time of temporary diversion channel installation.

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, vegetated buffers, straw mulching, erosion control wattles, erosion control blanket, riprap, permanent seeding.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: Site was dry when temporary diversion channel was installed; no seining was required.

Topeka shiner mortality: 0

Comments: None

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 02T6	DOT Region: Aberdeen
Project Number: BRO 8003(23)	DOT Area: Huron
Structure Number: 03-055-280	Project Biologist: Craig Olawsky
Latitude: 44.2258	Project Engineer: Trevor Johnson
Longitude: -98.5900	Primary Contractor: Dakota Contracting
County: Beadle	Start Date: 08/11/2017
Stream Name: Trib. to Sand Creek	Completion Date: 10/17/2017
Watershed: James	Existing Structure: Bridge
Structure Ownership: County	New Structure: Box Culvert

Stream Habitat

Description of stream habitat: Intermittent prairie stream.

Impacts to Stream Habitat:

Disturbed Area (acres):	0.27
Structure Length (ft):	69.00 (44.00 barrel +25' wingwalls)
Permanent Impacted Length (ft):	84.00 15' is riprap
Structure Width (ft):	24.00 (2 - 12' x 6')
Length Previous Structure (ft):	22.00
Width of Previous Structure (ft):	33.00
Countersink Depth (inches):	12

Comments: The new culvert is wider than the bankfull stream channel width and is not expected to impact channel morphology or fish movement. Dewatering of stream habitat did not occur (stream was dry at time of diversion channel installation).

Diversion Channel

Diversion channel type:	Corrugated metal pipe (48") diversion channel with excavated fabric lined ends.
Temporary water barrier type:	Steel sheet pile
Date installation:	08/14/2017
Date removed:	09/22/2017

Description of stream flow: Dry at time of diversion channel installation.

Comments: Construction zone and adjacent sections of stream were dry at time of diversion channel installation.

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, straw mulching, permanent seeding, class B riprap.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: Site was dry when temporary diversion channel was installed; no seining was required.

Topeka shiner mortality: 0

Comments: None

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 02EV	DOT Region: Mitchell
Project Number: BRO 8056(13)	DOT Area: Mitchell
Structure Number: 56-228-070	Project Biologist: Craig Olawsky
Latitude: 44.0966	Project Engineer: Kent Gates
Longitude: -97.8744	Primary Contractor: Midwest Contracting
County: Sanborn	Start Date: 11/08/2017
Stream Name: West Redstone Creek	Completion Date: 11/30/2017
Watershed: James	Existing Structure: Bridge
Structure Ownership: County	New Structure: Box Culvert

Stream Habitat

Description of stream habitat: Intermittent stream.

Impacts to Stream Habitat:

Disturbed Area (acres):	0.80
Structure Length (ft):	78.00 (50.00 barrel +28' wingwalls)
Permanent Impacted Length (ft):	106.00 28' is riprap
Structure Width (ft):	36.00 (3 - 12' x 7')
Length Previous Structure (ft):	20.00
Width of Previous Structure (ft):	39.50
Countersink Depth (inches):	12

Comments: The new culvert is wider than the bankfull stream channel width and is not expected to impact channel morphology or fish movement.

Diversion Channel

Diversion channel type:	Fabric lined excavated channel
Temporary water barrier type:	Steel sheet pile
Date installation:	11/13/2017
Date removed:	11/27/2017

Description of stream flow: Extremely low flow.

Comments: None

Erosion and Sediment Control

BMPs implemented: High flow silt fence, floating silt curtain, erosion control wattles, type 2 erosion control blanket, straw mulching, permanent seeding, class B riprap.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining event (11/13/2017).

Topeka shiner mortality: Presumed to be zero.

Comments: Absolutely no fish were present at this site on this date. Water was approximately 18" deep and was clear enough to see the stream bottom. Biologist conducted a slow, visual survey of the site and observed no aquatic organisms. Ice was forming on the east portion of the stream channel.

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 022C	DOT Region: Aberdeen
Project Number: IM 0295(35)127	DOT Area: Watertown
Structure Numbers: 06-184/185-218	Project Biologist: Craig Olawsky
Latitude: 44.2282	Project Engineer: David Drake
Longitude: -96.7570	Primary Contractor: K&L Construction
County: Brookings	Start Date: 06/01/2017
Stream Name: Medary Creek	Completion Date: 12/15/2017
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: State	New Structure: Same – Scour Protection Only

Stream Habitat

Description of stream habitat: Intermittent prairie stream habitat.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.70
Structure Length (ft):	No change from previous
Permanent Impacted Length (ft):	239.00
Structure Width (ft):	No change from previous
Length Previous Structure (ft):	70.00
Width of Previous Structure (ft):	151.50
Countersink Depth (inches):	Not applicable

Comments: Scour protection (Class B riprap) placed on berm embankments under and around the bridge; and lining the entire width of stream channel under the bridge and extending out 50' upstream and downstream of the bridge.

Diversion Channel

Diversion channel type: A diversion channel was not used. See comments.
 Temporary water barrier type:
 Date installation:
 Date removed:

Description of stream flow: Normal stream flow at time of construction.

Comments: Construction zones were isolated in phases with floating silt curtain, anchored with posts and large sand bags with plastic sheet liner to allow continued stream flow and maintain fish passage. Floating silt curtain was pushed out into the stream channel from the shore to avoid fish entrapment.

Erosion and Sediment Control

BMPs implemented: High flow silt fence, floating silt curtain, erosion control wattle, vegetated buffer strips, straw mulching, permanent seeding, Class B riprap.

Comments: Erosion control was determined to be insufficient during site visit on 7/25/2017. The SD DOT Project Engineer was instructed to have additional wattles and erosion control fabric installed.

Fish Removal

Topeka shiners present: Construction zone was isolated with floating silt curtain to allow continued normal stream flow; no seining was required.

Topeka shiner mortality: Presumed to be zero.

Comments:

Impacts to Other Endangered Species: None

Conservation Recommendations:

Appendix II
**Individual stream crossing reporting forms for projects that were
constructed in 2017 and also impacted American burying beetle.**

SDDOT Project Reporting Form

PCN: 6749	DOT Region: Pierre
Project Number: BRF 6301(05)	DOT Area: Winner
Structure Number: 62-141-477	Project Biologist: Craig Olawsky
Lat/Long: 43.0869/-99.9680	Project Engineer: Eric Prunty
Legal Descrip.: Sec. 32&33, T96N, R77W	Primary Contractor: Corr Construction
County: Tripp	Start Date: 08/09/2016
Stream Name: Keya Paha River	Completion Date: 04/24/2017
Watershed: Not Applicable	Existing Structure: Bridge
Structure Ownership: County	New Structure: Bridge

Stream Habitat

Description of stream habitat: Slow moving, but intermittently flashy river.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.09
Structure Length (ft):	32.50
Permanent Impacted Length (ft):	96.00
Structure Width (ft):	82.00
Length Previous Structure (ft):	30.00
Width of Previous Structure (ft):	115.00
Countersink Depth (inches):	Not applicable

Comments: This project was a bridge and had minimal impact to the active stream channel. Dewatering of stream habitat did not occur.

Diversion Channel

Diversion channel type: A diversion channel was not used.
 Temporary water barrier type:
 Date installation:
 Date removed:

Description of stream flow: Minimal late summer/autumn flow

Comments: Construction zone was isolated with floating silt curtain to allow continued normal stream flow.

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, straw mulching, erosion control wattle, erosion control blanket, vegetation buffer strips, Class C riprap, permanent seeding.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: Todd County is not located within Topeka shiner range.

Topeka shiner mortality: Not applicable

Comments: None

Impacts to Other Endangered Species: Tripp County falls within the known range of the American burying beetle. Earth disturbing activities were kept to a minimum. Work limits were pulled in to the greatest extent possible.

Conservation Recommendations: Earth disturbing activities were kept to a minimum. Work limits were pulled in to the greatest extent possible during the preconstruction meeting.

Appendix III
Monitoring Plan for structures which ‘may adversely affect’
Topeka shiners

South Dakota Fish Passage Monitoring Protocol for Projects Regulated by the
2008 Programmatic Biological Opinion: Stream Crossing Projects Administered/Funded by the
South Dakota Department of Transportation and the Federal Highway Administration

Office of Project Development-Environmental
South Dakota Department of Transportation
2012

Submitted to:

United States Fish and Wildlife Service
Mountain-Prairie Region 6
South Dakota Ecological Services Office
Pierre, SD

Background and Purpose:

Construction of bridges and culverts by South Dakota Department of Transportation (SDDOT) and the Federal Highway Administration (FHWA) have and will continue to affect the streams and rivers of South Dakota. In 2008, SDDOT, FHWA, and the US Fish and Wildlife Service (FWS) developed and implemented a Programmatic Biological Opinion (Opinion) that evaluates potential impacts of stream-crossing projects on all federally listed Threatened and Endangered species in South Dakota. The Opinion specifically addresses adverse impacts to the Topeka Shiner (*Notropis topeka*) and the American Burying Beetle (*Nicrophorus americanus*), identifying nondiscretionary 'Reasonable and Prudent Measures' (RPMs) and their implementing Terms and Conditions (TCs) that, if followed, ensure the Incidental Take Statement issued with the Opinion remains valid and that any take resulting from stream-crossing projects is exempt under section 7(o)(2) of the Endangered Species Act. The RPMs and TCs relative to the Topeka Shiner are intended to minimize take primarily by preventing decreases in Topeka Shiner population and their occupied range in South Dakota.

Monitoring and reporting is required in the Opinion to ensure the RPMs and TCs for the Topeka shiner are appropriate and effective, and the level of take exempt by the Opinion is not exceeded. Development of a monitoring program is required under RPM 4 of the Opinion. The purpose of this monitoring program is to verify that SDDOT structures, as designed, constructed, and maintained are not influencing stream geomorphology or prohibiting fish movement.

The monitoring, to include field work and observations, will be done by SDDOT Environmental staff scientists and biologists, consultants, or temporary employees. Consultants and temporary employees will be trained by qualified SDDOT Environmental staff to ensure consistency in the assessments.

Fish Passage and Stream Crossing Design:

During project scoping, the Project Identification Coordinators (PICs) in cooperation with the Environmental Staff will identify structures where fish passage is required based on the Opinion. These structures are located in the eastern part of South Dakota where Topeka Shiners occur. Anomalous structures may also be included if it is determined that the structures may affect Topeka shiners. Anomalous structures may include features such as rock check dams to aid in fish passage or fish ladders when unusual methodology is determined necessary for fish passage. The USFWS will be notified if there are structures outside the main scope of this protocol.

TCs within the Opinion require that stream crossings be designed in a manner that facilitates development of normal channel features within the crossing. The SDDOT hydraulic design procedures have been established to meet or exceed the TCs of the BO. These procedures and definitions are documented in the South Dakota Drainage Manual hyperlinked at: <http://sddot.com/business/design/forms/drainage/Default.aspx>. Chapter 10 and sections 10.3.4.6 titled "Fish Passage" and Appendix 10.A titled "Fish Passage Guidelines" include additional design parameters used for fish passage.

The hydraulic design procedures for fish passage reference FHWA's Aquatic Organism Passage Design Guidelines for Roadway Culverts, Hydraulic Engineering Circular No. 26 (HEC 26). SDDOT design procedures and the USACE 404 nationwide permit further require culverts be sunk below the stream flow line to allow development of natural channel features within the culvert and to prevent outlet perching that may lead to restricted fish movement.

Specifically, the natural channel forming process is to be maintained by sizing stream crossings according to bankfull (Q_2) channel size, streambed slope, and channel complexity. The floor elevation of culverts is to be set below flow line of the stream as appropriate to facilitate the development of normal channel features within the culvert. At a minimum the culvert floor elevation will be set 1 foot below the stream flow line but not less than the adjustment profile line. Depth of counter sinking will be determined through design analysis tools and programs as discussed in the hydraulics design procedures. The culvert width will be at least 1.2 times the Q_2 channel width unless special circumstances dictate otherwise and shall be estimated using project survey data and peak flow estimation models or other models as appropriate. Finally, any installed diversion channels must be at grade with the stream bed with no fish passage obstructions.

The bankfull channel can generally be defined as the Q_2 stream channel or the elevation at which stream flow spills into the floodplain, whichever is less. In most cases, culverts will be sized much greater than the bankfull channel based solely on hydraulic criteria. In some rare cases, culverts may constrict the bankfull channel, especially if the culvert is designed for a very low flood recurrence frequency or the culvert is being placed in a watershed with a very large drainage area (i.e., > 100 sq mi). In some special cases, an exemption to the minimum culvert width may be allowed if strong evidence is available to suggest that fish passage will not be adversely impacted due to the width of the culvert. The USFWS will be notified if there are structures outside the main scope of this protocol and these projects will be processed through individual formal consultation. While exemptions do not fall under the terms and conditions of the BO, these structures will be monitored under this monitoring plan.

Site Inspections:

Monitoring in the late summer or fall will take place to adequately assess channel and streambed conditions resulting from past seasonal flows. Low flows of late summer and fall provide the best opportunity to access the site, evaluate channel and streambed conditions, take photos, and assess how the structure is functioning with regards to fish passage during low flows. Monitoring will be completed after the first high flow season following project completion and in the third and fifth year after construction¹. For example, a structure built in the summer of 2012 will be assessed in the fall of 2013, 2015 and finally 2017. In order to limit stream degradation and harm to fish during these assessments, stream disturbance will be limited to the greatest extent practicable.

The SDDOT will make a reasonable effort to perform surveys for each structure appended to the 2008 B.O. in accordance with this monitoring protocol however; the FWS recognizes there may be conditions and limitations that may preclude completion of surveys at each site. It is also noted that structures built between 2009 and 2011 have not been reviewed to date (pending an approved monitoring protocol). These structures will be given initial priority and the first assessment observations of these structures will be compared to the original design drawings and NBI photos (if available).

The inspection and findings documentation will be recorded on the 'SDDOT Fish Passage Assessment' form (See Attachment A).

The 'SDDOT Fish Passage Assessment' form includes the following:

General Project Information: This information will include specific project information, year

¹ Opinion, p.46 RPMs/TCs B-1, Monitoring will be conducted on an annual or biennial basis

constructed, county, structure location, stream name, date of assessment, and name of person completing the assessment.

- **Structure Type:** The structure type and size will be documented.
- **Structure Shape Comment:** The structure shape will be recorded using descriptions defined in the data sheet. The intent of recording structure shapes is to document whether the stream transition to and from the structure maintains and promotes fish passage. Terms used to describe the applicable outlet configuration are as follows:

Inlet Type

Projecting: The barrel simply extends beyond the embankment. No additional support is used.

Wing wall: A wing wall is a retaining wall placed adjacent to a culvert to retain fill and to a lesser extent direct water.

Head wall: Used along with wing walls to retain the fill, resist scour and improve the hydraulic capacity of the culvert

Apron: Aprons are usually made of concrete or riprap and installed to prevent or reduce scour. If an apron exists, a brief description will be provided in the observation section, including any low flow concentration structures.

Other: Could be Energy dissipaters, Bridge, etc...

Outlet Type

At Stream Grade: No perched condition at the outlet exists

Cascade over Riprap: Culvert flows onto either a rough riprap surface causing turbulence or a riprap / bedrock surface where flow depth decreases as it exits the culvert. If this condition exists, observation will be made to document whether or not this condition may prevent fish passage.

Free fall into Pool: Culvert outlet is perched directly over a pool, requires migrating fish to jump into culvert from outlet pool. If this condition exists, observation will be made to document whether or not this condition may prevent fish passage.

Free fall onto riprap: Culvert outlet is perched and exiting water plunges onto riprap or bedrock with no pool. If this condition exists, observation will be made to document whether or not this condition may prevent fish passage.

Outlet apron: Aprons are usually made of concrete or riprap and installed to prevent or reduce scour. If an apron exists, provide a brief description in the observation section, including any low flow concentration structures.

- **Observations:**
 1. *The structure is installed generally in accordance with plans (width, depth, location, size, countersunk, etc...).* This question will be answered during the first assessment only.

2. *Overall structure width is wider than the average stream width upstream and downstream.* This measurement will be compared to background information from the hydraulic data and cross sections developed and used during design. If the background information does not exist, the stream width will be determined during the 1st assessment by taking an average of 3 measurements upstream and 3 measurements downstream.
 3. *Natural streambed material exists throughout structure (i.e. structure remains counter sunk approximately 1 foot).*
 4. *Stream channel is free of scour activity that may impede fish passage.*
 5. *A natural low flow channel exists through the structure or if not the streambed surface within the structure simulate the streambed beyond the structure inlet and outlet similar to design conditions.*
 6. *Stream is free of channelizing along the surface of the structure.* Presence of a Thalweg allows the stream to flow in a narrower defined low flow channel within the stream which is suitable for fish passage and not along the surface of the structure. If a Thalweg is not present, a wider shallower stream may impede fish movement due to limited depths, elevated water temperatures, and/or other conditions that are not ideal for fish passage.
 7. *Up & downstream channel appears stable (no apparent erosion).*
 8. *Vegetation is/has re-established on the stream banks within the construction area.*
- **Stream Cross-Sections:** To evaluate whether the SDDOT structures are performing as intended, stream cross-sections will be taken perpendicular to the stream at the following locations:

3 cross sections will be taken at the following locations to determine if a Thalweg exists within the structure (see Figure 1): 1) within 10 feet of the structure inlet, 2) within 10 feet of the structure outlet, and 3) inside the structure (if accessible). Visual observations will be used instead of the 3rd cross section if this location is not be accessible (i.e. structure is too small to access with survey equipment, soil conditions are not stable, water volumes are excessive).

If a Thalweg does not exist within the structure (the area is flat or there is only a slight depression with no true defined low flow channel), a 4th cross section will be taken downstream of the structure at a distance of approximately 7 times the width of the stream (refer to Figure 2) to determine whether the structure appears to be changing the stream profile.

If a Thalweg does not exist within the structure or downstream of the structure, a 5th cross section will be taken upstream of the structure at approximately 7 times the width of the stream (refer to Figure 3) to determine whether the structure appears to be changing the stream profile.

Analysis of cross sections taken will be used as follows and findings will be documented in the report as shown below:

1. If a Thalweg exists within the structure (cross sections 1, 2, and 3), no additional cross-sections will be taken and the assessment will document the structure is performing as intended. Else...
2. If a Thalweg does not exist within the structure (cross sections 1, 2, and 3) and does not exist downstream (cross section 4), no additional cross-sections will be taken. The assessment will document "no further conclusion can be made at this time as fish restriction (if occurring) is below the structure". Else...
3. If a Thalweg does not exist upstream, exists downstream but does not exist within the structure the report will document "the structure is no more of a barrier than the stream

upstream and no further conclusion can be made at this time”.

4. If a Thalweg exists upstream and downstream of the structure but does not exist within the structure a detailed survey and correction plan will be required.

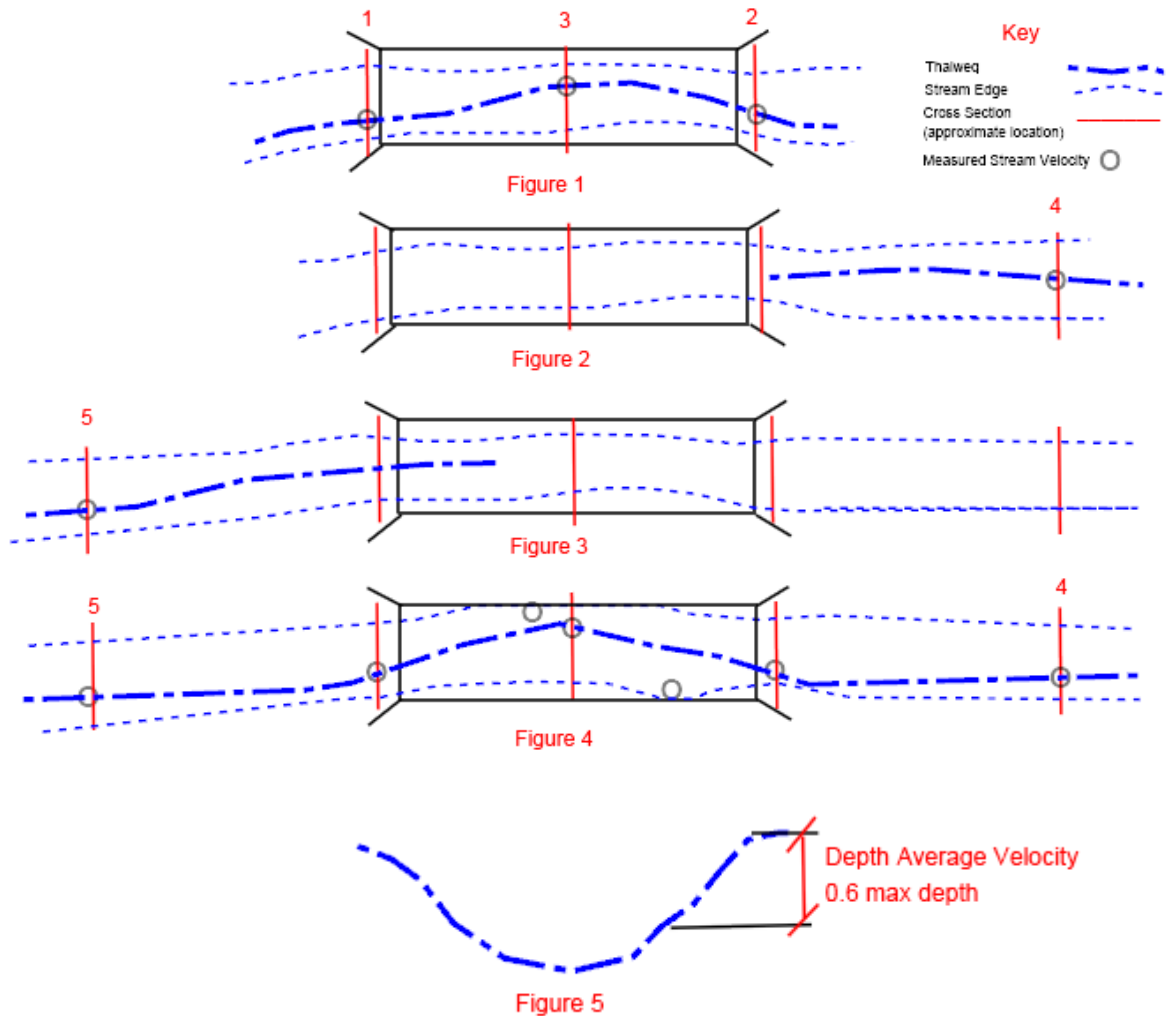
- **Stream Velocity:** A natural earthen and/or granular stream bank edge is a good indicator the stream is acting independent of the structure. If the edge of the stream is in contact with the structure during Q_2 or lower conditions, material within the structure may have shifted or water velocities, turbulence, and friction along the structure walls may have an effect on fish movement.

If the stream is in contact with one or both sides of the structure during the time of the assessment, the stream bed depth and reveal along the edges shall be evaluated to determine how the velocities compares to the natural stream edge outside the structure. The depth average velocity measured at a depth of 0.6 times the depth of the stream at the thalweg (see Figure 5) will be recorded and compared to the depth average velocity a distance approximately 7 times the width of the stream upstream and downstream of the structure within the Thalweg (see Figures 4) if a Thalweg exists.

Analysis of stream velocities taken will be used as follows and documented in the report findings.

1. If the stream is dry or water velocities are beyond the equipment's specified accuracy limits (i.e. <0.5 ft/s for March McBirney) at the locations where velocities are to be taken, the condition will be noted and no velocities will be taken. Else...
2. If the depth average velocities within the structure are at or below those recorded upstream and downstream, the assessment will document the structure is not considered to be impeding fish passage. Else...
3. If the depth average velocities within the structure are higher than those recorded upstream and downstream the structure and exceed the sustained swimming capabilities of Topeka shiner (0.9 ft./s - 1.31 ft./s. with burst swimming observed in water velocities of 1.31 ft./s- 2.46 ft./s (Adams 2000)²), the structure may be influencing the stream. A more detailed survey may be required. Further assessment and the need for a correction plan will be discussed with the FWS.

² S. Reid Adams, Jan Jeffrey Hoover and K. Jack Kilgore 2000. Swimming Performance of the Topeka Shiner (*Notropis topeka*) an Endangered Midwestern Minnow. *American Midland Naturalist* Vol. 144, No. 1 pp. 178-186 Published by the University of Notre Dame



- Comments:** Unique observations that have or may impact stream morphology or fish passage in the future such as widening of the channel, forming/changing pool locations/sizes, bank erosion, new deposits, isolated unusual channelization within the streambed, etc... will be noted. Changes to channel widths on structures designed narrower than the stream channel that were processed by Formal Consultation will be discussed.
- Photographs:** A minimum of 2 photographs will be taken in the direction of the structure inlet and 2 in the direction of the structure outlet within a distance of 7 times the width of the structure. Photograph locations will be documented and recorded (i.e. GPS latitude and longitude coordinates) such that photographs taken during subsequent inspections will be from the same location and direction. The intent of these photographs is to document whether 1) the stream channel width, location, and/or depth is changing over time and 2) whether changes in the channel may obstruct fish passage at the site. It is most important to select locations that capture the intended need for the photograph therefore locations shall be selected both upstream and downstream that are representative of: undisturbed channel beyond the construction area, disturbed channel, and the structure.

Assessment, Notifications, Corrective Actions:

Upon completion of the site inspection and assessment, each report will be filed with the project records and in an electronic Fish Passage file folder.

If it is determined a structure is not passable to fish, a report will be submitted to the FWS and FHWA within two weeks and a corrective action plan will be developed in coordination with FWS and FHWA. Where fish passage has been obstructed by debris or some other condition not related to the design or construction, the SDDOT Environmental Staff will coordinate with Operations to have the obstruction removed within three months of the inspection. Depending upon seasonal conditions, this timeframe may need to be extended. If necessary, extensions will be coordinated with FWS. Obstructions identified and corrected by the Area Offices, through normal roadway maintenance inspections, will be reported to the Environmental Office for further review and corrective actions if needed. Documentation of corrective actions will be made available to FWS within two weeks of completion. Any corrective actions taken will be documented in the annual report and a corrective action database will be maintained by the Environmental Office.

Annual Reporting:

Per RPM#6 in the Opinion, a hard copy of the annual report will be provided to the FWS by March 1 of each year that reviews activities conducted under the Opinion. In an effort to disseminate monitoring findings in a timely manner, monitoring reports will be completed, included, and disseminated with the Annual Report. These reports will also be available by request as well as online to the FWS, FHWA and any other interested entities at the SDDOT website:

<http://www.sddot.com/transportation/highways/environmental/endangered/Default.aspx>

Within 1 month of distribution of the annual report (or other agreed time agreed to by all parties), the FWS, FHWA and SDDOT will meet to review report findings. If no corrective actions have been required within the first 5 years of monitoring, the need for further monitoring by site will be determined at this meeting. If systemic issues are identified, a corrective action plan will be developed and the group will determine whether any specific sites will be monitored beyond 5 years. During the annual meeting the group will also evaluate effectiveness of the data being collected on the 'SDDOT Fish Passage Assessment Work Sheet'. Revisions will be discussed and implemented as needed to meet the terms and conditions of the BO.

Appendix IV
Forms Referenced Within Body of Compliance Report for 2017

Stream Turbidity Inspection Form

Project Number:	
County:	
PCN:	
Date:	
Inspector:	
Description of Stream Discharge:	
Description of Construction Activity During Inspection:	

	Upstream Site	Downstream Site
Measurement 1		
Measurement 2		
Measurement 3		
Measurement 4		
Measurement 5		
Mean Turbidity		
Distance (ft) from work limit along stream centerline		

Comments:	
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SDDOT Fish Passage Assessment Work Sheet-Attachment A

South Dakota Department of Transportation
 Office of Project Development—Environmental
 Becker-Hansen Building
 700 E. Broadway Ave. (605) 773-3268
 Pierre, SD 57501-2586 <http://www.sddot.com/business/environmental/Default.aspx>

General Project Information

Project # PCN Date / / Year Constructed
 County Structure Location
 Assessed By Stream Name

Structure Length and Width or Diameter

Structure Type	Number of Barrels			
	X Width (ft) x		Height (ft)	
Box	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Arch	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Pipe Diameter	<input type="text"/>			
Bridge	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Structure Shape Comments

Inlet Type	Outlet Type <small>(Document any potential fish passage barriers)</small>
<input type="checkbox"/> Projecting	<input type="checkbox"/> At Stream Grade
<input type="checkbox"/> Wing Wall	<input type="checkbox"/> Cascade Over Riprap
<input type="checkbox"/> Headwall	<input type="checkbox"/> Free Fall Into Pool
<input type="checkbox"/> Apron	<input type="checkbox"/> Free Fall Onto Riprap
<input type="checkbox"/> Riprap	<input type="checkbox"/> Apron
<input type="checkbox"/> Other	<input type="checkbox"/> Other

Rapid Visual Assessment

Observation	Yes, No or NA
1. The structure is installed generally in accordance with plans (height, width, elevation, location, etc. <i>This item is to be completed on the initial survey only.</i>)	<input type="text"/>
2. Overall structure width is wider than the average stream widths upstream and downstream.	<input type="text"/>
3. Natural streambed material exists throughout structure (i.e., countersunk approximately 1 foot).	<input type="text"/>
4. Stream channel is free of scour activity that may impede fish passage.	<input type="text"/>
5. A natural low flow channel exists through the structure or if not the streambed surface within the structure simulates the streambed beyond the structure inlet and outlet similar to design conditions.*	<input type="text"/>
6. Stream is free of channelizing along the surface of the structure.*	<input type="text"/>
7. Upstream and downstream channel appears stable (no apparent erosion).	<input type="text"/>
8. Vegetation is/has re-established on the stream banks within the construction area.	<input type="text"/>

If "no" is selected for items 5 or 6, additional field observation and measurements may be required. Refer to "Stream Crossing Section in the Monitoring Protocol for additional measurements and evaluation procedures. figures 1-4 are included for ease of reference.


Field Measurements

Stream Depth and Velocities at Structure (Take velocities at 0.6 times the total depth measured from the water's surface. Refer to Figure 5 on page 2 of this form.)

Location	Left		1/4 Pt		1/2 Pt		3/4 Pt		Right		Thalweg	
	Depth	Vel.	Depth	Vel.	Depth	Vel.	Depth	Vel.	Depth	Vel.	Depth	Vel.
Outlet	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
MidStr	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Inlet	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
7xWUpStrm	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
7xWDownStrm	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Describe observations used in making above determinations. Describe whether unusual channelizing exists within the structure or stream. Note other unique site conditions that may/may not warrant corrective actions. Document with additional photographs if needed.

SDDOT Fish Passage Assessment Work Sheet-Attachment A (continued)

Photos		Location Description (optional)	
		Latitude	Longitude
<p>Include description of photograph location for future reference. Photos should include: approximately 7xW upstream/downstream from structure in the direction of the structure showing undisturbed channel beyond the construction limits, the upstream/downstream channel disturbed by the project, and the structure inlet and outlet.</p>			
Upstream			
1			
2			
Downstream			
3			
4			
Other (optional)			
5			
6			
7			
8			

Report Findings

