



File Code: 2350-4

Date: February 8, 2007

Route To:

Subject: Sturgeon River Section 7

To: Forest Supervisor, Hiawatha National Forest

A team of resource specialists (Team) has evaluated the proposed bridge replacement on the Sturgeon River, as required by Section 7 of the Wild and Scenic Rivers Act (P.L. 90-542), for Regional Forester determination. It is understood the U.S. Army Corps of Engineers (COE) and Michigan Department of Environmental Quality Land and Water Management Division (DEQ) have asked the Forest Service to review COE/DEQ APPLICATION #06-056-011-0 for the above-described improvements. Based on the Hiawatha's submitted analysis, this letter forms the foundation for my determination under the "Direct and Adverse Effects" standard for the portions of this project within the bed and bank of the Sturgeon Wild and Scenic River.

This determination for compliance under Section 7 is not an appealable decision, nor does it affect any National Environmental Policy Act (NEPA) decisions in regard to the project.

Based upon the Team review, it is my determination that the above-referenced project does not have a direct and adverse effect on the free-flow character and outstandingly remarkable values on this portion of the Sturgeon Wild and Scenic River.

Our determination is also based on anticipation of a subsequent Biological Opinion by the U.S. Fish and Wildlife Service (FWS) in regard to the presence of federally listed threatened and endangered species near the project location. It is also based on the execution of a Memorandum of Agreement (MOA) between the Forest Service, the Delta County Road Commission, and the Michigan State Historic Preservation Office to mitigate the adverse effect of the bridge construction project on an archaeological site directly west of the bridge. If, as a result of this Biological Opinion or MOA, any change in the action or activities that have the potential to affect free-flow condition and/or the outstandingly remarkable values, this determination will need to be re-evaluated.

We ask that you share this determination with the COE, the FWS, and other agencies for reference and consideration under their delegated authority for the Sturgeon Wild and Scenic River.

If you have any additional questions, please contact John Romanowski at (414) 297-3727 or jromanowski@fs.fed.us.

/s/John Phipps (FOR)
RANDY MOORE
Regional Forester

Enclosures (8)

cc: David J. Silvieus, Richard A Corner, John Romanowski



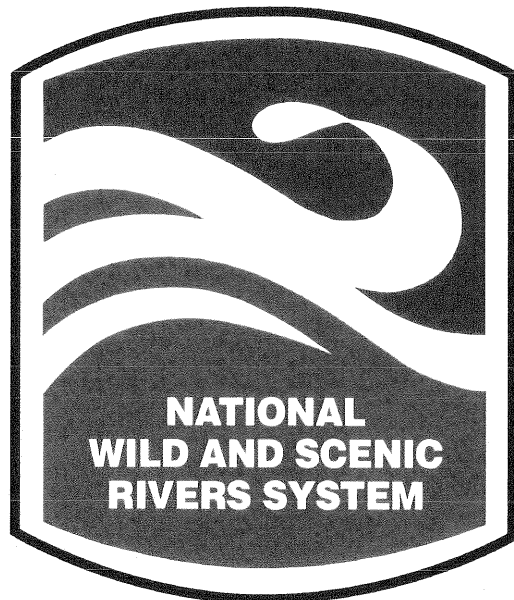
STURGEON RIVER

A.C.O.E. / MI DEQ Joint Permit

A.C.O.E FILE No. 06-056-011-0

(County Road 497 / Sturgeon River Bridge)

Section 7(a) Evaluation, Wild and Scenic Rivers Act



Prepared by: **Richard Corner, West Zone Hydrologist**

Specialist Input: **John Franzen, Archeologist**
Janet Ekstrum, Wildlife Biologist

Introduction

This document follows the evaluation procedure documented in the Wild and Scenic Rivers Reference Guide compiled by the Interagency Wild and Scenic Rivers Coordinating Council.

The U.S. Army Corps of Engineers (COE) Detroit District and the Michigan Department of Environmental Quality Land and Water Management Division (DEQ) have received a joint application for authorization to remove existing abutments and construct a new bridge across the Sturgeon River on Delta County Road 497 (See Appendix A). In addition, the application seeks authorization to replace four culverts and resurface the county road between the Village of Nahma and US Highway 2. In Michigan, the COE and DEQ are jointly responsible for issuing the permit for these activities under provisions of Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act.

The construction of the bridge over the Sturgeon River qualifies as a water resources project per FSM 2354.75 and thus requires a Section 7 evaluation for effects as prescribed in the Wild and Scenic Rivers Act. (The additional activities in the permit application, listed above, would not invade the area and unreasonably diminish the scenic, recreational, and fish and wildlife values present and will not be treated in this analysis.) In accordance with the Wild and Scenic Rivers Act, the USDA Forest Service is the federal agency responsible for the Section 7 evaluation for the Sturgeon River. This analysis will determine if there are any direct and adverse effects to the outstandingly remarkable values for which the river was designated and will also evaluate the impacts of the completed construction on the free flow of the Sturgeon Wild and Scenic River.

Comment: Although omitted at this section, the third component of a Section 7 determination (water quality) was evaluated in the Hydrological Report.

Sturgeon Wild and Scenic River:

The Sturgeon River, located on the West Zone of the Hiawatha National Forest, was designated as a component of the National Wild and Scenic Rivers System in March of 1992 (Public Law No: 102-249). The designated river corridor encompasses 8,268 acres and includes about 44 miles of the approximately 62 mile long Sturgeon River. The lower section, from Fourteen Mile Bridge on Forest Highway 13 south to the River's mouth at Nahma, contains about 26 miles of the main stem Sturgeon River and is classified as "Recreational". This section, which includes the project area, is characterized by a high degree of shoreline development towards the mouth at Nahma and by an increasingly sparsely populated, forested setting upstream from there (Figure 1). The Sturgeon River is paralleled by Forest Highway 13 (which is also called County Road 497 below U.S. Hwy 2) for its entire length within the section.

The Hiawatha National Forest Plan Final Environmental Impact Statement (Hiawatha National Forest 2006B) provides final river corridor boundaries, management direction, and a discussion of the Outstandingly Remarkable Values (ORV's) for the Sturgeon Wild and Scenic River. The ORVs are hydrological, ecological/botanical, wildlife, and heritage resources.

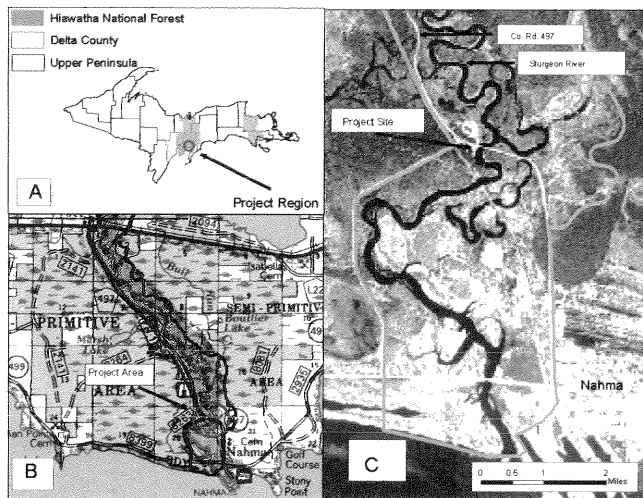


Figure 1: A. Regional view of Michigan's Upper Peninsula showing Delta County (blue shading), the East and West Zones of the Hiawatha National Forest (dark green shading) and the general project location (red circle). B. Project Area view of National Forest System Land ownership (dark green shading), Sturgeon Wild and Scenic River corridor (blue shading within black outline) and project area (red circle) with respect to Village of Nahma and US Highway 2 (red line at north edge of frame). C. Air photograph with Wild and Scenic River corridor boundaries (green lines) and showing Sturgeon River, County Road 497, and project site location at intersection of County Rd. 497 and Sturgeon River.

Description of the Project Area

The project site is located approximately 4 miles upstream from the River's confluence with Lake Michigan where Delta County Road 497 (Co. Rd. 497) crosses the Sturgeon River (Figure 1). Here, the Sturgeon River runs through deep outwash sands and upland vegetation grows adjacent to the river on both sides of the channel. The area on the west side of the bridge is characterized by open stands of red and jack pine whereas the east side is upland hardwoods such as red maple and aspen (Figure 1.C). There are no developments or wetlands at the project site. On the west side of the river there are archaeological remains of an early sawmill settlement that has been determined eligible for the National Register of Historic Places (Appendix B). All lands affected are National Forest System Lands.

The Delta County Road Commission has documented that it authorized construction of County Road 497 in 1915 and adopted the road into the Delta County System in May, 1945. Currently, the Road Commission maintains the road and believes it holds an existing easement of a 66 foot right of way through the Hiawatha National Forest to do so. The Hiawatha National Forest intends to acknowledge this easement by granting a Public Road Easement.

Define the Proposed Activity

The Co. Rd. 497 Bridge over the Sturgeon River was constructed in 1917 by the Joliet Bridge and Iron Company of Joliet, Ill (Figure 2). It was a steel pony-truss style bridge, 94 feet long and 20 feet wide and carried one-way traffic. The bridge was closed in 1991 due to structural inadequacy and vehicle traffic re-routed to Forest Road 8263. The bridge was then sold by the Delta County Road Commission and removed in 2006. However, the concrete abutments were left in place. The proposed project would replace the existing bridge by constructing a new two-lane roadway bridge. The new bridge would be placed on the same alignment but would be 20 feet longer (from 94 to 114 feet) and 10 feet wider than the original (Appendix B, C, and D). The new structure will provide access to the village of Nahma, allowing emergency vehicles, residents, and tourists a direct route into the village. The additional span would allow construction to occur out of the river channel, “in the dry”. Like the existing bridge, the proposed bridge would be a one span structure placed on concrete abutments stabilized by piling (Appendix B, C, and D).



Figure 2: Former County Road 497 Bridge over the Sturgeon River, looking upstream. The Bridge was removed in 2006 but the concrete abutments were left in place. The proposed replacement bridge would be of similar construction (steel pony-truss bridge with concrete deck) but be 20 feet longer and 10 feet wider.

The proposed replacement structure would be the same style as the original; a steel pony-truss bridge with a concrete deck. The type of steel known as “weathering steel,” which forms a thin corrosion resistant surface, would be used to provide a more rustic effect that would mimic the scenic qualities of the former bridge.

Existing abutments would be removed by first installing sheet pile cofferdams on both sides of the river. Removal of existing abutments and construction of new more widely spaced abutments would then occur in dry conditions. Finally, sheet pile cofferdams would be cut off to the approximate elevation of the channel bottom and backfill and riprap armoring installed (Appendix C, Profile View).

All construction activities would be staged from the Co. Rd. 497 right-of-way (ROW) on both the southern and northern sides of the Sturgeon River. The current roadway detour would remain in place until the completion of the proposed bridge. Restrictions on access and staging areas have been established to protect cultural and heritage areas designated to the west of the proposed bridge. These areas would be fenced to prevent encroachment and disturbance to archaeological remains that are present both north and south of the ROW.

Alteration of Within-Channel Conditions

Limited alteration of both a temporary and permanent nature to within-channel conditions would be expected to occur as a result of this project. Temporary alterations would be associated with the installation of sheet pile cofferdams and removal of original bridge abutments. Some turbidity and sedimentation would occur during this phase of construction. No permanent sources of either would result from this project and no adverse physical or ecological effect would be expected. The temporary effects would be minimized as much as possible by the method of construction and use of best management practices (BMPs) in accordance with the regulatory authority of the Michigan Department of Environmental Quality (under Part 31, Floodplain Authority and part 301, Inland Lakes and Streams of the Natural Resources and Environmental Protection Act (NREPA), Part 451, as amended) and U.S. Army Corps of Engineers (under Section 10 of the 1899 Rivers and harbors Act and Section 404 of the 1977 Clean Water Act).

Permanent alterations will result due to the locations of the new bridge abutments. The new bridge will have a wider span compared to the existing and, in the long term, free flow within the river channel will be improved relative to the current condition (Appendix C, Profile View).

Alteration of Riparian And/Or Floodplain Condition

Activities associated with the proposed project would not be expected to result in consequential alteration of riparian function or floodplain condition. A limited area of land, approximately 0.10 acres, adjacent to the Sturgeon River would be impacted by construction activities. The extent of this disturbance is the area covered by riprap armoring as shown in (Appendix C, Plan View). These lands would be subjected to installation of sheet piling, excavation for removal of old abutments and construction of new, backfill, and/or riprap armoring. About one half of the 0.10 acre area is within the existing 66 foot right of way of Co. Rd. 497 and the remaining 0.05 acres is outside of the

roads original foot print. Effected lands on the western side of the bridge are above the normal floodplain and do not support riparian vegetation (Figure 4 and Appendix C, Plan View). Affected lands on the eastern side are almost entirely fill material associated with construction of the original bridge (Figure 5). No wetlands would be impacted by this project.



Figure 4: First Meander Bend immediately downstream of the proposed project site. Inadequate span of original structure likely contributed to bank erosion of the deep, droughty, infertile sands adjacent to the river.

Alteration of Upland Conditions

Other than the impacts to archeological resources (discussed under the “Compare Project Analysis to Management Goals” section), no alterations of upland conditions are expected.

Alteration of Hydrological Or Biological Processes

Near the project site, the Sturgeon River meanders through deep, droughty, infertile outwash sands (Croswell Series) on the western side of the river and poorly drained sands on the eastern side (U.S.D.A. Soil Conservation Service 1994). The Sturgeon’s annual flow regime is characterized by peak discharges during spring run off, usually in April, followed by a high pulse in October through December (see also **Hydrological Report** section). The lowest median monthly discharge, which occurs in August, is only 16% of the highest median discharge (in April) and river stage can increase by 6 feet or more during peak runoff. The stream is flashy and responds relatively quickly to precipitation

events. This is due to the low water storage capacity of poorly drained outwash sands throughout much of the watershed and to additional areas of shallow soils over bedrock.

The existing bridge abutments were not spaced widely enough to accommodate the River's flow regime and so constrict flow, especially during higher discharge (Figure 5 and Appendix B). The constriction has altered channel forming processes from what would be expected under natural conditions, leading to bank scour on the outside of the bend both upstream and downstream of the bridge (Figure 5). Scour also occurs upstream of the bridge on the inside on the meander (Figure 5). Additionally, by increasing downstream velocities, the confined cross section has likely contributed to increased bank erosion downstream of the bridge (Figure 4).



Figure 5: Constriction of the Sturgeon River by bridge abutments installed circa 1917. Bank scour upstream of bridge can be seen at left middle ground and on the opposite side of the river, upstream of bridge abutment. Flow is from left to right.

The new bridge would be constructed with a wider span and therefore have a greater capacity to transport flows through the area. The new crossing would still constrict the channel to some degree and would not completely eliminate existing stream flow modification. However, a more natural flow regime through the area would occur. This would contribute substantially to mitigating bank scour near the bridge and may also facilitate “healing” of the eroding bank downstream.

Despite the rather significant channel constriction caused by the existing abutments, velocities upstream of the bridge have remained sufficiently high to maintain sediment transport processes and no artificial sediment step has developed. Therefore, increases in sediment transport across the bridge site due to greater hydraulic capacity of the new construction would not be expected to occur.

Sedimentation associated with the removal of old abutments and construction of new is expected to be minimal due to use of BMPs. Further, this segment of the Sturgeon River is characterized by high natural sediment loads and is less sensitive to sedimentation impacts compared to upstream reaches with lower natural sediment loads. For example, spawning gravels are not present in the lower Sturgeon so would not be lost. For these reasons, adverse alterations to hydrologic or biological processes related to sediment dynamics would be unlikely.

As shown in Appendix B, the original bridge was constructed on a meander bend. This disrupts natural hydrological processes at the site by preventing lateral channel migration. Because the project involves construction of a bridge to link portions of an existing road, moving the road and bridge to ameliorate this is not feasible.

In summary, following completion of this project, direct and adverse effects to free flow would be expected to continue but to a lesser extent than current conditions and substantial improvements would be realized.

Comment: The effects of the existing bridge are accepted as it existed at the river's date of designation. The role of the river-administering agency is to determine if the predicted project proposal effects will be greater than those of the existing situation.

Magnitude and Extent of Potential Off-Site Changes

Changes associated with this project may extend to the first meander bend downstream of the bridge site by allowing re-stabilization of the eroding bank (Figure 4). No other off-site changes are anticipated.

Time Scale

The Co. Rd. 497 Bridge project would be expected to take one season to complete; beginning on June 1, 2007 and ending before October 15, 2007.

Compare Project Analysis to Management Goals

Management objectives for the Sturgeon Wild and Scenic and River are provided in the Hiawatha National Forest 2006 Forest Plan, under Management Areas 8.4 and 8.4.4 (Hiawatha National Forest 2006A), and the accompanying Final Environmental Impact Statement (Hiawatha National Forest 2006B):

1. Protection of the Outstandingly Remarkable Values of the Sturgeon River.

The Sturgeon Wild and Scenic River ORVs are hydrological, ecological/botanical, wildlife, and heritage.

Hydrological: The hydrologic ORV is the presence and continuous formation of oxbow features in the river's lower reaches. Oxbows occur when the amount of sediment being transported in a system is great relative to the volume of channel flows. The oxbow features in the project area can be seen in Figure 1.C.

Activities associated with this project would not be expected to alter sediment supply or stream discharge at a scale sufficient to affect this ORV. However, as described under the above section "Alteration of Hydrological or Biological Processes", the original bridge was constructed on a meander (Figure 1.C and Appendix B). This is an existing adverse effect on the hydrologic ORV because lateral channel migration, necessary for the formation of oxbows, is prevented on the respective meander loop. Because the project involves construction of a bridge to link portions of an existing road, moving the road and bridge to ameliorate this is not feasible. Following completion of this project, direct and adverse effects to the hydrologic ORV would be the same as the current condition.

Ecological/Botanical: The lower reaches of the Sturgeon River corridor support a high quality southern floodplain forest, a plant community not commonly found as far north as Michigan's Upper Peninsula. Due to its high quality and northern location, this southern flood plain forest is considered a regionally outstandingly remarkable value.

The proposed project would not occur within southern flood plain forest. Further, the project would occur within the "foot print" of a development that has existed since the early 1900's, so most impacts would be to previously developed lands. No effects on the ecological/botanical ORV would be expected to occur as a result of this project.

Wildlife: The types of habitats and associated wildlife species found within the Sturgeon River corridor can be found throughout Michigan's Upper Peninsula with the exception of the southern flood plain forest discussed above. Because the habitats occur in relatively large contiguous areas, providing a large contiguous corridor of wildlife habitat with limited human disturbance, wildlife habitat is considered an outstandingly remarkable value.

No federally Threatened, Endangered, or Sensitive species or Regional Forester Sensitive Species (RFSS) have been recorded at the project site. Habitat exists for the following federally listed species: bald eagle, grey wolf, and Canada lynx. Regional Forester Sensitive Species with habitat in the project area include red-shouldered hawk, Northern goshawk, Blanding's turtle, black-backed woodpecker, black-crowned night-heron, and Rapid's clubtail dragonfly.

A detailed Biological Evaluation has been completed (Appendix E) and a request for concurrence of Threatened and Endangered Species determinations from the U.S. Fish and Wildlife Service has been made. In summary, a determination of *Not Likely to adversely affect where the effects are expected to be discountable* is given for bald eagle, gray wolf and Canada lynx. A determination of *May Impact Individuals but is not likely to cause a trend to federal listing or loss of viability* is given for red-shouldered hawk, Northern goshawk, and Blanding's turtle. The project would have *No Impacts* on Rapid's clubtail dragonfly, black-backed woodpecker, and black-crowned night-heron.

Because this project would occur within an area that has been developed since the early 1900s, no permanent change to the wildlife ORV is expected. There will be no change to

early or late successional communities by the proposed action. The proposed action will have no effect on populations of game species or on Forest Management Indicator Species. Use of suitable habitats in a localized area may be temporarily disrupted by activities associated with the operation of heavy construction equipment. This temporary impact on the Wildlife ORV would be expected to occur until project completion, from June 1 to October 15, 2007. The proposed action may increase the amount of vehicle use once the road is paved and the bridge is re-constructed. However, the Sturgeon River will continue to provide an area of relatively low human development and travel corridor for wildlife and a travel corridor for wildlife species.

The proposed action will not change the amount of large woody debris in the project area and will not change habitat conditions or have a negative effect on American marten.

The river corridor provides foraging and nesting habitat for osprey. The Michigan Natural Features Inventory (MNFI) database shows no recorded osprey nests within the project area since 1994. Michigan Department of Natural Resources records show a nest in 2003 greater than one half mile from the bridge construction site. Osprey may choose to forage in less disturbed areas during construction activities.

Heritage: The archaeological site directly west of the bridge contributes to the Outstandingly Remarkable Heritage Values for the Sturgeon River. This site consists of the archaeological remains of one of the earliest sawmill settlements (c. 1848-1859) in northern Michigan, and it has been determined eligible for the National Register of Historic Places. It is located both upstream and downstream from the bridge on the west bank of the river. A relatively intact portion of the site on the south side of the road extends into the area of potential effects for this project. Specifically, direct adverse impacts would involve earth-disturbance, including compaction, due to the placement of riprap on and adjacent to archaeological deposits. In addition, a relatively high risk of indirect impacts would exist for deposits in close proximity to the riprap due to heavy equipment used during construction and future routine or emergency maintenance.

We propose to mitigate the adverse effect of the bridge construction project on this site through archaeological data recovery implemented through a Memorandum of Agreement signed by the USDA Forest Service, the Delta County Road Commission, and the Michigan State Historic Preservation Office. Portions of the site outside the requested easement and not directly threatened by construction will be protected from indirect impacts during construction by temporarily erecting a fence to prevent equipment or vehicles from access to the site from County Road 497. This fence would be included in the work specified in construction documents and contract terms would require protection of the site.

Data recovery, rather than long-term preservation, is an appropriate treatment for this portion of the site for several reasons. Because this project involves construction of a bridge to link portions of an existing road, moving the road and bridge to preserve this portion of the archaeological site in-place is not feasible. The new bridge design may also result in mitigation of bank erosion problems associated with the old abutments of a

previous bridge, which are currently eroding this archaeological site (Figure 4). Over the long term the new bridge should reduce erosion and have a beneficial effect on the remaining portions of the site. Without the new bridge, continued erosion of the archaeological site is expected. In addition, the information in the portion of the site proposed for data recovery is at relatively high risk for damage due to recreational use. Finally, the recovered information can be used to interpret the heritage values of the river. We are developing a plan for interpretation of both the archaeological site and the previous bridge.

Based on implementation of this MOA the Forest Service will have fulfilled its obligation under the National Historic Preservation Act to take into account the effects of this project on heritage resources. These same mitigation measures will also ensure that the project is consistent with a non-degradation and enhancement policy for heritage resources within the Sturgeon River Wild and Scenic River corridor, in accordance with the protection requirements in Section 10 of the National Wild and Scenic River Act.

2. Maintain the free-flowing character of the Sturgeon River

As discussed under the **Alteration of Hydrological or Biological Processes and Protecting the Hydrologic ORV** sections above, the free-flowing character of the Sturgeon River is adversely impacted by the narrow span of the existing bridge abutments. The resultant constriction on channel cross sectional area leads to a higher rate of bank scour and bank erosion than would be expected under an unconfined flow regime. The new bridge span, although wider than existing, would still constrict the flows to some degree. Therefore, the proposed project would not completely eliminate existing stream flow modification. However, the new structure would have an improved hydraulic capacity promoting a more natural flow regime through the area. This, in turn, would be expected to contribute to the mitigation of bank scour and stream bank erosion. Also as described above, channel migration is currently inhibited at the project site due to the location of the channel crossing on a meander. This would still be true after project completion. However, mitigation, by relocating the bridge, is not feasible at this time.

3. Protect the “eligibility” of Study River Segments

The proposed project would not occur within a Study River Segment.

4. Desired Conditions

Desired conditions for the Sturgeon Wild and Scenic River, as described in Management Area 8.4.4 in the 2006 Hiawatha National Forest Plan, are summarized under eight subheadings; Ecological, Social, Economic, Recreation, Access/Transportation System, Scenic Quality, Heritage Resources, and Private Property.

Ecological:

This subheading provides desired objectives for a wide range of environmental elements, patterns, and processes within the Wild and Scenic River corridor. The proposed project

would have negligible effects on many of these, including landscape scale vegetation community successional status and disturbance regimes, populations of game species, and large woody debris. Effects on Threatened and Endangered species and channel forming processes are discussed under the Wildlife and Hydrological ORVs in the above section. Other factors under this subheading are discussed below.

The desired condition for **non-native Invasive Species (NNIS)** is for complete absence or existence at very low levels within the corridor. Spotted knapweed currently exists at the proposed project site and may benefit from exposure of mineral soils associated with construction. This would be a localized effect and, should it occur, would be easily mitigated by spot treatment following project implementation. The chance for spread of new NNIS into the project area would be reduced by the requirement for vehicle washing (see **Mitigation Measures** section below).

Quality habitat for **anadromous salmonids, resident trout populations, lake sturgeon, and aquatic macroinvertebrates** is also described as a desired condition. Although the wider span of the proposed bridge would likely result in reduced stream velocity through the project area, conditions at the project site do not currently cause impediment to aquatic organism passage. BMPs would be used to minimize sedimentation from construction activities. Further, natural sediment loads in the lower Sturgeon River are high and spawning gravels are not an important natural habitat component of this stretch of river. Sedimentation is therefore not a major habitat concern in the lower reaches of the sturgeon river and native aquatic organisms would be adapted to a mostly sand dominated substrate. For these reasons, no changes related to fisheries or aquatic organisms are expected to result from this project.

The desired condition for **water quality** is to meet or exceed standards set by the Michigan Water Resources Commission. Water quality at the project site is currently high. Although limited sedimentation may result from construction activities despite the use of BMPs, this would only be expected to result in a limited and temporary (days) effect on water quality.

A final desired condition under the Ecological subheading is for bank stabilization and other aquatic habitat management to **allow natural river processes to continue** and to **blend with the natural landscape**. The former bridge and its abutments disrupted natural river process due to inadequate span and the location of the structure on a meander. As described in previous sections, the replacement bridge would provide an improved, although not entirely unaffected, flow regime compared to current conditions. Although not a part of the "natural landscape", the existing original bridge and abutments "blended" with its surroundings due to the style of construction and age of materials. As previously described, the replacement bridge would quickly attain a similar look due to the facts that it would be the same style of construction and because of the use of weathering steel. The replacement concrete abutments and their armoring would appear "newer" and therefore may take several years of ageing to blend into the setting.

Social and Recreation:

Desired conditions described under these subheadings would not be altered appreciably by proposed project activities. However, it is possible that the restored roadway would provide improved access for some Forest visitors to social/recreational opportunities in the lower river such as canoeing, hunting, fishing, driving for pleasure, or visiting the Nahma Marsh Trail.

Economic:

No economic analysis has been done for the proposed project. In 1997 the Nahma Township Board stated that they believed reconstruction of the bridge was important to the economic development of the Village of Nahma (Appendix F).

Access/Transportation System:

The proposed project would be consistent with desired conditions for access and transportation. Specifically, the river crossing would be updated to provide greater protection of river resource values (provide an improved flow regime, mitigate bank scour and bank erosion), allow safe passage to river access points. Sedimentation will be minimized by design of the bridge and by using BMPs.

Scenic Quality:

The proposed project would be consistent with desired conditions for the Recreational segment of the Sturgeon Wild and Scenic River. See also the discussion relating to "blending with the natural landscape" under the **Ecological** subheading above.

Heritage Resources:

Affects on Heritage Resources are addressed under the Heritage ORV, above.

Private Property:

No effects on private property would be anticipated.

Determination

1. Long-term effects of the project on free-flow would be positive because the increased span of the proposed bridge would result in a more natural, although not completely unaffected, flow regime compared to current conditions.
2. The analysis indicates that, given the proposed mitigations to cultural resources described under the previous section, the proposed activity would not directly or adversely affect the established ORVs of the Sturgeon Wild and Scenic River.

Mitigation measures recommended for this permit application that are paramount to protecting the wild and scenic river values are:

- Soil erosion and sediment control measures would be implemented in accordance with Michigan Department of Transportation Standard Details R96-C (Michigan Department of Transportation 2006) and under the regulatory authority of Michigan Department of Environmental Quality under Part 31, Floodplain Authority and part 301, Inland Lakes and Streams of the Natural Resources and Environmental Protection Act (NREPA), Part 451, as amended.
- Prior to moving construction equipment into the project area, the contractor would be required to take reasonable measures to ensure that each piece of equipment is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds of Non-native Invasive Species.
- The original steel pony truss bridge would be replaced with a similar structure to mitigate impacts to aesthetic values.
- “Weathering steel” would be used to mimic the look of the original structure.
- Fencing would be used to prevent encroachment and disturbance to archaeological remains that are present both north and south of the ROW.
- Potential adverse effect of the bridge construction project on historical cultural resources would be mitigated by archaeological data recovery

References

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List of Appendices

Comment: Only Appendix G, the Hydrological Report, is included.

Appendix A – Michigan Department of Environmental Quality and U. S. Army Corps of Engineers Joint Permit Application with Memo to Hiawatha National Forest.

Appendix B – Project Construction Sheet, Area Scale View

Appendix C – Project Construction Sheet, Bridge Construction Detail; Plan and Profile Views

Appendix D – Project Construction Sheet, Bridge Abutment Construction Detail

Appendix E – Biological Evaluation

Appendix F – Letter of project support from Nahma Township Supervisor

Appendix G – Hydrological Report

Hydrological Report

The Sturgeon River Watershed

The Sturgeon River Watershed is located in the central Upper Peninsula of Michigan on the West Zone of the Hiawatha National Forest (Figure 1). The watershed has a long and narrow configuration and drains about 215 square miles of land. Glacial outwash plain, characterized by level, deep, well drained sands or poorly drained organic soil (in low areas), is the dominant landform within the watershed and occurs on almost 60% of its area (Figure 1). Less extensive areas of lake plain (25% of the watershed), end moraine (13%), ice contact (2%), shallow till plain over bedrock (1%), and forested dune and beach ridges (1%) also occur within the watershed.

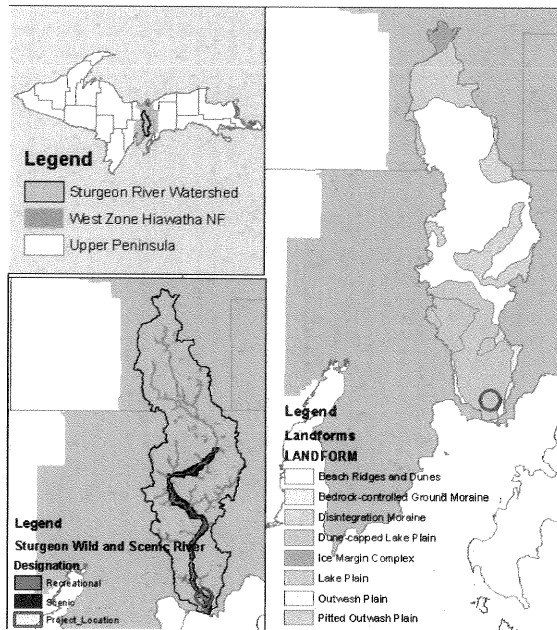


Figure 1: Location of Sturgeon River Watershed, Sturgeon River Wild and Scenic River Corridor, and distribution of landforms (Jerome 2006) within the River's watershed.

In spite of the extensive areas of well drained sands within the watershed, the main stem Sturgeon River is primarily a surface water dominated system with relatively low base flows, high seasonal peak flows, and moderately rapid response to snowmelt and precipitation events. However, ground water dominated tributary streams with stable flow regimes and high base flows do occur within the system; especially in its upper reaches.

The Sturgeon River

The Sturgeon's annual flow regime is characterized by peak discharges during spring runoff, usually in April, followed by a high pulse in October through December (Figure 2). The lowest median monthly discharge, which occurs in August, is only 16% of the highest median discharge (in April) and river stage may increase by 5 feet or more during peak runoff. Maximum measured discharge on the Sturgeon River, 2030 cubic feet per second (cfs), was reported on April 21, 1986 and the minimum, 32 cfs, was reported on August 5th, 1998.

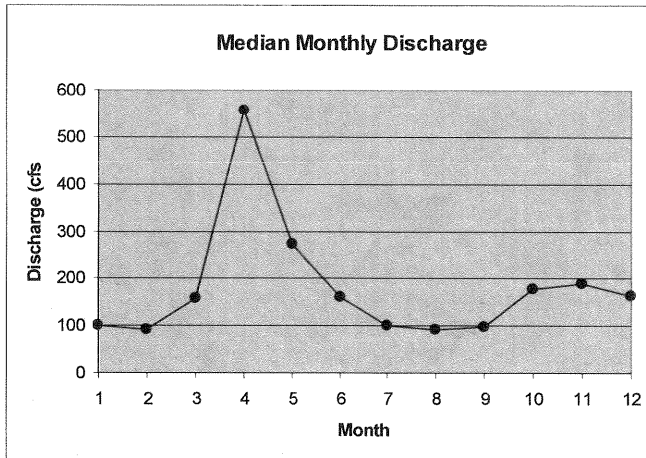


Figure 2. Median monthly discharge on the Sturgeon River. The highest seasonal discharges are realized in April, followed by a high pulse in October or November as a result of increased precipitation events in the fall. Data from USGS Gage #04057510 located on Sturgeon River approximately 6 linear miles upstream of the project site.

In addition to seasonal variations, the Sturgeon River is flashy and responds relatively quickly to precipitation or snow melt events. This results from the River's watershed having large areas of soils that are saturated year round with very low water storage capacity. Also significant areas occur that have relatively shallow soils over bed rock.

Near the project area, the Sturgeon River is a C5 channel (Rosgen 1996) with a moderate width to depth ratio (13.7) and high sinuosity (2.3). Channel slope in the project area is very level (0.012%). Using USGS gage data collected about 6 linear miles upstream of the project site and assuming bank full flows occur about once every 1.2 years; bankfull discharge is estimated to be around 900 cfs. The return interval assumption is likely a good one based on information collected for regional rating curves elsewhere in the Upper Peninsula (Jennifer Mistack, Michigan Department of Natural Resources personnel communication). However, cfs may be higher because the project site is several miles below the gage station.

Hydrological Effects

The existing bridge abutments were not spaced widely enough to accommodate the River's flow regime and so constrict flow, especially during higher discharge (Figure 3 and Appendix B). The constriction has altered channel forming processes from what would be expected under natural conditions, leading to bank scour on the outside of the bend both upstream and downstream of the bridge (Figures 3 and 4). Bank scour also occurs upstream of the bridge on the inside on the meander (Figure 3). Additionally, the confined cross sectional area likely increases downstream velocities and contributes to increased bank erosion downstream of the bridge (Figure 5).



Figure 3: Constriction of the Sturgeon River by bridge abutments installed circa 1917. Bank scour upstream of bridge can be seen at left middle ground and on the opposite side of the river, upstream of bridge abutment. Flow is from left to right.

The new bridge would be constructed with a wider span and would therefore have a greater capacity to transport flows through the area (project construction plans are provided in Appendices B, C, and D). This would result in a more natural local flow regime and would alleviate bank scour near the bridge.

Reductions in stream velocities through the crossing would be expected to accompany the increased hydrolic capacity of the new bridge. This may alleviate or reduce the rate of downstream bank erosion (Figure 5). However, observations by Forest Service personnel suggest that bank erosion at this site has increased substantially over the past decade. It is uncertain why (or if) the bridge, built in 1917, is causing this type of erosion many decades later. As evidenced by the many oxbow lakes (visible in Figure 6), the Sturgeon River is a naturally dynamic system; especially in its lower reaches. A sequential analysis

of air photographs between 1937 and the present showed that the reach directly upstream from the project area, from the project site to U. S. Highway 2, has been undergoing a straightening trend (Figure 6, Table 2). This type of channel response would be expected to accompany a decrease in sediment supply from the watershed and may indicate that



Figure 4: Infrared air photograph from 2000 showing bank scour (at green arrow) due to the narrow span of the bridge constructed c. 1917.



Figure 5: First Meander Bend immediately downstream of the proposed project site. Inadequate span of original structure likely contributed to bank erosion of the deep, droughty, infertile sands adjacent to the river.

the channel is still recovering from excessive sedimentation during the logging era. Channel straightening would increase slope upstream of the project area and possibly contribute to greater channel velocities through the project site in recent decades; leading, in turn, to increased bank erosion rates. Another factor may be related to weather

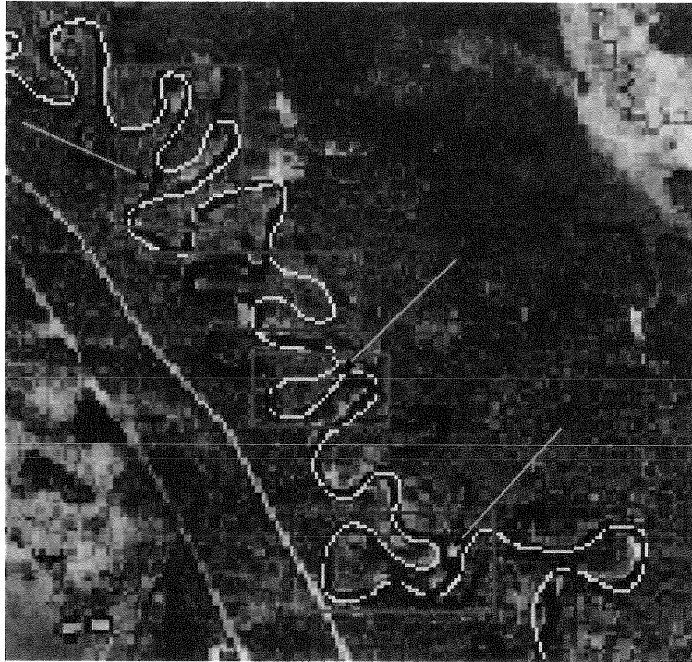


Figure 6: Infrared air photograph from 2000 showing channel straightening upstream of the project area. The green line follows the 1937 course of the Sturgeon River through the area. The blue arrows point to sections of channel that have “cut off” the meander loops enclosed in the red boxes.

Table 2: Length of Sturgeon River between U.S. Highway 2 and Sturgeon River Crossing at different years.		
YEAR	Channel Length (miles)	Change From Previous
1937	8.43	*
1954	8.35	-0.08
1972	7.95	-0.40
2000	7.63	-0.32
Total		-0.80

patterns. Recent observations of bank erosion in the form of large frozen soil clods cast from the upper B horizon may have resulted from a freeze thaw cycle (Figures 7 and 8). Increasing soil pore pressure from the expansion of freezing water within the profile would be alleviated towards the free face of the bank (see Leopold 1994, p. 255). Over the course of several years, this process could contribute substantially to bank erosion in the Sturgeon River system.

In summary, while construction activities associated with the project would be expected to alleviate downstream bank erosion; other factors may be contributing to the problem. Monitoring of the site will be necessary to determine if additional action would be required.



Figure 7. Large soil clods cast from upper B horizon of stream bank during a freeze-thaw cycle. Over several years, this process could contribute substantially to bank erosion in the Sturgeon River system.



Figure 8. Detail of frozen soil clod cast from B horizon for scale.

Lastly, the channel would still be constricted at the project site to some degree following project completion. Existing fill material for the eastern approach would still extend into

the active channel during higher flows (Figure 9). Although a substantial improvement would be expected over current conditions, especially with respect to channel scour at the bridge site, the proposed project would not completely eliminate existing stream flow modification.



Figure 9. Existing approach on the eastern side of the Sturgeon River is fill material that extends into the flood plain. This approach will still constrict the Sturgeon River after project completion. However, the new structure would have a greater hydraulic capacity and provide for a much improved, though not completely unaffected, flow regime through the area.

Despite the rather significant channel constriction caused by the existing abutments, velocities upstream of the bridge have remained sufficiently high to maintain sediment transport processes and no artificial sediment step has developed. Therefore, increases in sediment transport across the bridge site due to erosion of sediments accumulated upstream of the crossing would not be expected to occur.

Sedimentation associated with the removal of old abutments and construction of new is expected to be minimal due to use of BMPs. Further, this segment of the Sturgeon River is characterized by high natural sediment loads and is less sensitive to sedimentation impacts compared to upstream reaches with lower natural sediment loads. For example, spawning gravels are not present in the lower Sturgeon so would not be lost. For these reasons, adverse alterations to hydrologic or biological processes related to sediment dynamics would be unlikely.

As shown in Figure 4, the original bridge was constructed on a meander bend. This disrupts natural hydrological processes at the site by preventing lateral channel migration. Because the project involves construction of a bridge to link portions of an existing road, moving the road and bridge to ameliorate this is not feasible.

In summary, following completion of this project, direct and adverse effects to free flow would be expected to continue but to a lesser extent than current conditions and substantial improvements, especially concerning bank scour near the bridge, would be expected to be realized. No permanent effects associated with sedimentation are expected.