

2013

# Elkhart River and Christiana Creek Dams

## Appendix H – Monitoring Plan





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## Introduction

Section 2039 of WRDA 2007 directs the Secretary of the Army to ensure, that when conducting a feasibility study for a project (or component of a project) under the Corps ecosystem restoration mission, that the recommended project includes a monitoring plan to measure the success of the ecosystem restoration and to dictate the direction adaptive management should proceed, if needed. This monitoring and adaptive management plan shall include a description of the monitoring activities, the criteria for success, and the estimated cost and duration of the monitoring as well as specify that monitoring will continue until such time as the Secretary determines that the success criteria have been met.

Section 2039 of WRDA 2007 also directs the Corps to consider the need for an adaptive management plan for all ecosystem restoration projects. The adaptive management plan must be appropriately scoped to the scale of the project. The information generated by the monitoring plan will be used by the District in consultation with the Federal and State resources agencies and the MSC to guide decisions on operational or structural changes that may be needed to ensure that the ecosystem restoration project meets the success criteria.

An effective monitoring program is necessary to assess the status and trends of ecological health and biota richness and abundance on a per project basis, as well as to report on regional program success within the United States. Assessing status and trends includes both spatial and temporal variations. Gathered information under this monitoring plan will provide insights into the effectiveness of current restoration projects and adaptive management strategies, and indicate where goals have been met, if actions should continue, and/or whether more aggressive management is warranted.

Monitoring the changes at a project site is not always a simple task. Ecosystems, by their very nature, are dynamic systems where populations of macroinvertebrates, fish, birds, and other organisms fluctuate with natural cycles. Water quality also varies, particularly as seasonal and annual weather patterns change. The task of tracking environmental changes can be difficult, and distinguishing the changes caused by human actions from natural variations can be even more difficult. This is why a focused monitoring protocol tied directly to the planning objectives needs to be followed.

This Monitoring and Adaptive Management Plan describes the existing habitats and monitoring methods that could be utilized to assess projects. By reporting on environmental changes, the results from this monitoring effort will be able to evaluate whether measurable results have been achieved.

## Guidance

The following documents provide distinct Corps policy and guidance that are pertinent to developing this monitoring and adaptive management plan:

a. Section 2039 of WRDA 2007 Monitoring Ecosystem Restoration

(a) In General - In conducting a feasibility study for a project (or a component of a project) for ecosystem restoration, the Secretary shall ensure that the recommended project includes, as an integral part of the project, a plan for monitoring the success of the ecosystem restoration.

(b) Monitoring Plan - The monitoring plan shall--

- (1) include a description of the monitoring activities to be carried out, the criteria for ecosystem restoration success, and the estimated cost and duration of the monitoring; and
- (2) specify that the monitoring shall continue until such time as the Secretary determines that the criteria for ecosystem restoration success will be met.
- (c) Cost Share - For a period of 10 years from completion of construction of a project (or a component of a project) for ecosystem restoration, the Secretary shall consider the cost of carrying out the monitoring as a project cost. If the monitoring plan under subsection (b) requires monitoring beyond the 10-year period, the cost of monitoring shall be a non-Federal responsibility.
- b. USACE. 2009. Planning Memorandum. Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) - Monitoring Ecosystem Restoration
- c. USACE. 2000. ER 1105-2-100, Guidance for Conducting Civil Works Planning Studies. Washington D.C.
- d. USACE. 2003a. ER 1105-2-404. Planning Civil Work Projects under the Environmental Operating Principles. Washington, D.C.

## General Monitoring Objectives

As presented in “Guidance on Monitoring Ecosystem Restoration Project” on 12 January 2010, the following are general project monitoring objectives:

- To determine and prioritize needs for ecosystem restoration
- To support adaptive management of implemented projects
- To assess and justify adaptive management expenditures
- To minimize costs and maximize benefits of future restoration projects
- To determine “ecological success”, document, and communicate it
- To advance the state of ecosystem restoration practice

## Project Area Description

Elkhart Dam – The Elkhart River dam is about 10-feet high and 147-feet long. Its backwater effects extend for about 2,000-feet upstream, where the lack of riverine hydraulics forms a degraded reservoir habitat. This dam has greatly altered sediment transport in holding back sand, gravel and cobble, which has caused significant channel incision downstream. The Elkhart dam is a major impediment to migrating fishes and mussels. This first dam was constructed in 1832 and permanently rebuilt in 1875. The dam consists of piled up river cobbles with a concrete outer shell.

Christiana Dam – The Christiana Creek dam is about 3-feet high and 50-feet long. Its backwater effects are quite negligible. The main issue with this dam is that it impeded small fish migration, such as the rare and unique greenside darter (*Etheostoma blennioides*) and it impedes sediment transport and deposition. It is quite evident from field visits that sand and gravel are being held back from the lower portions of the creek and eventually the St. Joseph River. These are important substrates that provide

spawning material for many fish species. There are no fine sediments behind this dam. This dam is about 60-years old and presently serves no purpose.

## Monitoring Components

### Monitoring Plan Goals & Objectives

Ecosystem restoration is a primary goal of the Elkhart River and Christiana Creek Dams Section 506 Project. As specified in the Project Partnership Agreement, monitoring is “necessary to determine if predicted outcomes of the Project are achieved”. Predicted outcomes, or goals include:

- Restore stream connectivity to the Elkhart River and Christiana Creek
- Restore aquatic biodiversity above both dams
- Restore riverine habitat, morphology, hydrology, and natural sediment transport

The following specific objectives were established for monitoring the effectiveness of this project:

- Restore connectivity of roughly 9 miles of Christiana Creek and 50 miles of the lower Elkhart River watershed
- Reconnect the St. Joseph River and its major tributaries.
- Increase native species richness upstream of both dams between 40% and 60%
- Increase Qualitative Habitat Evaluation Index values above both dams by 10 to 20 points.

In order to evaluate the overall effectiveness of the project and to determine if the specific objectives are met, the following Monitoring Plan is proposed which is focused on fish species and habitat aspects of the restoration. All components will be monitored as specified below, once prior to the project and one time per year for five years following completion of the project, as specified in the PPA.

### Fish Communities

Monitoring of fish communities in streams is a well established way to determine native fish species richness. As discussed in the DPR, native species richness and abundance is an important way to determine process success and implementation of aquatic ecosystem restoration. Comparisons of fish community structure will also be made using the Index of Biological integrity.

Basic fish monitoring will consist of sampling areas immediately above and below both dams. These areas were sampled during the initial stages of the project. Sampling above and below the project areas will allow for comparison of fish community structure above and below the barriers. Multiple sites further upstream of both dams will be monitored as well to determine extent of the affects of the project. As the project areas are in close vicinity to the confluence with the St. Joseph River, multiple sites will be monitored downstream in the St. Joseph River. Total sites monitored will be 5 sites below the dams and 6-7 sites above the dams. Sites will be monitored twice during the sampling season.

All collection sites will be sampled with a boat mounted Smith-Root 5.0 GPP electrofishing system for the Elkhart and St. Joseph River sites. Christiana Creek sites will be sampled with a tote barge mounted Smith Root 2.5 GPP electrofishing system. Each location on the St. Joseph River and Elkhart River are

500 meters and each site on Christiana Creek will be 15 times the wetted width of the stream at the sampling location.

### **Instream Habitat Monitoring**

Instream habitat will be monitored at the same locations described above for the fish monitoring study. Habitat parameters at all six locations will be evaluated using the Qualitative Habitat Evaluation Index, or QHEI (Rankin 1989). This index includes 8 metrics, with a total score of 100; higher scores indicating better habitat conditions.

### **Streambank and Riparian Zone**

Streambank and riparian zone areas where re-vegetation occurred will have to be monitored after construction. Monitoring efforts will consist of invasive species removal, replanting, and any other necessary maintenance. All streambank and riparian zones will be monitored by the City of Elkhart.

### **Sampling/Survey Frequency**

Monitoring near the Elkhart River and Christiana Creek dams will focus on native species richness and abundance, as well as habitat quality. Sampling would occur between June and August of each year of monitoring activities. Sampling would occur once a year. The total monitoring period will be 5 years.

### **Data Analysis**

Success will be based on an increase in native species richness and abundance in areas above both dams that have been cut off from downstream areas for 50-150 years. When areas above the dams have an equal or superior richness level to areas below the dam prior to implementation, the project will be determined to be a success. Success will also be based on physical habitat immediately above the dams. Once the barriers are removed, the impounded areas will be allowed to return to natural flowing stream segments that will show increased habitat diversity that will support a larger number of native fish species.

The information generated through the monitoring of fish communities and aquatic habitat would be used to indicate the trend in overall condition of the area. The native fish species richness and QHEI are expected to increase each year. If the analysis of the collected data indicates a decrease in condition within any areas with an implemented restoration measure, adaptive management actions may be taken to increase the score for the following sampling year.

### **Monitoring Responsibilities**

The local sponsor, the City of Elkhart, will be responsible for sampling the native fish communities and aquatic habitat in and near the project sites.

## **Monitoring Costs**

Monitoring costs will be based on sampling five sites below the dams and 6-7 sites above the dams. Sites will be sampled twice annually for a period of 5 years. Costs associated with using the City of Elkhart's stream survey team, comprised of an aquatic biologist and three trained interns will be approximately \$10,285 annually or \$51,425. Approximately 15 days of field work per year will be necessary to complete the monitoring with another 15 days necessary for field work prep, data synthesis and analysis, and reporting.

## **Reporting Results**

A yearly monitoring summary report would be drafted by the USACE that briefly summarizes the data collected and determines if adaptive management is needed. A final monitoring report would be drafted that details the outcomes of the restoration project. Monitoring reports will be made available to GLRC and any interested party.

## **Contact Information**

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## **Adaptive Management Planning**

Potential adaptive management actions may include constructing riffle structures, rock vanes, j-hooks or other structures that facilitate improved upstream fish passage. If habitat does not increase in quality, stabilization and native plantings among other options may be incorporated. The degree to which a particular monitoring trend deviates from its intended course will be discussed with local managers, sponsors, and USACE personnel to determine the appropriate response.