

Compliance Report for 2016: Biological Opinion for Stream-Crossing Projects
Administered/Funded by the South Dakota Department of Transportation and the Federal
Highway Administration

By:

Office of Project Development
South Dakota Department of Transportation
March 2017

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). In this newest 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 Reasonable and Prudent Measures (RPMs) were set in place:

- 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 on 1) each RPM which can be found in the reporting forms (Appendix 1) 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 2008 Biological 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.

There are currently discussions with three other state DOTs and two other Fish and Wildlife offices on applying tracking measures to culverts. Missouri recently implemented a tracking and mitigation program. Information on this program is being collected to see if similar procedures might be utilized by South Dakota for tracking fish passage concerns. Similarly, biologists at Kansas State University and South Dakota State University are also being contacted in regards to prioritizing culverts, particularly in Topeka shiner habitat. A biologist at South Dakota State University has recently been 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.

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 BMP's 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. Other countries (New Zealand, Australia, and

some African Countries) are trying to minimize in-stream work by leaving the channel intact with work zones outside the banks two to four feet. However, more research is needed to get a complete picture of stream habitat maintenance.

Summary of Construction Activities:

In this Annual Compliance Report, data related to construction completed in 2016 at 10 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 (Opinion). All structures reported on in this document were completed between January 1st 2016 and December 31st 2016. 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 (B.A.s) is being devised.

For 9 construction projects completed during 2016 that were “Likely to Adversely Affect” the Topeka shiner, 10.44 acres of riparian area were temporarily affected by vehicles or construction activities. Six of the 9 projects listed in the SDDOT Project Reporting Forms affected over 1.0 acre; two of which affected 2.0 acres.

Three of the 9 projects affected between 0.40 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 2016 with only two exceptions. During seining and project inspection, it was observed that erosion control was insufficient and installed incorrectly at structures 06-184/185-031 and 06-184/185-044 in Brookings County (pages 34-37 of this report). The SDDOT Project Engineer and the primary contractor were notified of these problems. Erosion and sediment control BMPs were corrected within 48 hours.

Summary of Habitat Impacts:

Stream-crossing projects completed in 2016 which were listed to “Affect, Likely to Adversely Affect” the Topeka shiner totaled 9; and 1 project was 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 fact that anticipated “take” of Topeka shiner is expected to be zero at sites “Not Likely to Adversely Affect.”

The 9 stream crossings permanently impacted 1,577.50 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 made up 1,243.00 feet of stream channel impact. The primary

cause of this impact was placement of riprap at the inlet and outlet of box culverts, and riprap placed for abutment protection at bridges. Riprap placement for scour protection projects at bridge abutments, and upstream and downstream of bridge abutments (1,192 feet) accounted for the majority of stream channel impact due to riprap. The remaining 51 feet of riprap placement occurred at inlets and outlets of box culverts. The remaining 334.50 feet of stream channel impacts to the channel was due to replacing an old structure with a new longer structure, or extending the ends of an existing structure (Table 2).

Flowlines and Bankfull Width in Relation to Fish Passage

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 run and provided an estimation of flowlines; and the expected depth culverts should be countersunk in order for natural geomorphic processes to occur within the box.

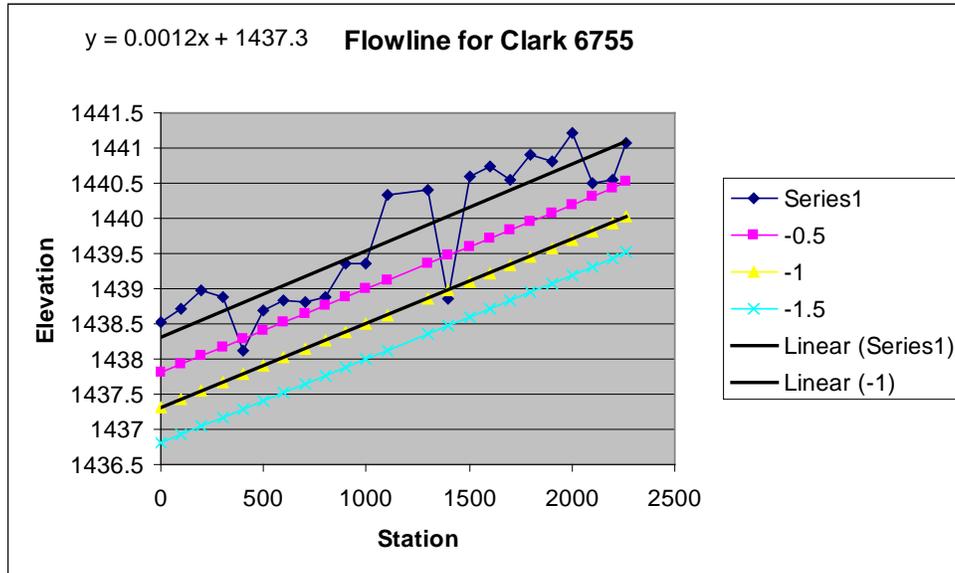


Figure 1: Flowline regression for a prior project in Clark County (2012). “Series 1” is the actual elevations provided by our consultants, with this data a trendline is set (and can be seen in the highest solid black line). This is our expected flowline given the data and an elevation for the structure can be identified at the roadway station (in this example the roadway is at station 1000). Scour can be seen in front of and behind the roadway. Data series labeled with a (-) indicate possible culvert floor elevations.

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

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 in close proximity to 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 we require redesign of the structure.

The second RPM for the 2008 Opinion is to minimize fish mortality. RPMs 2 and 3 will be listed for each project in Table 3. Seining was conducted in 2016 at ten sites where work was determined ‘Likely to Adversely Affect’ Topeka shiners. Of these ten sites, construction activities were completed at eight sites (Table 4) in calendar year 2016. It is expected that the two unfinished stream-crossing project sites (Minnehaha PCN 025C, Turner 01W8) will be included in the Annual Report for calendar year 2017. One site where seining was conducted in calendar year 2015 (PCN 022C, structures 06-184-074/06-185-074) is also included in this report, since construction activities were completed in calendar year 2016.

Monitoring

RPM four refers to the monitoring of all replaced structures found to “Adversely Affect” Topeka shiners. During development of the Monitoring Program, a number of 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.

Monitoring of 20 structures with a determination of 'May Affect, Likely to Adversely Affect' Topeka shiners, where construction concluded in 2015, was conducted in July and early August 2016. In addition, one structure site was examined by SDDOT, USFWS, and FHWA staff specifically because concerns or questions were raised after previous monitoring seasons. Scheduled third-year monitoring was also conducted at 12 structures constructed in 2014, as indicated in the Monitoring Plan. Scheduled fifth-year monitoring was also conducted at 34 structures constructed 2009 - 2011, as indicated in the Monitoring Plan. As a condition of the Monitoring Plan, the *2016 Monitoring Report* is submitted with the *2016 Annual Compliance Report*. Within one month of distribution of the *2016 Monitoring Report* (or other time agreed to by all parties), the FWS, FHWA, and SDDOT will meet to review the *2016 Monitoring Report* findings. Revisions will be discussed and implemented as needed to meet the term and conditions of the 2008 Biological Opinion.

Turbidity Monitoring:

For these projects, monitoring of turbidity around the construction sites is required to ensure that measurements remain within 50 NTUs of the background turbidity. All engineers have been provided with our Turbidity Reporting Form. 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.

Training and Research

The last two RPMs which will be discussed are numbers 5 (training) and 7 (new scientific information). 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) in reference to 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.

Department of Transportation (SDDOT) employees and contractors continue to attend Sediment and Erosion Control Training each spring. As of December 31, 2016 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. In July 2016, the SDDOT wildlife biologist, a summer intern, and two Environmental Scientists from the SDDOT Environmental Office participated in a one day small fish identification workshop/field survey coordinated by Jesse Wilkins with the South Dakota Department of Environment

and Natural Resources (DENR). Participating in this workshop improved 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.

American Burying Beetle RPMs:

As part of the 2008 Biological Opinion (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 will be included on each RPM, which can be found in the reporting forms (Appendix II) and in the text to follow.

Summary of Construction Activities:

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 (Opinion). All structures reported on in this document were completed between January 1st 2016 and December 31st 2016. 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 (B.A.s) is being devised.

For one structure replacement project completed within the American burying beetle range during 2016, approximately 1.50 acres were temporarily affected by vehicles or construction activities.

Summary of Habitat Impacts:

One project in 2016 was determined to “Affect, Likely to Adversely Affect” the American burying beetle (Table 4). The RPMs of the Opinion are applied on projects which will “Adversely Affect.” This is due to the fact 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 or Minimizing Habitat Disturbance (Ground-disturbing Activities)

The first RPM for the 2008 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 and Research

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.

Table 2. Stream length impacted by the new stream crossing (2016) and stream length impacted by the previous stream crossing. 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.

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)
0334	64-010-112	Bridge	30.00	122.50	Bridge	30.50	146.00	150.00
01DT	29-218-030	Bridge	24.00	76.00	Bridge	32.50	96.00	140.00
5552	42-050-207	Bridge	21.00	20.50	Box Culvert	78.00	20.00	93.00
03A2	13-028-360	Box Culvert	78.00	20.00	Box Culvert	141.75	20.00	157.75
03A2	13-017-360	Box Culvert	50.00	20.00	Box Culvert	122.75	22.00	144.75
022B	06-193-211	Bridge	34.75	209.00	Scour Protection	NA	NA	135.00
022C	06-184/185-074	Bridge	41.00	152.00	Scour Protection	NA	NA	290.00
022C	06-184/185-031	Bridge	41.00	87.00	Scour Protection	NA	NA	240.00
022C	06-184/185-044	Bridge	41.00	74.00	Scour Protection	NA	NA	227.00
								Ttl 1577.50

Table 3. A summary of RPMs implemented at 2016 projects that were “Likely to Adversely Affect” the Topeka shiner. A description of the RPMs listed in this table is given in the introduction of this report.

PCN	Structure #	RPM 1	RPM 2	RPM 3	RPM 4	RPM 5	RPM 6	RPM 7
0334	64-010-112	Yes*	Yes	Yes	Yes	Yes	Yes	Yes
01DT	29-218-030	Yes*	Not Applicable ‡					
5552	42-050-207	Yes	Yes	Yes	Yes	Yes	Yes	Yes
03A2	13-028-360	Yes	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes
03A2	13-017-360	Yes	Yes	Yes	Yes	Yes	Yes	Yes
022B	06-193-211	Yes	Not Applicable ‡	Yes	Yes	Yes	Yes	Yes
022C	06-184/185-074	Yes	Yes	Yes	Yes	Yes	Yes	Yes
022C	06-184/185-031	Yes	Yes	Yes	Yes	Yes	Yes	Yes
022C	06-184/185-044	Yes	Yes	Yes	Yes	Yes	Yes	Yes

‡ Structures did not utilize a dewatering and a stream diversion, therefore, not requiring fish removal but all projects did comply with water withdrawal.

* 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 2016 completed projects that were “Likely to Adversely Affect” the Topeka shiner. Additional information for individual structures listed in this table is provided in Appendix I of this report.

PCN	Structure #	County/Stream	Seined	Topeka Shiners/ Mortality	Comments
0334	64-010-112	Union/Brule Creek	Yes	0/0	Species: white crappie, brassy minnow (6/7/2016); fathead minnow, brassy minnow, common shiner, sand shiner, red shiner, channel catfish (7/13/2016)
01DT	29-218-030	Hamlin/Big Sioux River	No	NA	Project was bridge and had minimal impact to steam channel. Dewatering did not occur
5552	42-050-207	Lincoln/Trib to Saddle Creek	Yes	0/0	Species: creek chub, black bullhead, brassy minnow, fathead minnow, green sunfish, common shiner, orange-spotted sunfish, sand shiner, brook stickleback, johnny darter, bluegill
03A2	13-028-360	Clark/Trib to Shue Creek	No	NA	Stream was dry when diversion installed. No seining was needed.
03A2	13-017-360	Clark/Trib to Shue Creek	Yes	0/0	Species: common carp, black bullhead, northern pike
022B	06-193-211	Brookings/Medary Creek	No	NA	Project was bridge berm scour protection and had minimal impact to steam channel. Dewatering did not occur.
022C	06-184/185-074	Brookings/E. Br. North Deer Creek	Yes	0/0	Species: black bullhead, northern pike
022C	06-184/185-031	Brookings/North Deer Creek	Yes	0/0	Species: green sunfish, orange-spotted sunfish, black bullhead, white sucker, fathead minnow
022C	06-184/185-044	Brookings/Branch of North Deer Creek	Yes	0/0	Species: creek chub, Iowa darter, brassy minnow, green sunfish, fathead minnow, white sucker, sand shiner, orange-spotted sunfish, black bullhead

Table 5. Project identification, location, and American burying beetle determination for stream crossing projects covered that involved construction between January 1, 2016 and December 31, 2016. 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.

PCN	County	Project Number	Structure Number	Stream	Section	Township & Range	American Burying Beetle Status
02RV	Todd	NH 0018(172)230	61-485-010	White Horse Creek	Sec. 4 & 9	T39N R25W	ALTAA

Table 6. Stream length impacted by the new stream crossing (2016) and stream length impacted by the previous stream crossing. 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.

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)
02RV	61-485-010	Bridge	30.00	122.60	Box Culvert	130.00	60.00	142.00

Table 7. A summary of RPMs implemented at 2016 projects that were “Likely to Adversely Affect” the American burying beetle. A description of the RPMs listed in this table is given on page 12 of this report.

PCN	Structure #	RPM 1	RPM 2	RPM 3	RPM 4
02RV	61-485-010	Yes	Yes	Yes	Yes

Appendix I. Individual stream crossing reporting forms for projects that were constructed in 2016 and also impacted the Topeka shiner.

SDDOT Project Reporting Form

PCN: 0334	DOT Region: Mitchell
Project Number: BRO 8064(28)	DOT Area: Yankton
Structure Number: 64-010-112	Project Biologist: Craig Olawsky
Latitude: 42.92235	Project Engineer: Kevin Heiman
Longitude: -96.78556	Primary Contractor: Duinick, Inc
County: Union	Start Date: 04/25/2016
Stream Name: Brule Creek	Completion Date: 12/10/2016
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: County	New Structure: Bridge

Stream Habitat

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

Impacts to Stream Habitat:

Disturbed Area (acres):	2.07
Structure Length (ft):	30.50
Permanent Impacted Length (ft):	160.00
Structure Width (ft):	146.00
Length Previous Structure (ft):	30.00
Width of Previous Structure (ft):	122.50
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 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 flow.

Comments: Construction zone was isolated with floating silt curtain to allow continued normal stream flow. Cofferdams were installed around the two piers, and water was 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 (6/7/2016 and 7/13/2016) inside two cofferdams.

Topeka shiner mortality: Presumed to be zero.

Comments: Other species included white crappie, common shiner, fathead minnow, brassy minnow, red shiner, common shiner, sand shiner, channel catfish.

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 01DT	DOT Region: Aberdeen
Project Number: BRO 8029(18)	DOT Area: Watertown
Structure Number: 29-218-030	Project Biologist: Craig Olawsky
Latitude: 44.7606	Project Engineer: John Rittershaus
Longitude: -97.0501	Primary Contractor: Prahm Construction
County: Hamlin	Start Date: 07/20/2016
Stream Name: Big Sioux River	Completion Date: 11/12/2016
Watershed: Big Sioux River	Existing Structure: Bridge
Structure Ownership: County	New Structure: Bridge

Stream Habitat

Description of stream habitat: Slow moving river.

Impacts to Stream Habitat:

Disturbed Area (acres):	0.38
Structure Length (ft):	32.50
Permanent Impacted Length (ft):	140.00
Structure Width (ft):	96.00
Length Previous Structure (ft):	24.00
Width of Previous Structure (ft):	76.00
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 to low summer flow.

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

SDDOT Project Reporting Form

PCN: 5552	DOT Region: Mitchell
Project Number: BRO 8042(31)	DOT Area: Yankton
Structure Number: 42-050-207	Project Biologist: Craig Olawsky
Latitude: 43.2043	Project Engineer: Brian Wenisch
Longitude: -96.8258	Primary Contractor: Dakota Contracting
County: Lincoln	Start Date: 06/21/2016
Stream Name: Saddle Creek	Completion Date: 09/20/2016
Watershed: Big Sioux	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):	0.44
Structure Length (ft):	78.00 (46.00 barrel +32' wingwalls)
Permanent Impacted Length (ft):	93.00 15' is riprap
Structure Width (ft):	20.00 (2 - 10' x 8')
Length Previous Structure (ft):	21.00
Width of Previous Structure (ft):	20.50
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:	Corrugated metal pipe (48") diversion channel with excavated fabric lined ends.
Temporary water barrier type:	Steel sheet pile
Date installation:	06/22/2016
Date removed:	08/19/2016

Description of stream flow: Low flow.

Comments: None

Erosion and Sediment Control

BMPs implemented: High flow silt fence, 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 (6/24/2016).

Topeka shiner mortality: Presumed to be zero.

Comments: Other species included creek chub, black bullhead, brassy minnow, fathead minnow, green sunfish, common shiner, orange spotted sunfish, sand shiner, brook stickleback, Johnny darter, bluegill, northern crayfish.

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 03A2	DOT Region: Aberdeen
Project Number: P 0028(35)297	DOT Area: Huron
Structure Number: 13-028-360	Project Biologist: Craig Olawsky
Latitude: 44.6314	Project Engineer: Trevor Johnson
Longitude: -97.9224	Primary Contractor: Halme, inc.
County: Clark/Beadle	Start Date: 04/20/2016
Stream Name: Trib. to Shue Creek	Completion Date: 10/11/2016
Watershed: James	Existing Structure: Box Culvert
Structure Ownership: State	New Structure: Box Culvert

Stream Habitat

Description of stream habitat: Intermittent prairie stream habitat.

Impacts to Stream Habitat:

Disturbed Area (acres):	0.80
Structure Length (ft):	141.75 (102.00 barrel+39.75' wingwalls)
Permanent Impacted Length (ft):	157.75 16' is riprap
Structure Width (ft):	20.00 (2 – 10'x10')
Length Previous Structure (ft):	78.00
Width of Previous Structure (ft):	20.00 (2 – 10'x10')
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 (42") diversion channel with excavated fabric lined ends.
Temporary water barrier type:	Class B riprap and sand bags with plastic sheet liner
Date installation:	05/03/2016
Date removed:	08/22/2016

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

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

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, erosion control wattle, straw mulching, class B riprap, soil stabilizer, permanent seeding.

Comments: BMPs appear to have been effective and functional.

Fish Removal

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

Topeka shiner mortality: 0

Comments: None

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 03A2	DOT Region: Aberdeen
Project Number: P 0028(35)297	DOT Area: Huron
Structure Number: 13-017-360	Project Biologist: Craig Olawsky
Latitude: 44.6315	Project Engineer: Trevor Johnson
Longitude: -97.9436	Primary Contractor: Halme, inc.
County: Clark/Beadle	Start Date: 04/20/2016
Stream Name: Tributary to Shue Creek	Completion Date: 10/11/2016
Watershed: James	Existing Structure: Box Culvert
Structure Ownership: State	New Structure: Box Culvert

Stream Habitat

Description of stream habitat: Intermittent prairie stream habitat.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.15
Structure Length (ft):	122.75 (82.00 barrel+40.75' wingwalls)
Permanent Impacted Length (ft):	144.75 20' is riprap
Structure Width (ft):	22.00 (2 – 11'x10')
Length Previous Structure (ft):	50.00
Width of Previous Structure (ft):	20.00 (2 – 10'x9')
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:	Corrugated metal pipe (42") diversion channel with excavated fabric lined ends.
Temporary water barrier type:	Class B riprap and sand bags with plastic sheet liner
Date installation:	05/24/2016
Date removed:	08/25/2016

Description of stream flow: High flows.

Comments: Heavy recent rains in late May 2016.

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, erosion control wattle, straw mulching, class B riprap, soil stabilizer, permanent seeding.

Comments: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining event (5/25/2016).

Topeka shiner mortality: Presumed to be zero

Comments: Other species included common carp, black bullhead, northern pike

Impacts to Other Endangered Species: None

Conservation Recommendations:

SDDOT Project Reporting Form

PCN: 022B	DOT Region: Aberdeen
Project Number: P 0324(04)358	DOT Area: Watertown
Structure Number: 06-193-211	Project Biologist: Craig Olawsky
Latitude: 44.2390	Project Engineer: David Drake
Longitude: -96.7399	Primary Contractor: K&L Construction
County: Brookings	Start Date: 11/2/2016
Stream Name: Medary Creek	Completion Date: 12/22/2016
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: State	New Structure: Same – Scour Protection Only

Stream Habitat

Description of stream habitat: Typical prairie stream habitat.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.20
Structure Length (ft):	No change from previous
Permanent Impacted Length (ft):	135.00
Structure Width (ft):	No change from previous
Length Previous Structure (ft):	34.75
Width of Previous Structure (ft):	209.00
Countersink Depth (inches):	Not applicable

Comments: Scour protection (Class B riprap) placed on berm embankments under and around 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 autumn stream flow at time of construction.

Comments: Floating silt curtain used around the bridge abutments where riprap was placed; allowing the main stream channel to remain open.

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: BMPs appear to have been effective and functional.

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:

SDDOT Project Reporting Form

PCN: 022C	DOT Region: Aberdeen
Project Number: IM 0295(35)127	DOT Area: Watertown
Structure Numbers: 06-184/185-031	Project Biologist: Craig Olawsky
Latitude: 44.49921	Project Engineer: David Drake
Longitude: -96.7571	Primary Contractor: K&L Construction
County: Brookings	Start Date: 08/01/2016
Stream Name: North Deer Creek	Completion Date: 11/02/2016
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):	1.30
Structure Length (ft):	No change from previous
Permanent Impacted Length (ft):	240.00
Structure Width (ft):	No change from previous
Length Previous Structure (ft):	41.00
Width of Previous Structure (ft):	87.00
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 centerline.

Diversion Channel

Diversion channel type:	Fabric lined excavated channel & 24" corrugated plastic pipe.
Temporary water barrier type:	Sand bags with plastic sheet liner
Date installation:	08/18/2016
Date removed:	10/24/2016

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

Comments: Heavy localized rain for several weeks prior to and during diversion installation.

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 on 8/17/2016. Additional wattles and erosion control fabric was installed by afternoon of 8/18/2016.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining event, 08/18/2016.

Topeka shiner mortality: Presumed to be zero.

Comments: Other species included black bullhead, green sunfish, orange-spotted sunfish, white sucker, fathead minnow.

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: 06-184/185-044	Project Biologist: Craig Olawsky
Latitude: 44.48	Project Engineer: David Drake
Longitude: -96.7571	Primary Contractor: K&L Construction
County: Brookings	Start Date: 06/01/2016
Stream Name: Branch of North Deer Creek	Completion Date: 11/02/2016
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: State	New Structure: Same – Scour Protection Only

Stream Habitat

Description of stream habitat: Typical prairie stream habitat.

Impacts to Stream Habitat:

Disturbed Area (acres):	1.10
Structure Length (ft):	No change from previous
Permanent Impacted Length (ft):	227.00
Structure Width (ft):	No change from previous
Length Previous Structure (ft):	41.00
Width of Previous Structure (ft):	74.00
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 centerline.

Diversion Channel

Diversion channel type:	Fabric lined excavated channel & 24" corrugated plastic pipe. Installed after barriers overtopped (see comments).
Temporary water barrier type:	Sand bags with plastic sheet liner
Date installation:	08/16/2016
Date removed:	10/20/2016

Description of stream flow: Low stream flow in early June. High flow in August at time of diversion construction.

Comments: Entire work zone had been dry when upstream and downstream sandbag barriers were initially installed in early June. Several weeks of heavy rain in late July through early August resulted in the upstream sandbag barrier overtopping. As a result, we seined a small area in the work zone where water had accumulated.

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 on 8/16/2016. Additional wattles and erosion control fabric was installed by evening of 8/17/2016.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining event, 08/17/2016.

Topeka shiner mortality: Presumed to be zero.

Comments: Other species included black bullhead, green sunfish, orange-spotted sunfish, white sucker, fathead minnow, creek chub, sand shiner, Johnny darter, northern crayfish.

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: 06-184/185-074	Project Biologist: Craig Olawsky
Latitude: 44.4367	Project Engineer: David Drake
Longitude: -96.7570	Primary Contractor: K&L Construction
County: Brookings	Start Date: 10/07/2015
Stream Name: E. Br. of North Deer Creek	Completion Date: 11/02/2016
Watershed: Big Sioux	Existing Structure: Bridge
Structure Ownership: State	New Structure: Same – Scour Protection Only

Stream Habitat

Description of stream habitat: Typical prairie stream habitat.

Impacts to Stream Habitat:

Disturbed Area (acres):	2.00
Structure Length (ft):	No change from previous
Permanent Impacted Length (ft):	290.00
Structure Width (ft):	No change from previous
Length Previous Structure (ft):	41.00
Width of Previous Structure (ft):	152.00
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 centerline.

Diversion Channel

Diversion channel type:	Fabric lined excavated channel & 24" corrugated plastic pipe on south toe of the stream bank.
Temporary water barrier type:	Sand bags with plastic sheet liner
Date installation:	10/14/2015
Date removed:	09/15/2016

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

Comments: Riprap work through the stream bed and halfway up the north inslope was completed in 2015. Work was suspended 11/20/2015, and resumed in June 2016.

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: BMPs appear to have been effective and functional.

Fish Removal

Topeka shiners present: No Topeka shiners were found during seining event, 10/19/2015.

Topeka shiner mortality: Presumed to be zero.

Comments: Other species included black bullhead, northern pike.

Impacts to Other Endangered Species: None

Conservation Recommendations:

Appendix II. Individual stream crossing reporting forms for projects that were constructed in 2016 and also impacted the American burying beetle.

SDDOT Project Reporting Form

PCN:	02RV	DOT Region:	Pierre
Project Number:	NH 0018(172)230	DOT Area:	Winner
Structure Number:	61-485-010	Project Biologist:	Craig Olawsky
Lat/Long:	43.3755/-100.2838	Project Engineer:	Richard Frazier(2015)/Tyler Brunsvig(2016)
Legal Descrip.:	Sec. 4&9, T39N, R25W	Primary Contractor:	Sharpe Enterprises
County:	Todd	Start Date:	05/20/2015
Stream Name:	White Horse Creek	Completion Date:	10/26/2016
Watershed:	Not Applicable	Existing Structure:	Bridge
Structure Ownership:	State	New Structure:	Box Culvert

Stream Habitat

Description of stream habitat: Slow moving, but intermittently flashy stream in partially wooded area.

Impacts to Stream Habitat:

Disturbed Area (acres):	0.80
Structure Length (ft):	130.00 (82.00 barrel+48' wingwalls)
Permanent Impacted Length (ft):	142.00 12.00' is riprap
Structure Width (ft):	60.00 (5 - 12' x 12')
Length Previous Structure (ft):	30.00
Width of Previous Structure (ft):	122.60
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.

Diversion Channel

Diversion channel type:	48" metal arch pipe
Temporary water barrier type:	Fabric and riprap protected earth berm
Date installation:	6/30/2015
Date removed:	7/12/2016

Description of stream flow: Minimal flow

Comments: None

Erosion and Sediment Control

BMPs implemented: Low flow silt fence, high flow silt fence, straw mulching, erosion control wattle, erosion control blanket, surface roughening, gabions, Class B 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: Todd 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

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

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 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.

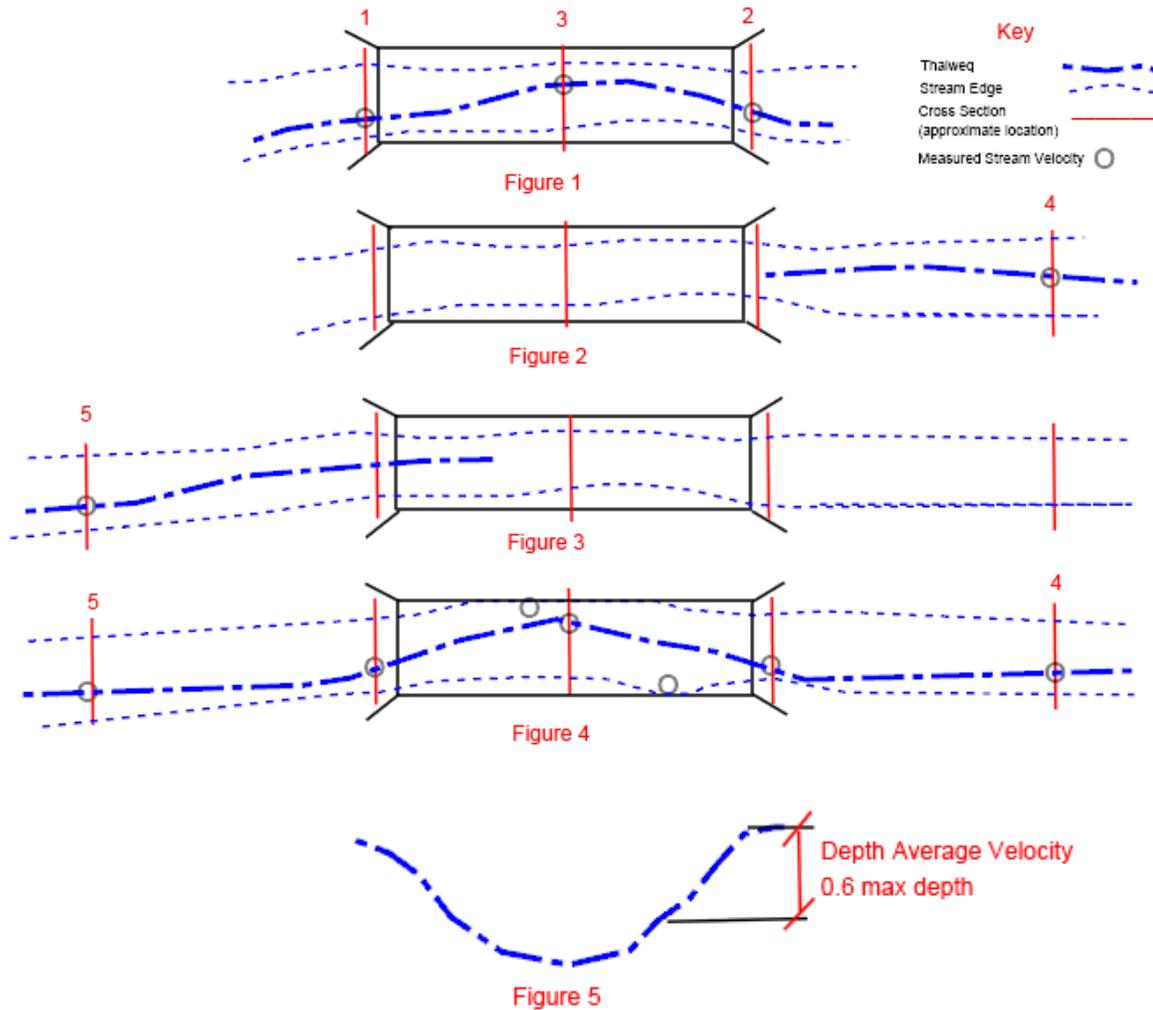
If the stream is in contact with one or both sides of the structure during the time of the assessment, the stream bed depth and reveal along the edges shall be evaluated to determine how the velocities compares to the natural stream edge outside the structure. The depth average velocity measured at a 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 -1.31ft./s. with burst swimming observed in water velocities of 1.31ft./s-2.46 ft./s (Adams 2000)²), the structure may be

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

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.



- 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.