United States Department of the Interior

FISH AND WILDLIFE SERVICE

2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823-6360

IN REPLY REFER TO:

May 3, 2018

Memorandum

To: Scott Koproski, Project Leader, Alpena Fish and Wildlife Conservation Office

From: Scott Hicks, Field Supervisor, Michigan Ecological Services Field Office

Re: Biological Opinion, Log No. 18-R3-ELFO-01, for the Woodland Road, Lake Kathleen Dam, and Two-track Crossing Project on the Maple River, Emmet County, Michigan

Pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, this document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (Opinion) for the culvert replacement at the Woodland Road, removal of the Lake Kathleen dam, and the replacement of the culverts at the two-track crossing on the Maple River. The Opinion considers the effects of the proposed action on Hungerford's crawling water beetle (*Brychius hungerfordi*) and Michigan monkey flower (*Mimulus michiganesis*). We received your request for formal consultation on December 8, 2017.

We base this Opinion on information provided in your Biological Assessment, supplemental information provided by Matt Kowalski, published literature, and information obtained from species experts. A complete administrative record of this consultation is on file at our office.

With respect to ESA compliance, all aspects of the project description are binding. Reasonable and prudent measures and the accompanying Terms and Conditions provided within the enclosed Opinion are nondiscretionary and are designed to minimize incidental take.

We greatly appreciate the assistance and cooperation of your staff throughout this consultation process. If you have any questions, please contact me or Carrie Tansy of this office at 517-351-8375.

cc: Phil Delphey, Bloomington MN

Biological Opinion
for
The Woodland Road, Lake Kathleen Dam, and Two-track Crossing Project on the Maple River, Emmet County, Michigan

Submitted to the U.S. Fish and Wildlife Service

Alpena Fish and Wildlife Conservation Office

May 3, 2018

Prepared by:

U.S. Fish and Wildlife Service

Michigan Ecological Services Field Office

2651 Coolidge Road, Suite 101

East Lansing, Michigan 48823

CONTENTS

List of Figures

List of Tables

CONSULTATION HISTORY

- On July 18, 2017, the US Fish and Wildlife Service (FWS) Alpena Fish and Wildlife Conservation Office (FWCO) sent an email to the Michigan Ecological Services Field Office (MIFO) requesting initiation of formal consultation. The Biological Assessment concluded that the proposed action was likely to adversely affect Hungerford's crawling water beetle (*Brychius hungerfordi*, HCWB) and not likely to adversely affect Michigan monkey flower (*Mimulus michiganesis*, MMF). The proposed action included construction of a sea lamprey barrier following the removal of the Lake Kathleen dam.

- On a call on August 17, 2017, Alpena FWCO informed MIFO that plans for the sea lamprey barrier were uncertain, and discussions among stakeholders were being planned to consider possible changes to the proposed action related to sea lamprey barrier options.

- At a meeting on September 6, 2017, MIFO notified Alpena FWCO that we would wait to initiate formal consultation until we had more information on the proposed action specifically related to the sea lamprey barrier so that we could adequately assess impacts to listed species (i.e., whether the East Branch of the Maple River was likely to need to be treated with the lampricide TFM following removal of the Lake Kathleen dam). We also discussed concerns over potential effects to hydrology and impacts to MMF.

- On October 27, 2017, biologists from Alpena FWCO and MIFO met with hydrologists with Michigan Department of Environmental Quality at the project site to review the proposed action and discuss possible effects to MMF.

- On December 8, 2017, the Alpena FWCO sent an email initiating formal consultation. The revised BA made a "likely to adversely affect determination for MMF, and does not include a sea lamprey barrier as part of the proposed action.

- On January 8, 2018, MIFO sent a memo to the Alpena FWCO acknowledging a complete initiation package.

- On April 24, 2018, a draft of this Biological Opinion was sent to Alpena FWCO.

- On April 30, 2019, Alpena FWCO sent comments on the draft Biological Opinion.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action considered in this Biological Opinion (Opinion) includes three projects in the Maple River Watershed, Emmet County, Michigan: 1) removing the Woodland Road culverts and replacing them with a channel spanning structure (bridge), 2) removing the Lake Kathleen dam, and 3) removing and replacing the two-track crossing culverts with a properly sized structure to accommodate natural flow conditions. The project is funded by the U.S. Fish and Wildlife Service's Fish Passage Program and Great Lakes Restoration Initiative funding. Alpena FWCO is the lead agency for this consultation.

The HCWB and MMF are federally endangered species that occur in close proximity to the proposed actions.

Project Description

1) Woodland Road Culvert Replacement:

The proposed project involves removing the three existing undersized and perched culverts and replacing them with a channel-spanning structure (timber bridge) designed to accommodate the natural flow of the river. The existing culverts drop approximately 4 feet in elevation through the length of the culverts, which is accelerating velocities through the culverts and blocking aquatic species passage. At this location the Maple River has bankfull width of about 30 feet (ft). Following dam removal and site restoration, the new bridge will span about 80 ft. Additionally, the road embankments will be stabilized and road runoff managed to reduce or eliminate sedimentation at the crossing.

2) Lake Kathleen Dam Removal:

This project element involves the complete removal of the existing dam from the spillway crest to Woodland Road crossing. The previously inundated area would revert to a riverine channel with extended flood shelves. A temporary sheetpile cofferdam will be installed and the lake levels will be lowered. The spillway will be demolished and removed. The sediment basin upstream of existing structure will be excavated to capture headcut sediment, and the upstream exposed impoundment bottom lands will be restored and stabilized with vegetative cover.

The process of incrementally lowering the water level of Lake Kathleen will minimize the erosion of sediment from the newly exposed lake bed. Additionally, the excavation of a sediment basin upstream of the existing structure will trap mobilized sediment and minimize downstream sediment loading.

3) Two-track Crossing Culvert Replacement:

At the two-track road crossing, the six existing undersized culverts will be removed and replaced with a lighter duty timber bridge capable of handling off-road vehicles such as all-terrain vehicles, snowmobiles, hobby-type tractors, and the occasional passenger vehicle. This project will include building a coffer dam or dewatering structure and removing the existing culverts. The bridge substructure will be installed, and the deck will be built. Finally, road and approach work will be completed, including restoring embankments and stabilizing areas.

Conservation Measures

The action agency included several conservation measures as part of the proposed action to minimize incidental take of HCWB and adverse effects to MMF. All construction activities on Woodland Road will be carried out from the existing road grade. Widening of Woodland road to accommodate the new timber bridge structure will be to the north side avoiding direct impacts to the wetlands to the south where MMF occurs. The timber bridge design and construction will follow the BMP's outlined in Pilon 2002. The action agency will contract with Michigan Natural Features Inventory (MNFI) to monitor seep levels to determine to what extent changes to hydrology as a result of dam removal are affecting MMF. If seepage appreciably decreases where MMF occurs, the action agency with work with MNFI and MIFO to transplant MMF plants to suitable habitat with stable hydrology downstream of the action area, as practicable. In addition, to offset any adverse effects, they will host work days to reduce invasive species that threaten the Maple River MMF population.

For the two-track crossing project, the action agency will fund and carry out surveys, removal, and relocation of HCWB immediately prior to construction (i.e., in-stream disturbance) activities. The timber bridge design and construction will follow the BMP's outlined in Pilon 2002.

For a more detailed description of the proposed action, please see pages 3-7 of the Biological Assessment (USFWS 2017) and pages 14-29 of the Environmental Assessment (USFWS 2018).

ACTION AREA

The "action area" is the area to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The Maple River is a high-quality coldwater stream that drains a watershed of approximately 159 square miles and outlets to Burt Lake in Cheboygan County, Michigan. The West Branch of the Maple River drains extensive swamps while the East Branch of the Maple River begins at the outlet of Douglas Lake. The Lake Kathleen dam (also known as the Maple River dam) is just below the confluence of the East and West Branches of the Maple River and forms 42-acre Lake Kathleen. The Lake Kathleen dam is located in Maple River Township (T36 N, R4W, Section 10), Emmet County, immediately north of Woodland Road and approximately one-third of a mile east of US-31.

The proposed action area includes the East Branch of the Maple River from just above the two-track crossing downstream to Lake Kathleen, the downstream portion of the West Branch of the Maple River up to approximately RM 0.25, Lake Kathleen and the immediate surrounding lands, and the Mainstem Maple River from the dam to approximately one mile downstream (Figure 1).

The dam removal will affect water levels, flow, temperature, and sediment transport processes in Lake Kathleen and the first ¼ mile of the East and West Branches of the Maple Rivers.

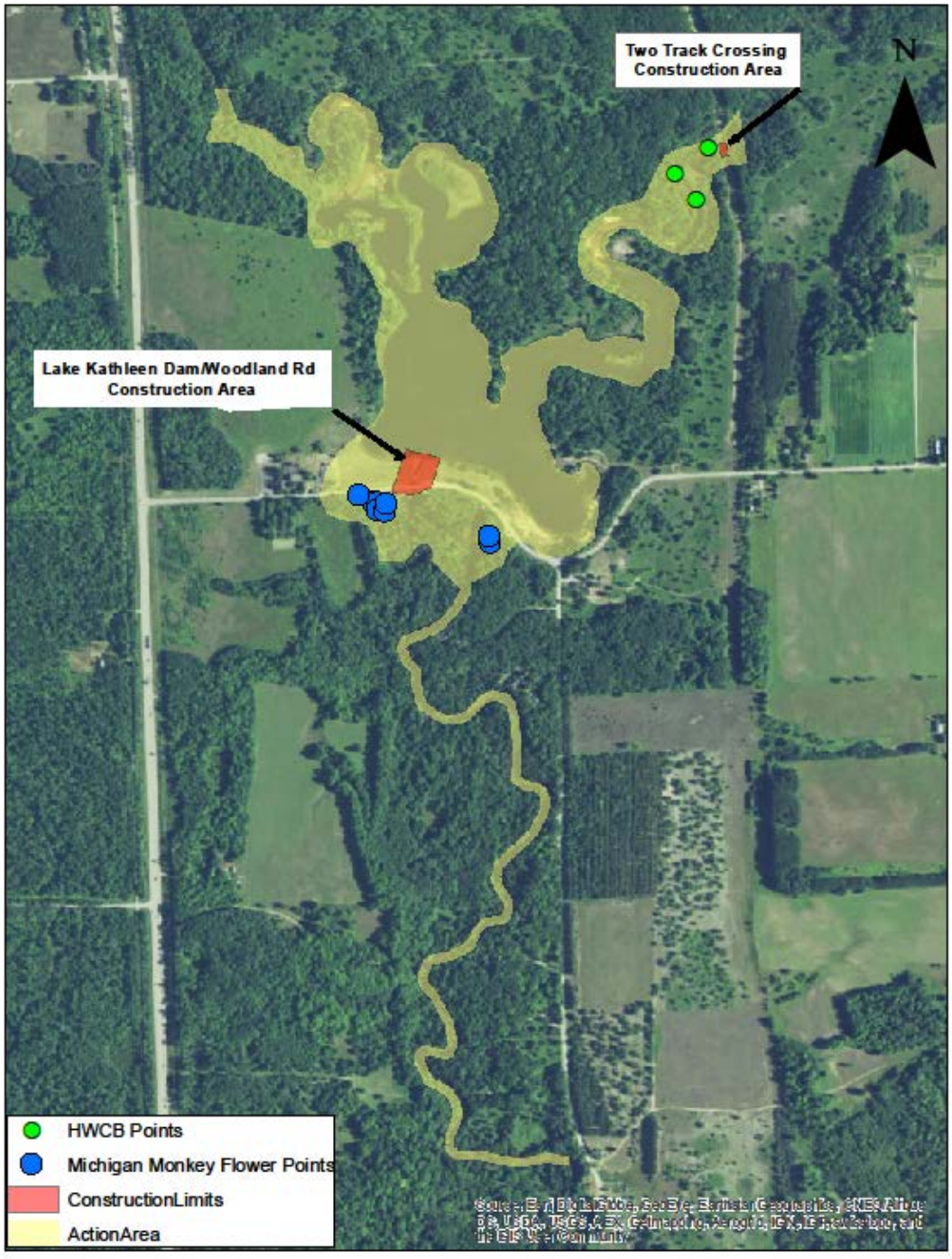

Figure 1. Action Area (from USFWS 2017)

STATUS OF THE SPECIES

1) Hungerford's crawling water beetle

The FWS listed the HCWB under the Endangered Species Act of 1973, as amended (ESA) on March 7, 1994 (USFWS 1994). Critical habitat has not been designated for this species.

Species Description and Life History

HCWB is a member of the Haliplidae family. All members of the Haliplidae (collectively known as haliplids) are aquatic, with all active life history stages spent in water (Pennak 1953, Roughley and Larson 1991). The Haliplidae includes three genera in North America—*Brychius*, *Haliplus*, and *Peltodytes*.

Adult HCWBs are small, with an average body length of 3.8-4.3 mm. They have a distinctive elongated and streamlined body shape, adapted for swimming or crawling in water (Holmen 1987). They are yellowish-brown in color with irregular dark markings and longitudinal stripes on the elytra (hardened outer wings), each of which is comprised of a series of fine, closely spaced and darkly pigmented indentations. Adults have large hind coxal plates covering the base of their hind legs and abdomen. HCWB larvae are light yellowish brown with cylindrical bodies that taper to a hooked tail. They are stiff-bodied and possess short legs with five-segments and single tarsal hooks (Strand 1989).

Very little is known about the life history of HCWB; however, information and observations for closely related species can provide a reasonable estimate of the likely life history of HCWB. Brigham (1982), Hickman (1931), Holmen (1987), Leech and Chandler (1956), Matheson (1912), Pennak (1953), and White et al. (1984) provide a description of the basic life history of haliplids. The Hungerford's Crawling Water Beetle Recovery Plan (USFWS 2006a) presents a more thorough discussion of what is known or inferred about the species' life history.

HCWB, like all beetle species, undergoes complete metamorphosis with a life cycle that consists of four distinct stages. In general, the period of egg laying for haliplids extends from May through June, although there may be another generation in the fall for some species. Oviposition (egg-laying) has not been observed for any species of *Brychius*, nor has the egg stage been described. Eggs of haliplids generally hatch 8-14 days after oviposition (Brigham 1982, White et al. 1984). Haliplid larvae pass through three instars and are herbivorous. In *Brychius hornii,* the first two instars occur in July, and the third instar stage lasts from August to April (Mousseau and Roughley 2003). HCWB larvae have been found in or near direct current in association with algae in the genus *Chara*, which is thought to be a food source (Strand and Spangler 1994). When mature, larvae leave the water in search of a place in damp soil to pupate. In the fall, larvae of HCWB have been found away from the current, buried in an island of damp sand and *Chara* up to 15 cm above the water line (Strand and Spangler 1994). Other haliplids overwinter in the larval stage in position for spring pupation. The pupal stage is the only one spent in a terrestrial setting. This stage lasts two to three weeks (Pennak 1953), during which time the transformation to adult takes place. The pupal stage of HCWB has not been observed.

Reproduction in haliplids usually occurs in the spring and early summer. Mating has been observed in June for *B. hungerfordi* (Scholtens 2002) and *B. hornii* (Mousseau and Roughley 2003). Adults of HCWB have been found year round, suggesting that some adults survive the winter, even beneath ice cover (Grant et al. 2000). Other species in the Haliplidae have at least one generation in the summer and likely another in the late summer or fall (Hickman 1931). Observations of HCWB in the East Branch of Maple River suggest that they may have two generations per year, with adults emerging in early spring (May) and a second brood of adults emerging late in the season (August) (Grant et al. 2000; Bert Ebbers, Great Lakes Ecosystems, pers. comm. 2004).

Adults appear to be generalists in their food choice, feeding on algae including *Chara*, *Cladophora*, and *Dichotomosiphon*, and as well as the epiphytic diatom *Cocconeis* (Grant and Vande Kopple 2009). The diet of adults may also change seasonally (Grant and Vande Kopple 2003). Larvae appear to prefer the alga *Dichotomosiphon tuberosus* (Grant and Vande Kopple 2009). *Dichotomosiphon*, although widespread, is not common. Its presence may be an important factor in determining the distribution of HCWB (Grant and Vande Kopple 2009).

HCWB must periodically surface for air or may use bubbles trapped under rocks or in vegetation to replenish its oxygen reserve (Scholtens and Tamaska 2004). HCWB likely uses its expanded hind coxal plates to store air (in the form of a bubble), which allows it to respire while remaining submerged for long periods of time. The surface of the bubble in the posterior coxal cavity serves as a diffusion membrane (i.e., a physical gill) through which oxygen and carbon dioxide gas are exchanged between the coxal air store and the water. The frequency of surfacing to replenish the air store depends on environmental conditions (i.e., temperature, oxygen content, and depth) of their surroundings. Larvae can breathe continually underwater and do not take in air at the surface. They obtain oxygen by cutaneous respiration and through microtracheal gills (Eriksen et al. 1984, Holmen 1987, Strand and Spangler 1994).

Adult haliplids are generally not fast or strong swimmers and spend the majority of their time crawling on the bottom among the cobbles and aquatic vegetation (Matheson 1912). It is unknown how HCWB beetles disperse within the stream. Drift is a possible mechanism of dispersal. They may also be able to crawl upstream to colonize new sites. It is not known to what extent these beetles use drift or what distances they can crawl upstream. Another potential mechanism of dispersal is flight. Adults of most aquatic Coleopteran species leave the water on dispersal flights (White et al. 1984). Hickman (1931) reported adult haliplids coming to lights in the laboratory, but others report attraction to light to be very rare (Matheson 1912). Holmen (1987) reports that although many species of Haliplidae are capable of flight, the majority of species fly only rarely. Jackson (1952, 1956) found that the development of muscles necessary for flight varies among species and may also vary through the life span of some individuals. Several beetle species are capable of flight for only short periods of time (e.g., some elmid species fly immediately after emergence from the pupal chamber only). Specimens of *Brychius* have fully developed flight wings (Roughley 1989). Brian Scholtens (College of Charleston, pers. comm. 2005) observed an adult HCWB flying from his hand, but this is the only report of flight in HCWB. It is unknown whether they are capable of utilizing flight as a means of

dispersal to distant suitable habitats. Population demography (e.g., birth rate, rates of dispersal, survivorship, and mortality) of HCWB populations has not been examined at any site.

Populations of HCWB are found downstream from culverts, beaver and natural debris dams, and human-made impoundments. They are found in plunge pools created below these structures, as well as in riffles and other well-aerated sections of the stream. In general, HCWB is found in areas of streams characterized by moderate to fast stream flow, good stream aeration, inorganic substrate, and alkaline water conditions (Wilsmann and Strand 1990). The adult beetles are generally found at depths of a few inches to a few feet in streams that are relatively cool (15º C to 25º C) (Wilsmann and Strand 1990). The hydrology of a site appears to be important for this species. HCWB seems to prefer seasonal streams that have some groundwater input. These streams do not dry up completely, but the water level can drop considerably (e.g., several feet in the East Branch of the Maple River) (Vande Kopple and Grant 2004). As the water levels drop, damp river edge sand becomes exposed in the summer and fall (Vande Kopple and Grant 2004). This microhabitat may be important for the pupation stage of the life cycle.

It has been speculated that beaver are important for creating and maintaining habitat for HCWB, but beaver activity can also eliminate HCWB habitat. Although a beaver dam typically creates good habitat immediately below the structure, it often eliminates suitable habitat for many miles upstream and can result in considerable siltation downstream. In relatively warmer river systems where HCWB is abundant, beaver activity may be of little value or consequence to the beetle, or even detrimental to otherwise good HCWB habitat. For example in the Van Helen Creek system, beaver dams appear to alter, reduce, or temporarily eliminate HCWB habitat in flooded areas. Conversely, in colder waters, like the North Branch of the Boyne River, beaver activity may be important to HCWB survival (Grant et al. 2011). In these rivers, beaver activity may favor HCWB, by warming the water, to a temperature range suitable for *Dichotomosiphon* growth (Grant et al. 2011). Adult beetles presumably shift around in the system, within or among years, to wherever *Dichotomosiphon* is established in quantities allowing successful HCWB reproduction (Grant et al. 2011).

At the time of listing in 1994 (59 FR 10580), HCWB was known to occur in only three isolated locations (i.e., East Branch of the Maple River in Emmet County, East Branch of the Black River in Montmorency County, and North Saugeen River in Bruce County Ontario). The limited known distribution at the time of listing was despite extensive surveys in Michigan, Wisconsin, Minnesota, and Ontario. The listing rule cites the research results of Wilsmann and Strand (1990), which indicated the rarity of the species and its geographic isolation. The Service analyzed the status survey, as well as other information, and determined that the beetle is facing serious threats and should be protected as an endangered species (USFWS 1994). The listing rule speculated that human activities, such as fish management, logging, beaver control, dredging, stream pollution, and general stream degradation, have likely contributed to the reduction of HCWB habitat (Wilsmann and Strand 1990). Other threats could include amateur collections, disease, or predation. In general, threats to the species include any activities that degrade water quality or remove or disrupt the pools and riffle environment of streams in which this species lives.

Range-wide Status and Distribution of the Species

HCWB was discovered relatively recently, in 1952. The species has a limited geographic range, being known only from a few populations in northern Michigan and across the border in Canada. Whether the species may have historically been more widespread is unknown.

In an effort to determine the historical distribution, museums and collections were examined for species of *Brychius*. The U.S. Geological Survey's Great Lakes Science Center reported finding two *Brychius* larvae in 1983 in St. Clair River (Hudson et al. 1986). This is a curious record because St. Clair River is not similar to other known HCWB sites and would not be classified as suitable habitat based on our current understanding of the species. Surveys in 2002 were unsuccessful in locating HCWB larvae in St. Clair River (Patrick Hudson, USGS-Great Lakes Science Center, pers. comm. 2002).

HCWB is known to occur in eleven streams range-wide (Figure 2); eight of these locations are in northern Michigan and three are in Ontario, Canada. The Service has not designated critical habitat for this species. The status of HCWB at each of its known occupied sites is described below.

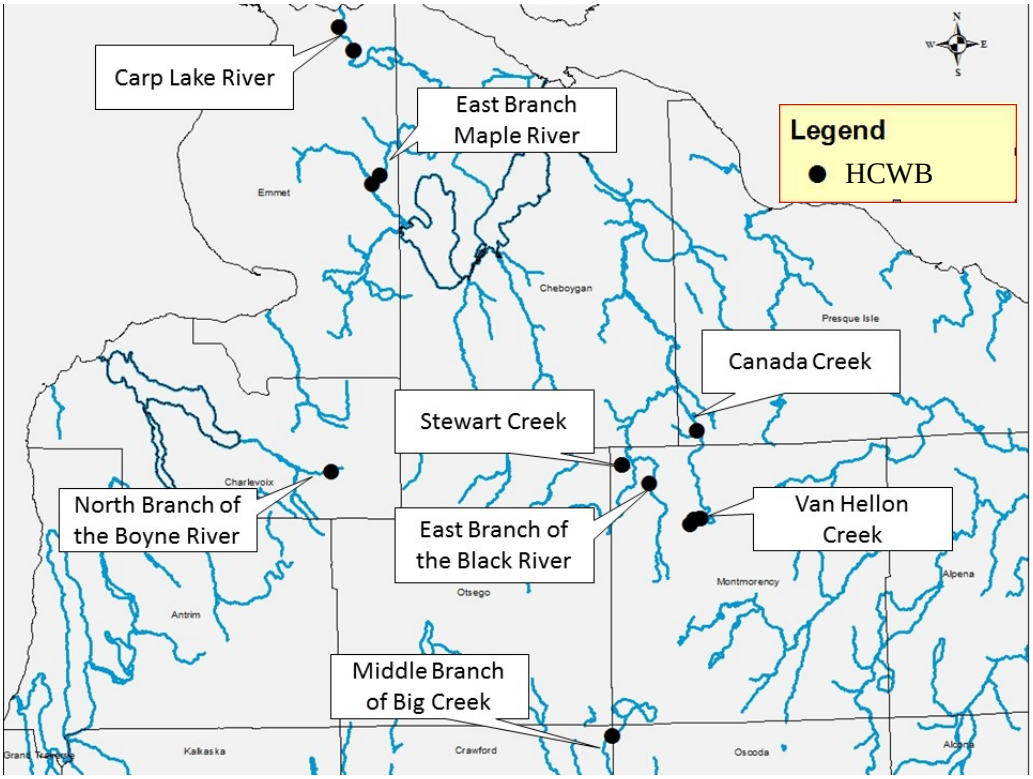

Figure 2. The known U.S. distribution of HCWB, which includes 8 streams in the northern Lower Peninsula of Michigan

Emmet County, Michigan

Carp Lake River – Hungerford's was discovered at this site in 1997 when four adults were found below the culvert at the Oliver Road crossing. In 1998, the Emmet County Road Commission cleared the vegetation from the road ditches along Oliver Road, which resulted in increased erosion and sedimentation of the stream (Vande Kopple and Grant 2004). This led to a loss of some suitable habitat. Surveys conducted in 1998 did not find any HCWB. One adult was found in a survey in 1999 (Hinz, Jr. and Wiley 1999). None were found during surveys conducted in 2003 (Vande Kopple and Grant 2004). In 2004, only one adult HCWB was found at the Oliver Road crossing on two separate occasions in August and September, despite several hours of searching (Ebbers, pers. comm. 2004). In 2006, 28 beetles were collected from the Oliver Road site and were moved upstream to the Gill Road site as part of bridge construction at Oliver Road. Surveys in 2011 found four adult beetles at this site, documenting recolonization following culvert replacement in 2006 (USFWS, 2006b, Grant et al. 2011).

The Gill Road site, approximately three miles upstream of Oliver Road, was discovered in September 2004. Suitable habitat for HCWB generally extends from just upstream of Gill Road to approximately 0.8 mile downstream. The Gill Road pool is immediately downstream of the perched culverts at Gill Road where the original survey attempt in 2004 found five beetles in approximately ten minutes (Ebbers, pers. comm. 2004). Currently, the habitat at the Gill Road site is better overall and appears to support the greatest number of beetles in Carp Lake River (Ebbers, pers. comm. 2004). In 2009, surveys found 29 adults at Gill Road and eight individuals upstream and downstream of Gill Road (Grant et al. 2009a). In August 2017, 20 adult HCWB were found below Gill Road (Vande Kopple 2017). A culvert replacement is planned for Gill Road in 2019 (T. Linton, Great Lakes Environmental Center, pers. comm. 2017).

East Branch of Maple River – HCWB was originally discovered in the East Branch of Maple River in 1952 (Spangler 1954). The beetle is found in several areas of the river from the Douglas Lake Road crossing downstream for approximately 2.5 miles until the two track crossing just above Lake Kathleen. The majority of occupied portions of this stream occur within and along the boundary of the University of Michigan Biological Station (UMBS). The East Branch of Maple River is the best-studied site and has the largest known population of this species. The results of a mark-recapture study in one pool indicated population numbers near 1,000 (Grant et al. 2002). Because HCWB occurs in several locations along 2.5 miles of the stream, we expect that the population in the East Branch of Maple River is much greater than 1,000 individuals. Based on recent studies, populations of HCWB appear to be stable throughout the occupied portions of this stream.

The two-track site was surveyed in July 2012, and ten adult HCWB were found in three locations just upstream of Lake Kathleen (see Figure 1). In July 2013, one adult was collected from the pool below the Lake Kathleen dam, but a follow up survey during the anticipated peak of adult abundance (August 2013) did not find any HCWB(Vande Kopple et al. 2013). The one adult may have washed down from an upstream site (i.e., the population immediately above Lake Kathleen), or HCWB may occur at this site in low densities. Portions of the West Branch and

the Main Branch have been surveyed, but HCWB has not been found (Vande Kopple et al. 2013).

Montmorency County, Michigan

East Branch of Black River – This site is approximately 2.5 miles upstream from the Barber Bridge (Strand 1989). Only two adults were found during surveys in 1989 (Strand 1989). Surveys conducted by MNFI in 1996 found two adults at this same location and one adult farther downstream, closer to the Barber Bridge (Legge 1996). The current status of this site is unknown.

Van Hellon Creek (also known as Van Hetton and Van Helen Creek) – HCWB was first discovered in Van Hellon Creek in July 1999 (Grant et al. 2000). Six adult beetles were captured downstream of the Roth Road crossing of the creek. Grant et al. (2000) noted that this site differed from previously described locations as this stretch of Van Hellon Creek was composed of sand overlain with a thin layer of detritus. At this site, the beetles were dispersed along a stretch of creek several hundred meters in length (Grant et al. 2000), beginning approximately 30-50 yards downstream of a culvert and county road crossing (Vande Kopple, pers. comm. 1999). Three beetles were found in less than ten minutes at this site in 2004 (Carrie Tansy, U.S. Fish and Wildlife Service, pers. comm. 2004), and one was found during a brief survey effort in 2005 (Bruce Walker, Michigan Department of Environmental Quality, 2005).

Van Hellon Creek was surveyed again in 2009. Ten adult beetles were captured downstream of the Roth Road crossing on July 24, 2009. Of these ten, eight were in the pool immediately below the culvert and two were approximately 150 feet downstream of the culvert (Rawlings, pers. comm. 2010). During a survey on August 27, 2009, one adult beetle was found below an old beaver dam upstream of the road crossing (Grant et al. 2009b). Grant et al. (2009b) note that for a short distance below this old beaver dam, the stream is sandy with small patches of *Dichotomosiphon* and *Chara* algae but that much of the creek from the upstream beaver dam to Roth Road does not appear suitable for Hungerford's due to large amounts of detritus.

Additional surveys were conducted in Van Hellon Creek in July 2010. Twenty-three adult HCWBs were found approximately 0.2 to 0.5 mile downstream of the Roth Road crossing (Ebbers, pers. comm. 2010).

In 2010, the culvert at the Roth Road crossing was replaced with a larger culvert (USFWS 2010). Three adult beetles were removed from the site before construction and relocated 0.5 mile downstream where a population of HCWB had been confirmed (USFWS 2011b). Post-construction surveys in 2011 found five adult beetles immediately below the new culvert (Grant et al. 2011).

In July 2012, the site was revisited to assess recolonization following the culvert replacement. Grant et al. (2012) found that the culvert work, although well engineered, resulted in re-distributed detritus that had accumulated for many years on the upstream side of the culvert. A low water year in 2012 and increased stream flow through the new culvert, resulted in a significant down-cutting of the stream channel through the rich accumulated organic layer present immediately upstream of the road crossing, exposing a large area of mud flats on that side, and sending some organic material downstream. The 2012 low water level, a result of

sustained dry conditions, apparently increased the proportion of groundwater to base flow, resulting in a stream temperature of 14 °C, usually too cold for HCWB (Grant et al. 2012). No beetles were found below the culvert in 2012 despite relatively intensive survey effort (Grant et al. 2012).

HCWB is still extant farther downstream of the road crossing, however. A survey of the site where captured beetles previously had been relocated (prior to culvert replacement) found three adult beetles in approximately 10 minutes of searching. The water temperatures were generally warmer (18 °C), with patches of *Dichotomosiphon* easily visible (Grant et al. 2011). This location is downstream from a beaver dam that was active at the time of the survey.

Canada Creek – Two adults and one larva were found in Canada Creek, downstream of Highway 622, in July 2007 (Vande Kopple 2007). Additional information about this site is below under Presque Isle County, Michigan.

Stewart Creek – In July 2009, four adults were found in Stewart Creek upstream and downstream of the Blue Lakes Road crossing (Grant et al. 2009b). Searching was confined to the immediate vicinity of the road culvert. Stewart Creek was surveyed again in October 2010, but no beetles were found (Ebbers and Grant 2010). During the summer of 2011, approximately 1.5 miles downstream of the culvert and 300 feet upstream of the culvert were surveyed. In July 2011, 20 adult beetles were located approximately 60 feet below the culvert, and 5 adults were netted in this same location again in August 2011 (Grant et al. 2011b). No beetles were found at any other locations in the creek.

The culvert at this site was replaced in the summer of 2012 (USFWS 2012). Prior to the construction, Stewart Creek was surveyed, in late June of 2012 (Grant et al. 2012). In June, two people searched the first 40 feet of the creek downstream of the old culvert, for 30 minutes each, and found no beetles. In July, following construction, two adult beetles were found with only ten minutes effort. The beetles were found near a prominent sandbar located approximately 40 feet downstream from the Black River Ranch fence (which marks the approximate road right-of-way limit). *Dichotomosiphon* beds were still present on the sandbar (after culvert installation), and the water temperature, at 16.5 °C, was near ideal for HCWB (Grant et al. 2012). The water level on the upstream side of the culvert had dropped about 8 inches as a result of the culvert replacement project, with levels dropping maybe 1 to 2 inches on the downstream side (Grant et al. 2012). As a result, the researchers concluded that the culvert replacement had little or no negative impact on this particular HCWB population (Grant et al. 2012).

In 2013, only one beetle was found. Although the culvert installation did not result in negative effects to HCWB habitat at this site, a large cedar tree had fallen directly on the best *Dichotomosiphon* beds downstream of the culverts (Vande Kopple et al. 2013). The current status of this site is not known.

Presque Isle County, Michigan

Canada Creek – In June 2005, one adult beetle was discovered in Canada Creek, just upstream from the Bear Den Road crossing (Vande Kopple, pers. comm. 2005; Walker, pers. comm. 2005). It is possible that the beetle was washed from an area upstream to the location in which it was discovered, as the beetle was found following a significant rain event (Vande Kopple, pers. comm. 2005).

Cheboygan County

North Branch of the Boyne River – In April 2011, a student in an Aquatic Entomology class collected a HCWB larva (confirmed by Bob Vande Kopple) from near a small beaver dam on the North Branch of the Boyne River near where the river flows adjacent to Camp 10 Road. Bob Vande Kopple returned to survey for HCWB at this location and found that recent road work dramatically altered the Boyne River habitat in the vicinity of where the larva had been collected. Downstream of the original collection location, they found suitable habitat, but a subsequent survey (September 2011) did not find HCWB (Grant et al. 2011).

It is possible that HCWB is present in small numbers and were not detected during the survey. The North Branch of the Boyne is colder than where HCWB is typically found (Grant et al. 2011). Grant et al. (2011) speculate that there may have been a small local population of the beetle in the vicinity of the old beaver dam where the larva was originally found, but the 2011 road construction activity altered the habitat to a degree that the small local population there is currently extirpated. It is possible that the small beaver dam that was originally present near the road crossing, which was subsequently mechanically dismantled and removed, may have warmed the water just enough to foster a small HCWB. Given the colder typical water temperatures of the North Branch of the Boyne River than the optimal temperatures for HCWB, it is likely that this river supports only small numbers of HCWB (Grant et al. 2011). Additional surveys are needed to determine the extent of occupancy in this stream, and should target areas wherever the water is slightly warmer and where *Dichotomosiphon* beds are found.

Oscoda County (on the border Oscoda and Crawford County)

Middle Branch of Big Creek – In August 2011, ten adults were found in the Middle Branch of Big Creek from the tail end of a plunge pool below the Farrington Road culvert to roughly 20 feet downstream from the culvert end (Grant et al. 2011). The water temperature (19.5 ºC) and flow rate (3 cubic feet per second) were both close to ideal for HCWB (Grant et al. 2011b). The Big Creek record represents a new watershed (AuSable River) for HCWB, as well as an expansion of its geographic range beyond the outer Port Huron moraine (Grant et al. 2011). Additional surveys are needed to determine the extent of HCWB in this watershed. A culvert replacement is planned in 2019 for this site (Jennifer Muladore, Huron Pines, pers. comm., 2017).

Grey and Bruce County, Ontario

North Saugeen River

In 1986, 42 specimens were collected at this site in Bruce County in south central Ontario, near the village of Scone (Roughley 1991). This location is downstream from a dam and below an old millrace (Roughley 1991). The last time the species was found was in 2001; this population may be extirpated (Colin Jones, Ontario Ministry of Natural Resources, pers. comm. 2010).

Rankin River – This site is below the Rankin Dam. A single adult specimen was found in a survey in 2005 and later identified as HCWB. When the site was visited again in August 2008, ten adults and three larvae were detected in four kick-samples with a D-net (Jones, pers. comm. 2010).

Saugeen River – Located at Hanover, this population was discovered in 2008. Only a few adults have been located per visit (Jones, pers. comm. 2010).

2) Michigan monkey flower

The U.S. Fish and Wildlife Service listed the Michigan monkey flower (subspecies, *Mimulus glabratus michiganensis*) under the Endangered Species Act of 1973, as amended, on June 21, 1990 (USFWS 1990). The taxonomy was revised and elevated to species, *Mimulus michiganensis*, September 14, 2010 (75 FR 55686—55689).

Species Description and Life History

The MMF is a member of the Scrophulariaceae (snapdragon) family and is an aquatic to semi-aquatic glabrous perennial herb with lax stems averaging 36 cm (14 in) in length. It roots at its lower stem nodes to produce clones of up to several hundred stems. The broadly ovate to roundish, opposite leaves are inconspicuously to coarsely sharp-toothed and evenly distributed along the stem. Bright yellow, snapdragon-like, tubular flowers, ranging from 16 to 27 mm (0.6 to 1.1 in) in length, are produced from the upper leaf axil and are borne on slender pedicels that may be longer than the leaves. The flowers have two upper lips and three- lobed lower lips, with the lower lip and tube irregularly spotted.

MMF is a very rare Michigan endemic that is restricted to cold, alkaline spring seepages and streams, usually in association with northern white cedar (*Thuja occidentalis*) swamps found along current or post-glacial Great Lakes shorelines. It frequently occurs in cedar swamps formed in drainages found at the base of relatively steep, moraine slopes and bluffs. Colonies of MMF have been found in muck-covered sand in cold, flowing water that ranged in temperature from 8.7° to 16.6°C (47.6° - 61.9°F), and with a pH of 7.66 to 8.21.

However, research (Posto 2001) has shown that MMF seeds germinate best in light at approximately 23°C, suggesting that seed germination is probably highest along the water margins in the sun, rather than under water. Optimal habitat conditions for this plant are comprised of a combination of moderate to high light availability, cool substrate, and high nutrient availability within a narrow pH range, demonstrating its relatively specialized habitat requirements.

MMFs bloom from approximately mid-June to mid-August, extending occasionally into October. The fruit, which is seldom produced, consists of an oblong, pointed capsule around 8–10 mm (0.3–0.4 in) long, containing numerous oval seeds with longitudinal striations. MMF essentially has no pollen viability and is nearly totally dependent on vegetative propagation via rhizomes (Bliss 1983, Bliss 1986). The Maple River population is the only population that has been shown to have viable pollen and is capable of self-pollination (Posto and Prather 2000, Posto 2001). The taxon as a whole is also highly unlikely to produce seed asexually (Posto and Prather 2000). Because MMF depends primarily on vegetative propagation for reproduction, dispersal is greatly limited and likely occurs only locally through the fragmentation of clonal colonies. Fragmented parts of plants can be carried by flowing water and establish new colonies downstream. Seed setting allows great dispersal potential, as it can result in new colonies facilitated by wind or animals, as well as water. The seemingly unique ability of the Maple River population to reproduce sexually (i.e., set seed) results in this population being extremely valuable to the conservation of the species.

Relatively little population monitoring has been conducted for MMF, and thus the demography of its populations cannot be characterized. However, observations of colonies of the taxon through summer and winter seasons indicate that in fall colonies die back and become more or less dormant in streams and springs where water flow and temperature stay relatively constant, with colonies re-initiating growth in spring.

The greatest threat to MMF is direct destruction and modification of its habitat. MMF's habitat has been developed for recreational and residential purposes, which has led to severe impacts to and, in some cases, extirpation of historical populations. Hydrological disruptions also constitute a serious threat, as water diversion, warming of water sources, and other groundwater alterations lead to less than optimal habitat conditions.

Consequently, this species may be inadvertently impacted by offsite activities. Populations of MMF are particularly vulnerable to extirpation due to low numbers and limited capability for sexual reproduction. Additionally, periodic high water levels of the Great Lakes and strong winter storms impact MMF habitat that occurs near the Great Lakes shoreline by redirecting seepage streams and opening the overstory by felling cedars. However, opening of the overstory may also benefit MMF by allowing for colonization.

Invasive species, including forget-me-not (*Myosotis scirpoides*), coltsfoot (*Tussilago farfara*), reed canary grass (*Phalaris arundinacea*), and Canada thistle (*Cirsium arvense*) represent an additional threat. Some of the MMF colonies at the Maple River site are in pockets of habitat with up to 99% invasive species (Canada thistle and forget-me-not), with only scattered MMF stems remaining. Coltsfoot and reed canary grass are known to occur at or in the vicinity of other MMF sites.

A warmer climate may also cause an increase in water temperatures that may facilitate the invasion of warm water-adapted species or exotic species (MacIsaac et al. 2002; AMEC 2006). Increased water temperatures will also result in decreased ice cover and, when combined with an expected intensity of winter storms, will leave coastal areas more vulnerable to the effects of winter storms and flooding (Fang and Stefan 2000, AMEC 2006). Additionally, AMEC (2006) predicts that increased precipitation will increase the flow rates of some rivers and streams, resulting in increased scouring, deposition of sediment, nutrients and pesticides, bank erosion, channel widening, and siltation of gravel beds and estuaries. Thus, climate change could significantly alter the natural stream morphology and likely make the habitat unsuitable for this Michigan endemic.

For a more through discussion of the MMF life history, population dynamics, and threats, please see pages 1-15 of the Recovery Plan (USFWS 1997) and pages 7-12 of the most recent 5-year status review (USFWS 2011a).

Range-wide Distribution and Status

There are 23 element occurrences, including two historical occurrences (MNFI 2012) of MMF, ranging from Benzie and Leelanau counties to Mackinac County (Table 1, Figure 3). However, the majority of occurrences are clustered within the Mackinac Straits region. The newest colony was discovered in 2008 (MNFI 2012). Overall, the entire population is stable, although MMF

colonies at a few sites are in decline (MNFI 2012). However, this information was obtained from records in which most have not been updated in more than 10 years (MNFI 2012). A systematic survey would provide a more accurate description of MMF abundance and population trends.

Occurrences of MMF are often localized, sometimes consisting of small but dense patches restricted to small seeps, springs, and depressions, whereas others are comprised of numerous patches of plants widely dispersed along small streams and spring-fed seeps within northern white cedar swamps (Penskar and Higman 2001). Large to moderately-sized populations include occurrences on Glen Lake, Burt Lake, and portions of the Mackinac County shoreline within the Manitou Payment Highbanks formation in the Brevort to Epoufette region (Penskar and Higman 2001).

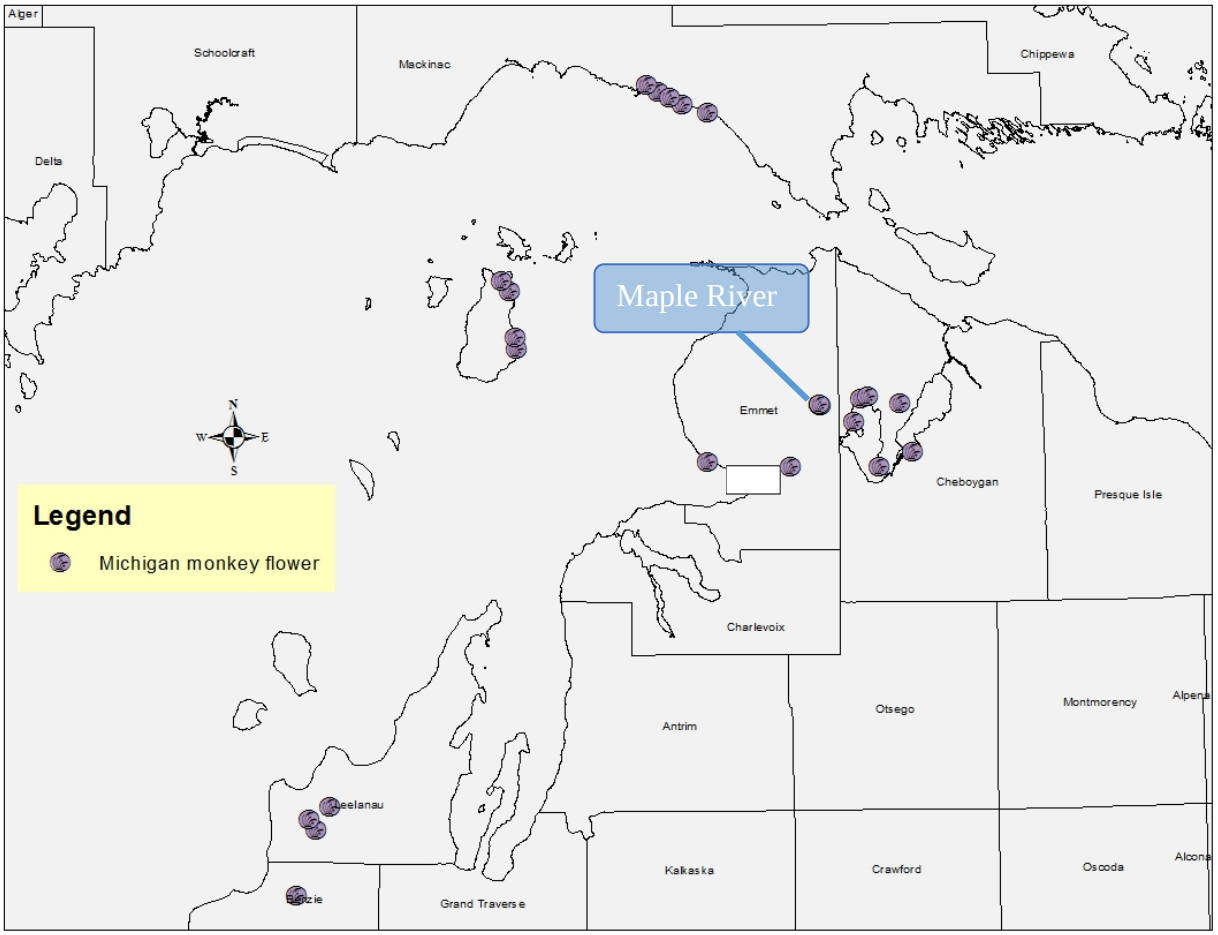

Figure 3. Range-wide distribution of Michigan monkey-flower.

Table 1. MMF element occurrence records and ranks. Table derived from USFWS (1997; 2011) and Penskar (2012). Highlighted row is in the action area.

EOR #	Site name	County	Current rank	Last review	Recovery plan	Landowner	Status
1	Carp Creek – Reese's Swamp	Cheboygan	A	A	A	Univ. of Michigan Biological Station (UMBS)	Localized patches, pristine habitat
2	Burt Lake West	Cheboygan/ Emmet	H	H	H	unknown	Last observed in 1933
3	Reese's Swamp	Cheboygan	A	A	A	UMBS; multiple private	Scattered patches in high quality habitat
4	Mullet Lake – West Shore	Cheboygan	H	H	H	unknown	
5	Maple River Dam	Emmet	B	B	B	Private	Locally abundant, only fertile colony
6	Mullet Lake SE – Parrott Point	Cheboygan	D	D	D	Private	Local, persistent, vigorous patch
7	Burdickville & Settler's Park	Leelanau	BC	BC	BC	multiple private	Patchy to locally abundant
8	St. James Harbor – Beaver Island	Charlevoix	D	D	B	Private	Colony appears to be extirpated
9	Epoufette Bay	Mackinac	B	B	BC	Township, Michigan Nature Assoc., multiple private	Small patches to locally abundant
10	Platte River - North Branch	Benzie	C	BC	BC	Private	Small, local patches persists
11	Manitou Payment Highbanks	Mackinac	BC	BC	BC	Sand Products Corp.	
12	Brevort	Mackinac	B	B	B	Multiple Private	Locally abundant
13	Little Sand Bay – Beaver Island	Charlevoix	BC	B	B	Little Traverse Conservancy	Restricted to mouth of creek & beach flats
14	Cut River West	Mackinac	A	A	B?	State of Michigan	Abundant
15	McFarlane Woods	Leelanau	B	A	A	National Park Service, Sleeping Bear Dunes	Small, patchy colonies
16	Harbor Springs	Emmet	C	C	BC	Idylwilde Association	Localized patches
17	Burt Lake Southeast	Cheboygan	C	C	C	Little Traverse Conservancy; multiple private	Localized patches
18	Cut River East	Mackinac	BC	C	-	State of Michigan	Discovered since recovery plan; locally abundant
19	Hatlem's Creek	Leelanau	B	B	-	Multiple private	Patchy to locally abundant
-	Harbor Springs	Emmet	-	-	-	Unknown	New occurrence, no data provided to date
-	Martin Point North	Charlevoix	C	-	-	Private	New occurrence, patch at creek mouth
-	Oden Fish Hatchery	Emmet	BC	-	-	State of Michigan	New occurrence, vigorous local patches
-	Point La Par South	Charlevoix	C	-	-	Private	New occurrence, patch at creek mouth

ENVIRONMENTAL BASELINE

This section describes the species status and trend information within the action area. It also includes State, tribal, local, and private actions already affecting the species or that will occur contemporaneously with the proposed action. Unrelated Federal actions that have completed formal or informal consultation are also included in the environmental baseline. The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the action area. The environmental baseline provides the basis from which to judge the effects of the action.

1) Hungerford's crawling water beetle

Status of the Species within the Action Area

The East Branch of the Maple River represents the best-studied and largest known population of this species. The beetle is found in several areas of the East Branch, from the Douglas Lake Road crossing downstream for approximately two and a half miles to the project site. HCWB was first collected from the East Branch of the Maple River in 1952 (Spangler 1954). Most recently, surveyors (Vande Kopple et al. 2013) completed thorough searches for the HCWB at several sites in the Maple River watershed. HCWB was not detected from locations at Ely Bridge Road (farthest upstream search location on the West Branch), at the Robinson Road crossing (West Branch of the Maple River, downstream from Ely Bridge Road) and at the Brutus Road crossing (Main Branch). However, after an intense search, they found a single adult HCWB immediately below the dam outfall (downstream of Woodland Road), in a large pool near the westerly bank. This beetle was found in location where a small amount of cooler groundwater entered the pool, presumably providing more favorable conditions than warmer portions of the pool. Because that single adult beetle was discovered, representing the first recorded occurrence of HCWB within the Main Branch of the Maple River, the survey team was asked to revisit the area to conduct a more thorough investigation. The follow-up work included re-surveying the entire spillway pool area, Lake Kathleen proper, upstream of Lake Kathleen on the East Branch, and downstream of the dam at Maple River Road. Despite intensive search efforts and timing the effort during the season of peak abundance, no HCWB were found at any of the sites within the action area, except for the East Branch site. There, seven adult beetles were captured over 3.75 hours, in 700 feet of stream below the two-track crossing. Based upon survey results, the survey team concluded that the original observation below the dam was probably incidental (Vande Kopple et al. 2013). The one adult HCWB could have washed down from an upstream population or flew from a nearby population and landed in the pool. It is unlikely that there is a resident population occurring in the outfall pool or at any of the survey sites on the Main or West Branch.

Stream modification, including culvert removal or bridge construction, could be a threat to the HCWB. However, in most cases, the overall positive benefits of these projects outweigh any short-term adverse impacts. Culvert replacement projects have occurred at several HCWB sites previously. Recolonization of these areas by HCWB following culvert replacement demonstrate

that projects that have long-term benefits to environmental conditions are likely to have overall benefits to this species.

Factors Affecting the Species within the Action Area

It is unclear what determines or affects population numbers and distribution of HCWB in the action area. Beaver activity may play a role in affecting the suitability of the stream for HCWB. Recreation (e.g., fishing) occurs in parts of the creek and may result in disturbance to HCWB in the action area. Natural predation by fish and other organisms may also affect HCWB in the action area.

Sea lamprey control in the action area

Sea lamprey are an invasive species that currently occur within a portion of the action area. Sea lamprey migrate up rivers to spawn and then die. The hatched larvae burrow into the sediment, undergo metamorphosis after 3 years or more, and leave the stream bottom and drift to the Great Lakes to feed on fish. The Cheboygan Dam and Lock complex represents the first impediment to sea lamprey migration in the Cheboygan River Watershed. This structure blocks a significant portion, but not 100% of adult sea lamprey migrating from Lake Huron. Additionally, a small population of adult sea lamprey likely complete their life cycle above the Cheboygan Dam, utilizing Burt and Mullet Lakes to feed (i.e., a self-sustaining inland population that utilize inland lakes). Successful spawning of adult sea lamprey in the upper Cheboygan Watershed can maintain the existing inland population and lead to escapement into Lake Huron. The combination of these two sources of adult lamprey into the upper Cheboygan watershed has resulted in the need to chemically treat the system, including the lower Maple River, with a chemical lampricide, TFM, on a 3-4 year cycle.

Previous Section 7 Consultations

- Intra-Service Section 7 Programmatic Consultation on Issuance of Section 10(a)(1)(A) Scientific Take Permits and Section 6 Grants for Recovery Activities
    - In July 2002, the Service completed a Biological Opinion on the issuance of permits and section 6 grants for the purpose of recovery of HCWB. Specifically, the Opinion analyzed the effects of gathering scientific information, implementing habitat enhancement measures, rearing, propagating and releasing captive individuals, and executing other conservation actions that may result in take of HCWB. Take would occur on only a small percentage of the population, no more than fifteen beetles annually, and would benefit the species by obtaining important information on its habitat and life history. In the Maple River, the aforementioned surveys have been conducted under this Opinion. Surveys result in harassment of beetles (i.e., netting them and removing them from the water for identification) but have not been known to cause harm or death to any HCWB.
- Intra-Service Section 7 Consultation on Sea Lamprey Control
    - The Mainstem of the Maple River has been treated with the lampricide TFM, most recently in 2016. During the Intra-Service consultation on the lampricide treatment action (April 2016), the FWS determined that any effects to HCWB as a result of TFM treatment of the Mainstem were discountable. There has only been

one adult found below the Lake Kathleen dam, and it is thought that it washed downstream from the East Branch of the Maple River and did not indicate a representative population of HCWB in the Mainstem.

2) Michigan monkey flower

Status of the Species within the Action Area

Populations occur both west and east of the river (Figure 4). Slaughter (2015) found that the population status was "poor to fair", threatened by forget-me-not and other weedy species such as Canada thistle. The weedy species are encouraged by run-off from the adjacent road and adjacent degraded uplands, as well as the lack of an adequate buffer between the road and springheads on the west side of the Maple River (Slaughter 2015).

The Maple River population is known for its relatively high levels of sexual reproduction compared to other populations that exhibit primarily vegetative reproduction (Bliss 1986, Penskar and Higman 2001). Penskar and Higman (2001) reported the Maple River population had a greater percentage of viable pollen and greater number of mature shoots with seed set, when compared to other studied populations. Because of this, Slaughter (2015) suggested that this population of MMF is perhaps the single most important colony. In 2015, Slaughter reported that only 1% of plans had seed capsules, and notes that several colonies were "sterile" (which we understand to mean were not flowering and/or did not form a capsule). Flowering stems were reported on both sides of the river (Slaughter 2015); it was not noted whether any of the capsules were full or had set seed.

During a site visit as part of this consultation, biologists from the Michigan Ecological Services Field Office and action agency met at the project site in fall 2017, and found *Mimulus* in an additional location on the east side of the river, although because they were not flowering (i.e., too late in the season), they could not confirm species. *Mimulus glabratus* (James' monkey-flower) and MMF can only be distinguished only by style length. James' monkey flower is not known to occur in Emmet County (http://michiganflora.net/species.aspx?id=1909), but has been documented in neighboring counties. Because of its close proximity to the other MMF colonies, we assume that this colony is MMF, although confirmation is needed during the flowering season. Additional colonies are likely to occur along the river to the south.

Factors Affecting the Species within the Action Area

The main threats to MMF at this site are impacts from the road and adjacent degraded uplands, competition by invasive plant species, and alterations to hydrology that affect the springs at Woodland Road. Several of the colonies at the Maple River site are 90-99% invasive species. For these colonies, without swift intervention, they are likely to be lost to the aggressive non-native species (i.e., forget-me-not and Canada thistle) that out-compete the MMF for resources. Penskar (2012) reported that this site is visited by classes from the University of Michigan Biological Station, and trampling could be a concern. There are no previous section 7 consultations for MMF in the action area.

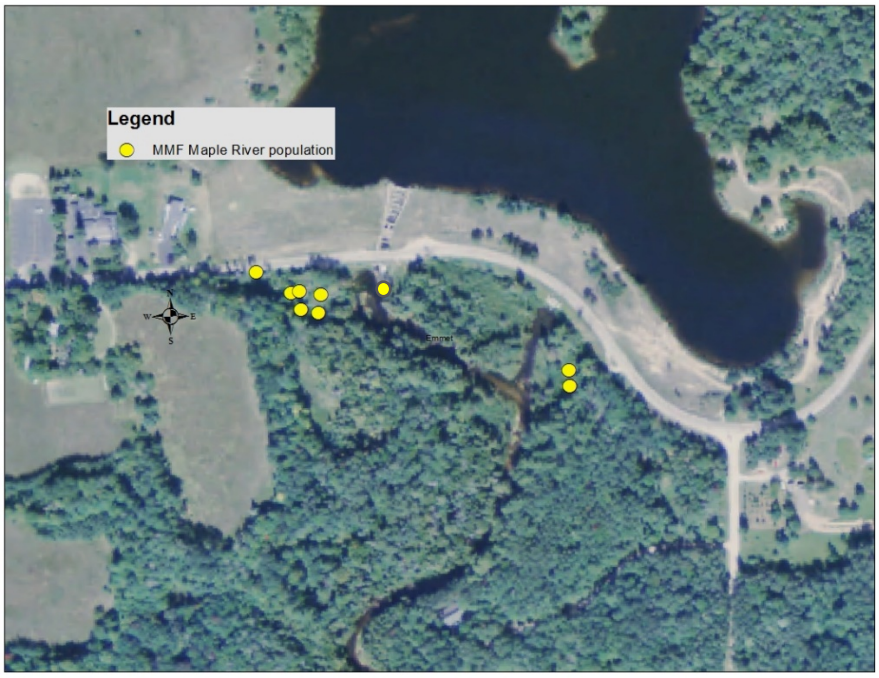

Figure 4. MMF distribution at the Maple River site. (Slaughter 2015; FWS unpublished data 2017).

Figure 5. Michigan monkey flower (yellow flowers), at the Maple River site, is threatened by the invasive species forget-me-not (white flowers).

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on the species. Direct effects are the immediate effects of the proposed action on a listed species and its habitat. Indirect effects are those that are caused later in time but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. We are not aware of any actions that are interdependent or interrelated to the proposed action being considered in this Opinion.

The removal of the Lake Kathleen dam will affect water levels, flow, temperature, and sediment transport processes in Lake Kathleen and the first ¼ mile of the East and West Branch Maple Rivers. Changes in the hydrology and hydraulics of the Mainstem are expected to be negligible. Sediment transport processes will be restored to convey sediments to downstream reaches of the Maple River. Sediments associated with the dam removal will be intensively managed, and downstream impacts will be limited to a normalized sediment transport pattern that is similar to existing transport patterns of natural reaches of the Maple River. The thermal regime of the Mainstem, for a limited distance downstream of the dam, will be impacted since warmer waters of Lake Kathleen will be eliminated.

The two-track crossing culvert replacement project will affect the hydrology and sediment transport in the immediate vicinity of the crossings and downstream. The natural hydrology of the river will be restored by replacing the undersized culverts with channel spanning structures. According to the BA, soil erosion and sediment control (SESC) measures will be implemented using best management practices to minimize erosion and sediment inputs during construction.

1) Hungerford's crawling water beetle

For the Lake Kathleen dam removal and Woodland Road project, we do not anticipate any indirect adverse effects resulting from alterations of habitat from the changes to hydrology; the HCWB location is farther upstream than the anticipated extent of these changes. We do not anticipate direct adverse effects to HCWB in the Main Branch; the one adult found at this location was likely washed downstream and does not represent a resident population. Indirect effects as a result of sea lamprey control activities are considered, because removal of the Lake Kathleen dam removes a barrier to sea lamprey.

The two-track crossing project will have direct adverse effects to HCWB through disturbance of occupied habitat. However, we expect the adverse effects to be short-term, with anticipated long-term benefits resulting from a reduction of sedimentation at this site.

HCWB Life Stages Likely Present

There is limited information on the life history of HCWB, but we can use the limited observations for HCWB coupled with the life history information for closely related species to predict what life stages will likely be present during the Woodland Road, Lake Kathleen, and two-track projects. Draw down of Lake Kathleen could begin as early as May, and the two-track crossing project will be last to be completed in July or August. We expect that all life stages

(eggs, larvae, pupae, and adult) HCWB could be present in the Maple River during the proposed action.

In the late summer/fall, haliplid larvae are typically in the third instar, which lasts from August to April in *Brychius hornii* (Mousseau and Roughley 2003), and so we expect that HCWB larvae will be present at the two-track crossing at the time of construction. Other Haliplids, and presumably HCWB, overwinter in the larval stage in position for spring pupation. When mature, larvae leave the water in search of a place in damp soil to pupate. In the fall, larvae of HCWB were found away from the current, buried in an island of damp sand and *Chara* up to 15 cm above the water line (Strand and Spangler 1994). Thus at the time of construction, some larvae are expected to be in the area, most likely in association with alage, although some could be out of the water in search of an overwintering location. Observations of HCWB in the East Branch of Maple River suggest that there may be two generations per year, with adults emerging in early spring (May) and a second brood of adults emerging late in the season (August) (Grant et al. 2000; Ebbers, pers. comm. 2004). If there is a second generation, eggs may also be present in the action area. Incubation is temperature dependent and larvae emerge 8 to 16 days after oviposition (Strand and Spangler 1994).

Direct Effects

Prior to commencement of construction activities, qualified biologists will search for beetles and capture as many as possible from within the action area. Any individuals that are found will be relocated downstream to areas of suitable habitat. Bob Vande Kopple, who holds a valid recovery permit under section 10(a)(1)(A) of the ESA, will be contracted to conduct this work. Additional biologists from the Alpena FWCO and MIFO may assist in this effort. The capture, handling, and holding of beetles will cause temporary harassment, but we do not expect long-term harm. HCWB is a sturdy species and unlikely to be hurt by capture or handling, based on previous experience handling the species (Bob Vande Kopple, pers. comm., 2018). Possible harm or mortality could occur from inadvertently stepping on a HCWB.

All captured beetles will be released into nearby suitable habitat. The beetles will be returned to the East Branch of the Maple River, as close to the two track crossing (and out of the area of disturbance) as possible. Final placement location will be determined by recognized HCWB experts and MIFO based on habitat conditions in the vicinity of the action area at the time of relocation. Previous culvert replacement projects have documented recolonization of HCWB following culvert removal, and we expect the same for this project.

Construction activities include dewatering (building a coffer dam or dewatering structure), removing the existing culverts, installing the abutments, and then building the free-span timber bridge. In-stream work is likely to impact no more than 150 feet below the culverts, and less than 50 feet above the culverts. Habitat for all life stages in this area will be temporarily disturbed, including substrate, cover, and food source (algae).

It is possible that not all individuals will be located and removed prior to construction. Adult and larval beetles can be difficult to find. Thus, we expect that dewatering the stream, excavation of

the channel, removal of the culvert, and placement of abutments will likely kill all individual HCWB (adults and larvae, possibly eggs) that remain within the 150-foot construction zone.

Any beetles remaining in the action area below the construction zone (approximately 150 to 400 feet downstream of the road crossing) will experience increased sedimentation during and immediately following construction. This increase in silt and sediment may settle on the stream bottom and cover the rock, cobble, and coarse sand utilized by HCWB. The sediment may also interfere with feeding, respiration and other normal behaviors and potentially smother larvae. We expect that siltation of HCWB habitat and smothering of larvae will be minimal because the stream flow will carry most of the sediments downstream to the slack water area, which is not suitable HCWB habitat. We also expect effects to normal feeding and respiratory behaviors to be temporary as the sediment moves through the stream. We expect that this temporary increase in sediment load will affect HCWB in the form of harm and harassment, but we do not anticipate any mortality due to the sedimentation.

Indirect Effects

Two-track crossing - Indirect effects relate primarily to habitat alteration. Replacing the existing undersized culvert will remove the pool currently below the culvert. The new structure will restablish the natural flow and bankwidth. Restoration of a natural stream channel with a cobble substrate and sufficient stream flow will likely maintain suitable habitat for HCWB. Long-term reduction of sedimentation will likely have beneficial effects to HCWB habitat. Monitoring of this site following implementation of this project will provide useful information on this species.

It is anticipated that the free-span timber bridge slated for the site will result in long-term habitat improvement. The existing array of culverts is in danger of complete failure, which would result in complete disruption of downstream habitats of HCWB.

The timber bridge design and construction will follow the BMP's for the production and installation of preserved wood products for use in, near, or over water, as outlined in MDNR 2002. The goal of the BMPs is to ensure wood preservation with minimum environmental impact by limiting the potential for migration or leaching of the preservative chemicals from the preserved wood into the aquatic environment. The free-span bridge will ensure no wood (i.e., pilings) will be in direct contact with water. The BMPs will ensure the least amount of preservative possible will leach out of the wood into the stream.

All wood preservatives have the potential to leach out of pressure treated wood and enter the aquatic environment in small amounts, despite best efforts to minimize leaching through BMPs. These chemicals can be toxic to aquatic life if they occur at sufficient concentrations. Once these chemicals enter the stream, processes such as volatilization, photolysis, sediment sorption and microbial degradation work to degrade and reduce the concentration of the preservative both in the water and in sediments. The cycling and environmental fate of common metals and other chemicals used to preserve wood and their potential for bioaccumulation and biomagnification is reviewed by Brooks (2000). Adverse effects to HCWB as a result of preservatives lost from the bridge are expected to be discountable because of the following points:

- There are not likely to be individuals present during times when the greatest levels of leaching are likely to occur (within the first few days following installation). Prior to bridge installation, the area will be thoroughly surveyed and all individuals present will be removed from site. Any individuals that remain in the area (not detected by surveyors) are likely to be killed during construction activities due to trampling and disturbance.
- The BMPs will ensure the amounts of preservatives that enter the stream are minimized to the extent possible.
- Areas previously occupied by HCWB are approximately 50 feet or farther downstream of the road crossing (Vande Kopple et al. 2013), and accumulation of preservatives tends to be limited to areas immediately around the treated structure (Lebow et al. 2000, Weis and Weis 1995).
- HCWB is found in areas with a sand/cobble bottom, rather than areas with a fine-grained (silt/clay) substrate that are likely to accumulate greater concentrations of preservatives (Weis et al. 1998).
- Studies have shown that there are no measurable impacts on aquatic invertebrates expected if treated wood is properly treated and installed (Brooks 1997, Brooks 2000, Brooks 2006, Lebow et al. 2000, Lebow et al. 2002, Sinnott 2000).

Thus, any indirect effects associated with the introduction of preservative chemicals from the treated timber are expected to be discountable and not expected to result in adverse effects to HCWB. The potential for incidental take will be minimized to the extent possible by implementation of BMPs to reduce the amount of preservative that is likely to enter the aquatic environment.

Thus, provided the BMPs are successfully implemented, it is highly unlikely that concentrations of preservatives within the fast flowing, pool-and-riffle portion of the East Branch of the Maple River inhabited by HCWB would reach biologically significant levels (assuming the habitat is suitable following construction and the species recolonizes this site in the future). If the BMPs are not properly implemented, we would expect greater concentrations of the preservative chemicals to enter the stream and believe that it is reasonable that adverse effects could be expected.

Lake Kathleen dam removal – indirect effects related to sea lamprey control

The existing dam at Lake Kathleen serves as a barrier to migrating sea lamprey. Removal of the dam represents a potential to allow sea lamprey to move into the East Branch of the Maple River, where HCWB occurs. If, following the Lake Kathleen dam removal, sufficient larval sea lamprey were found in the East Branch of the Maple River, it could result in the stream being treated with a chemical lampricide, TFM, which could result in adverse effects to HCWB.

The action agency coordinated with the USFWS's Sea Lamprey Control Program on the proposed action and its effect on sea lamprey movement in the watershed, and received concurrence from the Great Lakes Fishery Commission on the proposal to remove the dam at Lake Kathleen. They determined that the proposed action is not likely to lead to TFM treatments in the East Branch Maple River.

After consideration of several alternatives, the action agency selected a preferred alternative (i.e., the proposed action) that does not include the initial placement of a physical or electrical barrier following the removal of Lake Kathleen Dam. Sterile male release technique (SMRT) will be utilized in the upper watershed through at least 2019, and could be extended if it is determined to be effective. Sea lamprey spawning success and larval distribution along with transformer outmigration trapping will be monitored to determine if the proposed SMRT technique successfully delays/eliminates the need for TFM treatments in the Maple River including no expansion of TFM treatments into the East and West Branch Maple Rivers. Adaptive management triggers will be established to determine if and when additional alternatives need to be implemented to continue to meet sea lamprey control goals in the watershed. Several control techniques including SMRT, trapping, nest destruction, and placement of an electric or physical barrier could be implemented prior to any TFM treatment. This would provide the physical and biological benefits of the no barrier option while reducing the risk of sea lamprey infestation upstream through the extended use of SMRT. The unique characteristics and small abundance of the sea lamprey population in the Maple River allow for the opportunity to monitor the effectiveness of SMRT without the immediate risk of significantly increasing juvenile sea lamprey recruitment to Lake Huron or increasing TFM treatments above the current dam location potentially adversely affecting endangered HWCB.

The SMRT program will be implemented from 2017-2019 and involves releasing sterilized adult male lamprey in the Maple, Pigeon, and Sturgeon Rivers in order to either delay or eliminate the need for TFM treatments. The assessment of the program includes adult trapping, nest, and larval assessments. If the SMRT program demonstrates success then efforts will begin to modify the Cheboygan lock in order to completely prevent sea lamprey passage (i.e., block 100%). If modifications are successful then aggressive efforts could begin to eradicate the isolated inland sea lamprey population. If necessary, a new electric or other barrier may be needed in the future to control sea lamprey passage in the river system. Monitoring will be conducted to assess the success of the SMRT program and to determine whether sea lamprey expand into the East and West Branch Maple Rivers following the removal of Lake Kathleen dam. Monitoring associated with the adaptive management strategy of sea lamprey control, specifically larval assessment through electrofishing, is conducted in targeted larval sea lamprey habitat with low flow and silt dominated substrate is not likely to impact HCWB (Larval Assessment Task Force 2017).

Based on the action agency's assessment, TFM treatments are not reasonably likely to occur in the proposed action area where HCWB is found. If SMRT efforts are not effective, an electric or alternative barrier will be implemented away from HCWB habitat (i.e., in the main stem of the Maple River). If new information not considered here becomes available and TFM treatments are proposed in the East Branch of the Maple River, adverse effects to HCWB are likely and reinitiation of this formal consultation would be required.

Estimate of Incidental Take

In July 2012, ten adult beetles were found below the two-track road crossing of the East Branch of the Maple River. In August 2013, seven adult beetles were found from the road crossing downstream to the impoundment. The 2012 and 2013 respective capture rates were 0.010 and 0.014 beetles per linear foot (based on distance of river surveyed), and 15.0 and 3.7 beetles/hour (based on effort) (Vande Kopple et al. 2013). These data are not intended to represent an accurate assessment of the population of HCWB within the action area, but are intended to illustrate the possible range of densities that may exist in the action area (Vande Kopple et al. 2013).

Because these beetles are hard to find during surveys, and previous surveys were not intended to be exhaustive, it is reasonable to assume that more beetles are present than have been found during sampling efforts. Further, seasonal fluctuations are likely for this species, but peaks in seasonal abundance vary among years with no clear trend (Grant et al. 2000 and 2002).

There is no standard for HCWB to tell us how survey results relate to the overall beetle population at a site, but population studies conducted on HCWB in other areas are useful in approximating a reasonable population size for the two-track site. Using mark-release-recapture techniques, Grant et al. (2002) estimated the population of HCWB in a different location on the East Branch of Maple River. They captured and marked 81 and 101 beetles on the first and second days, respectively. Based on recapture rates, they estimated the population at approximately 1,000 individuals. At the time of this study, population estimates were *approximately* 10 times the number of individuals captured per hour in a survey attempt (Grant et al. 2002). This represents the best and only available information upon which to base an assumption about the number of beetles present in the action area. Applying a factor of 10 to the recent survey results at the two-track site, which ranged from 3.7 to 15 beetles/hour in 2013 and 2012, respectively, yields a population estimate ranging from 37-150 beetles within the action area. The occupied habitat farther downstream (i.e., greater than 150 feet downstream of the culvert) where the majority of adults were found in 2013 will not be disturbed by the culvert removal and in-stream work. However, in 2012, ten beetles were found below the culvert within the area of disturbance. Based on the best available information on this population and taking a relatively conservative approach, we are estimating that no more than 150 adult beetles will be present in the action area at the time of the proposed action.

A targeted and thorough search for and relocation of HCWB individuals will be conducted in the action area. Despite these efforts, some individuals are likely to remain in the action area. We anticipate that during these intensive collection efforts, with several qualified people searching over a period of an hour or more, the majority of beetles will be found and relocated. We assume that all HCWB relocated to a suitable habitat will survive. Assuming the intensive survey will locate at least half of the HCWB in the area of disturbance, we estimate relocation of 75 adult HCWB, and estimate that approximately 75 individuals will remain in the action area during construction activities or will drift downstream as a result of in-stream disturbance. We expect few eggs or larvae will be exposed to the proposed action if construction occurs in early summer (May or June); however, construction in the fall (September) will likely expose larvae to silt and sediment. Because it is difficult to detect and quantify the number of HCWB eggs or

larvae, we express take of eggs and larvae in terms of square feet of occupied habitat that will be exposed to the effects of the action. Stream conditions change yearly, but given the information available, take could occur in no more than 1500 square feet of stream (150 feet in length x 10 feet in width).

We expect all beetles remaining in the construction zone will be killed by the construction activities below the two-track crossing. Beetles remaining downstream of the construction zone may experience increased sedimentation but not mortality. Thus, we anticipate incidental take of no more than 75 adult beetles in the form of mortality (for undetected HCWB remaining in the action area) and up to 75 individuals in the form of harassment (for HCWB captured and relocated).

2) Michigan monkey-flower

We do not anticipate any effect to MMF as a result of the two-track crossing project. For the Lake Kathleen dam removal and Woodland Road culvert projects, we anticipate indirect effects to MMF colonies to the south of Woodland Road related to likely alterations of hydrology as a result of the drawdown and removal of the dam.

Direct Effects

The project includes conservation measures to avoid direct effects to MMF. All construction activities will be carried out from the existing road grade, and widening of Woodland road to accommodate the new timber bridge structure will be to the North side avoiding direct impacts to the wetlands to the South where MMF occurs.

Indirect Effects

Adverse indirect effects could occur as a result of alterations to hydrology that impact groundwater discharge and seepage feeding MMF colonies. This species requires maintenance of a cold water source, specific pH levels, and disruptions to hydrology are significant threats. It is unknown to what extent seepage at the springhead will be reduced, but we anticipate some level of reduction in flow. Water temperature will likely become cooler after dam removal, to some extent, which should not result in adverse effects to MMF.

The location and description of the seeps where MMF occurs suggest that they could be associated with the dam, i.e., water originating from Lake Kathleen pushing through the dam. Seeps like this are common on the downstream side of dams (J. Eash, USFWS, pers. comm., 2017). Previous dam inspection reports note concern over seepage from the dam in the vicinity of the western MMF colonies. As the water level of Lake Kathleen is lowered, this could reduce or eliminate seepage upon which the MMF depend.

It is also possible that the seepage originates from groundwater and will not be appreciably affected by removal of the dam. Seeps like those supporting MMF below Woodland Road are common along the East Branch above the Lake Kathleen dam, and farther downstream below Woodland Road (Chris Pierce, CRA pers. comm, 2017). Some of the MMF colonies occur farther west than the impoundment, and based on elevations and topography it seems unlikely that the seeps are fed by the impoundment (Chris Pierce, pers. comm., 2017). Based on our

assessment and site visit, and review of the available information, we determined that at least some of the seeps are likely influenced by the impoundment, and the removal of the Lake Kathleen dam is likely to result in reduced flow to some extent for at least a portion of MMF colonies at the Maple River site.

Safety inspections of the Lake Kathleen dam have been conducted to evaluate the potential for failure of the structure. It is deteriorating, and the current landowner does not want to maintain or improve the structure. The principal spillway concrete outfall structure is in "poor" condition, a sinkhole has developed on the west retaining wall of the principal spillway raceway, and the seepage along the embankment is a potential concern (Middleton 2015). The embankment has failed in the past (1951) (USFWS 2018), and if it fails again it could wash out the MMF colonies in the area of the failure.

The action agency has contracted with MNFI to monitor MMF following the drawdown of Lake Kathleen. Ground water seep levels feeding MMF beds will be monitored, as will MMF colonies, to determine if changes in hydrology are impacting the plants. Is seepage significantly declines, the action agency will transplant MMF as directed by MNFI. Transplanting MMF has been shown to be successful for the Glen Lake MMF population (Marquis 2012), with 15 out of 16 transplants surviving. The action agency is contracting with MNFI so that their botanists can help determine when transplantation is necessary, the most effective technique for transplanting, site selection, and post-transplant monitoring techniques. In addition, the action agency plans to host work days to remove invasive plant species (e.g., forget-me-not, Canada thistle) that currently threatened the MMF population at the Woodland Road site. The methods of removal of invasive species will be closely coordinated with the Michigan Ecological Services Field Office and MNFI to ensure indirect effects to MMF are minimized to the maximum extent possible. If chemical herbicide is found to be the only effective method to remove invasive plant species, MMF may be transplanted (permanently or temporarily) prior to broadcast spraying. MMF may be relocated downstream to an area with more stable hydrology, similar water temperature and pH to source colony location, and less threats from road run off and invasive species. These measures will minimize the extent of adverse effects related to the proposed action.

We expect the restoration activities included as part of the proposed action to increase the likelihood that the MMF colony at Maple River will continue to persist in the future.

Cumulative Effects on HCWB and MMF

Cumulative effects include the combined effects of any future, State, local, or private actions that are reasonably certain to occur within the action area covered in this Opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Alterations to the stream habitat in which HCWB is found are likely to occur in the future. Beaver found throughout the stream may change suitable habitat by modifying flow and increasing sedimentation. For MMF, invasive species are likely to continue to be a threat to

these populations, and road run-off is expected to continue. No State, local or private proposed actions are known.

BIOLOGICAL OPINION

Regulations define "jeopardize the continued existence of a species" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." We must analyze how the proposed action and potential effects could impact reproduction, number, and distribution of a listed species.

Hungerford's crawling water beetle

We anticipate that a loss of 75 individuals will subsequently reduce the number of adults reproducing in the spring and summer following the culvert removal and bridge placement. This slight reduction in reproduction will likely be short term, as the reproduction potential is high for insects, and it is thought that HCWB may have two generations per year. Any reduction in reproduction in the East Branch of the Maple River as a result of the project will likely last only one or two years. Reproduction at the other HCWB sites outside of the two-track crossing with the East Branch of the Maple River, and in other river systems, will not be impacted by this project.

The number of HCWB in the East Branch of the Maple River may decrease slightly as a result of this project. Any individuals found at the two-track site will be relocated to suitable habitat in the vicinity and outside of the area of disturbance prior to construction. We expect all of the relocated beetles to survive and may serve as a source of beetles for future re-colonization of the two-track project site. Although the project will result in the removal of the pool below the existing culvert, we expect the restored channel to provide habitat suitable for HCWB re-colonization. Thus, a large part of the HCWB population in the East Branch of the Maple River will not be affected. We ultimately expect improved habitat conditions for beetles downstream of the construction zone due to reduced runoff and sedimentation.

In terms of range-wide numbers, the action area has a very small number of individuals when compared to the rest of the East Branch of Maple River. Up to one hundred beetles have been found in one pool during a one hour survey in the East Branch of Maple River (Grant et al. 2002). The entire population of HCWB in the East Branch of Maple River has been estimated at more than 1,500 (i.e., more than 1,000 adult beetles estimated in one pool in the East Branch of Maple River, and the beetle is found in several other locations along a 2.5 mile stretch of this stream) (Grant et al. 2002). An additional but uncertain number of beetles are found at ten other streams range-wide. We anticipate that the overall numbers of HCWB will not be impacted by the two-track project.

After reviewing the current status of the HCWB, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, we conclude that the proposed action is not likely to reduce reproduction, numbers, or distribution of HCWB to such an extent as to reduce appreciably the likelihood of survival and recovery of the species. It is the Service's

biological opinion that the proposed action is not likely to jeopardize the continued existence of the HCWB. No critical habitat has been designated for the species; therefore, none will be affected.

Michigan monkey-flower

The existence of the Lake Kathleen dam both potentially supports (i.e., via seepage from the impoundment) and threatens (i.e., if the embankment fails) the population of MMF. The invasive species at the site have significantly degraded these colonies, and if nothing is done, the MMF population at this site will likely be extirpated. The proposed action will seek to maintain the Maple River MMF population by removing invasive species, monitoring MMF and hydrological changes, and transplanting MMF to areas with more stable hydrology and less threats, if needed. Ultimately, we expect the restoration activities included as part of the proposed action to increase the likelihood that the MMF colony at Maple River will continue to persist in the future.

After reviewing the current status of MMF, the environmental baseline for the action area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species. The project will affect at least some of the known Maple River MMF colonies, which include the only known fertile MMF plants (i.e., known to develop capsules (fruits) with seeds) (Bliss 1986, Penskar 2012). At this time, based on monitoring plans and proposed transplantation efforts, and efforts to offset any adverse effects by reducing the threat of invasive species, we do not expect appreciable reduction in reproduction, numbers, or distribution of MMF.

Because we have concluded a no-jeopardy opinion, the identification and implementation of "reasonable and prudent alternatives" to avoid jeopardy are not relevant. The action agency included several conservation measures that will be implemented as part of the proposed action, in fulfillment of their section 7(a)(1) responsibilities.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), take that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such take is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be implemented by the U.S. Fish and Wildlife Service in order for the exemption in section 7(o)(2) to apply. The U.S. Fish and Wildlife Service has a continuing duty to regulate the activity covered by this incidental take statement. If the U.S. Fish and Wildlife Service (1) fails to adhere to the terms and conditions of the incidental take statement, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the (agency or applicant) must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of Federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

Amount or Extent of Take

The Service anticipates that incidental take of HCWB will not exceed 150 individuals as a result of the proposed activities. We expect incidental take will occur in the form of harassment for 75 individuals that will be relocated prior to the time of construction. We expect incidental take in the form of mortality for up to 75 HCWB left in the action area at the time of construction.

Effect of Take

In the accompanying Opinion, we determined that the proposed action will not appreciably reduce the likelihood of recovery or survival of the HCWB. Therefore, we believe that the level of anticipated incidental take associated with the culvert removal project at the two-track crossing is not likely to jeopardize the species.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take of HCWB during the proposed action:

1. Ensure that surveys are conducted in the area of disturbance, including the suitable HCWB habitat 150 feet below the two-track crossing. Any HCWB individuals encountered must be removed from the area of disturbance to the maximum extent practicable prior to construction.

2. Ensure proper implementation of the culvert removal and timber bridge installation, including all best management practices, as described in “Project Description.”

3. Educate workers and other staff on the species.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, the Service must comply with the following terms and conditions which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

Terms and Conditions to fulfill RPM #1

1-1. Surveys prior to construction should be conducted by permitted biologists and qualified biologists experienced with HCWB. Any HCWB individuals that are found shall be moved to suitable habitat elsewhere within the East Branch of the Maple River (i.e., outside the area of disturbance) and permanently released.

1-2. Captured HCWB will be released within 5 hours. Prior to release, make an accurate count of the number of HCWB individuals being relocated. The relocation site should be approved by the Michigan Ecological Service Field Office, prior to release.

Terms and Conditions to fulfill RPM #2

2-1. Minimize the length of time the construction zone is dewatered. Conduct culvert removal and restoration activities as quickly as possible.

2-2. Maintain soil erosion controls in place at all times through final site stabilization. Use every practical precaution to protect the worksite from erosion, including placement of sandbags, silt fence, or similar measures as appropriate. Stabilize stream banks and road slopes to maximum extent practicable prior to removal of the coffer dam and restoration of stream flow to the original channel.

2-3. Allow for a site inspection by the Michigan Ecological Service Field Office during construction and other on-site activities related to this project.

Terms and Conditions to fulfill RPM #3

3-1. Notify contractors of the presence of a federally listed species in the stream and the importance of implementation of these measures prior to the start of construction for compliance with the Endangered Species Act.

Requirements for Monitoring and Reporting Incidental Take

Federal agencies have a continuing duty to monitor the impacts of incidental take resulting from their activities [50 CFR 402.14(i)(3)]. In doing so, the Federal agency must report the progress of the action and its impact on the species to the Service as specified below.

1) Supply the Michigan Ecological Services Field Office with a report, due 60 days after the proposed action that specifies:

a) The number of beetles captured and relocated prior to construction,

b) GPS location of relocation site, and

c) Compliance with these terms and conditions. This report should include photos of project implementation.

2) Contract with a permitted HCWB biologist(s) or conduct, as appropriate, a survey within the two-track action area for two consecutive years following construction. Submit to the Michigan Ecological Services Field Office a report that summarizes:

a) The number of beetles captured and their location, and

b) Stream conditions and habitat suitability for HCWB.

REINITIATION NOTICE

The Service believes that no more than 150 HCWBs will be incidentally taken as a result of the proposed action, with up to 75 removed and relocated prior to construction, and an additional 75 beetles remaining in the area of disturbance. If more than 75 beetles are captured and removed prior to construction, that suggests the population at this site is larger than we assumed. This would represent new information, requiring reinitiation of consultation. If fewer than 75 HCWB are captured, however, we assume the population is smaller than originally estimated and the take threshold will not have been exceeded.

Our effects analysis did not consider effects related to TFM treatment, or other sea lamprey treatment activities that may adversely effect HCWB, in the East Branch of the Maple River. If new information becomes available to indicate TFM treatments, or other sea lamprey treatment activities that may adversely effect HCWB, are likely to be needed in the East Branch of the Maple River as a result of the removal of the Lake Kathleen dam, then reinitiation of this consultation is required.

This concludes formal consultation on the action described above. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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