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## 4. Restoration Planning

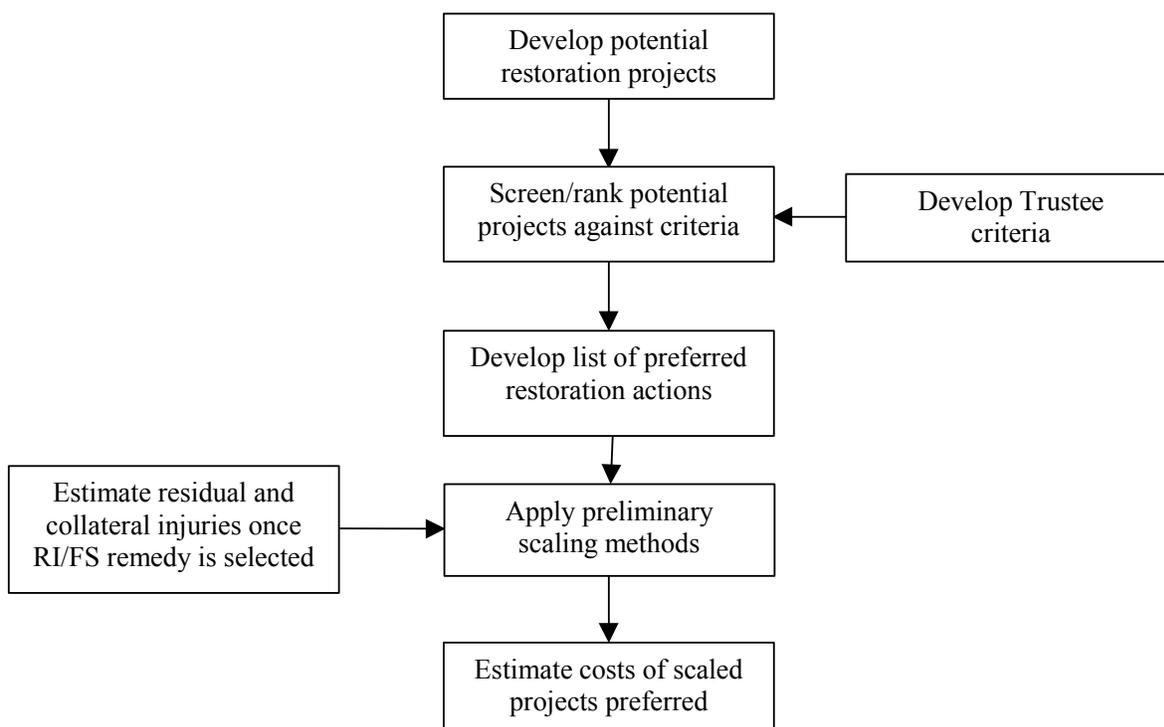
This chapter describes the Trustees' restoration planning activities in Stage I of the assessment. These Stage I restoration planning activities consist primarily of developing criteria for future selection of projects and compiling information on potential restoration actions for the KRE that are consistent with the DOI NRDA regulations and other applicable state and federal laws.

Restoration actions can include actions to restore, rehabilitate, replace, or acquire the equivalent of the injured resources and services they provide [43 CFR § 11.80(b)]. To the extent that PCBs are causing injuries to natural resources, eliminating or reducing exposure of the injured resources to PCBs can restore the resources to baseline (i.e., the condition they would have been in had the PCB releases not occurred) although interim services during remediation may still be lost. Response actions are expected to reduce PCB exposure, but to the extent that response actions do not fully restore resources to baseline, actions to extract or contain PCB contamination, such as sediment dredging or capping, soil removal or capping, or riverbank stabilization may be considered as part of restoration. Any such actions would be coordinated with the PCB cleanup being planned by the response agencies.

A second type of restoration action that may be taken is ecosystem-based restoration. In the KRE, the different components of the ecosystem are inextricably linked to each other, and the hazardous substances that have been released are one of several ecological stressors on the system. Other stressors such as habitat loss or degradation, alterations in natural hydrologic processes, and nonpoint source pollution can also result in loss of resources or services similar to the losses caused by hazardous substance releases. Any such stressors are taken into account by the Trustees in determining damages for PCB-related injuries to natural resources. In selecting actions to restore natural resources and services injured by PCBs, the Trustees will take into account the interdependencies of multiple resources and services. Ecosystem-based restoration actions can contribute both to restoring injured resources to baseline and to compensating the public for interim losses to their resources.

### 4.1 Overview of Restoration Planning

The Stage I restoration planning process is depicted in Figure 4.1. First, the Trustees develop a list of potential restoration projects. The list is compiled from projects or ideas developed for the KRE by resource managers, members of community and environmental groups, and private citizens and is presented in Appendix A. Second, the Trustees develop criteria for evaluating restoration projects based on the factors identified in the DOI regulations [43 CFR § 11.82(d)]. The criteria include a set of threshold screening criteria to determine whether potential



**Figure 4.1. Process for identifying, selecting, and costing preferred restoration alternatives.**

restoration projects are acceptable. The criteria also evaluate the focus, implementability, and benefits of restoration projects that pass the threshold acceptability criteria.

In the third step in restoration planning, the Trustees apply the criteria to specific potential restoration projects and rank them in a list of preferred projects. Fourth, the trustees scale the preferred alternatives. Scaling is the process of determining the appropriate mix, number, and size of restoration projects necessary to compensate the public for natural resource injuries associated with the site. Fifth, the Trustees estimate the costs of the preferred projects that have been scaled. Finally, the Trustees select which restoration projects to implement.

The scaling and selection of restoration projects are linked to remedial actions to be implemented at the site. EPA has announced that its overall plan for site remedial activities is to first eliminate ongoing sources of PCB contamination, including exposed paper wastes along the river bank, and then address instream sediments (U.S. EPA, 2002). The remediation will begin upstream and proceed downstream on a reach-by-reach or dam-to-dam basis. EPA has not yet determined the type and magnitude of remediation that will be conducted in the KRE. In light of the extended

timeframe anticipated to be necessary to fully implement the response agencies' cleanup plan and the uncertainty concerning the type and scope of remedial actions that will be selected, the Trustees have developed a broad range of restoration alternatives that could be combined with remedial actions. The Trustees anticipate that they will need to select and scale restoration projects for different sections of the river at different times. Once remedial actions have been selected, the Trustees may solicit more specific restoration proposals from the public.

## 4.2 Criteria for Evaluating Restoration Alternatives

The Trustees have developed criteria that they plan to use to select restoration projects designed to enhance, restore, or replace injured resources and the services they provide. As remedial decisions are made, the Trustees plan to evaluate and rank potential restoration projects using criteria based on factors identified in the DOI regulations [43 CFR §11.82(d)]. The Trustees have incorporated the 10 factors from the DOI regulations into a set of criteria that the Trustees believe are appropriate for the KRE.<sup>1</sup> These criteria were adapted from those developed for the Lower Fox River/Green Bay (Hagler Bailly Services, 1998).

The Trustees will evaluate specific proposals for restoration projects by first screening them using a set of threshold criteria and then ranking them using four sets of evaluation criteria. The four sets of criteria are as follows:

- ▶ **Project acceptability.** These screening criteria are evaluated on a pass/fail basis and relate to whether a proposed project is feasible, addresses the resources that were injured, and complies with applicable and relevant laws. A project must meet each of these criteria to be considered further.
- ▶ **Project focus.** These evaluation criteria relate to whether the project meets the goals and objectives of the Trustees for restoration of the Kalamazoo River Environment.
- ▶ **Project implementation.** These evaluation criteria relate to project implementability, feasibility, and cost-effectiveness.
- ▶ **Project benefits.** These evaluation criteria relate to the types, timing, and permanence of benefits provided by the project as related to the types and timing of the resources and services lost and an ecosystem perspective toward restoration.

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1. The 10 factors to consider when selecting restoration alternatives as listed in 43 CFR §11.82(d) are listed here numerically followed by the numbers of the corresponding KRE evaluation criteria: (1) A3; (2) I2; (3) I2; (4) I4; (5) B1; (6) I1; (7) F3; (8) A1; (9) F2, I5; and (10) A1.

The evaluation criteria in each of these categories are listed and described in Tables 4.1 through 4.4. Criteria will have different levels of emphasis. In Tables 4.2 through 4.4, general priority weights of higher, medium, and lower (relative to one another in a given category) are shown for the individual evaluation criteria.

**Table 4.1. Acceptability criteria for restoration (pass/fail)**

Criteria	Description
A1: Complies with applicable and relevant federal, state, local, and tribal laws and regulations.	Project must be legal, likely to receive required permits, and must consider public health, welfare, and the environment.
A2: Addresses resources injured by hazardous substances or services lost because of injuries in the Kalamazoo River Environment.	Projects must restore, rehabilitate, replace, or acquire the equivalent of injured natural resources, as measured by their physical, chemical, or biological properties or their services.
A3: Is technically feasible.	Projects must be likely to meet Trustee objectives within a reasonable period of time.

**Table 4.2. Focus criteria for restoration**

Criteria	Description	Weight
F1: On-site restoration.	Projects most directly benefiting resources associated with the Kalamazoo River and Portage Creek are preferred over projects with less direct or more distant benefits.	Higher
F2: Addresses/incorporates restoration of “preferred” trust resources and services as evidenced in Trustee mandates and priorities based on law and policy.	Trustee priorities include dynamic floodplain/riverine habitats, wetlands, habitat continuity, water quality, soil/sediment quality, public game/wildlife/recreation areas, threatened and endangered species, native species, important food-web species, recreationally significant species.	Medium
F3: Focuses restoration on resources that are unlikely to be addressed by other programs.	Ecologically valuable restorations that are often omitted from consideration because they need long-term inputs will be favored over quicker, more routine actions typically addressed by other programs.	Lower <sup>a</sup>

a. Restorations requiring long-term inputs will be ranked lower in priority relative to on-site restoration and preferred resources, but will still be favored over quick, routine actions.

**Table 4.3. Implementation criteria for restoration**

Criteria	Description	Weight
I1: Benefits can be measured for success by evaluation/comparison to baseline.	Projects will be evaluated in terms of whether the benefits can be quantified and the success of the project determined.	Higher
I2: Benefits achieved at reasonable cost (i.e., project is cost-effective).	Project will be evaluated as to whether it will: (a) achieve desired benefits at a reasonable cost; and (b) whether it is cost-effective relative to other projects that could provide the same or similar benefits.	Higher
I3: Uses established, reliable methods/technologies known to have a high probability of success.	Project methodology will be evaluated for likelihood of success. Factors that will be considered include whether the proposed technique is appropriate to the project, whether it has been used before, and whether it has been successful. Projects incorporating wholly experimental methods, research, or unproven technologies will be given lower priority.	Medium
I4: Takes into account completed, planned, or anticipated response actions.	Projects which restore or enhance habitat impacted by response actions will be preferred over those not associated with response actions. Projects proposed in areas likely to be impacted by response actions must be coordinated with response actions to provide cost savings and to take advantage of the availability of mobilized equipment onsite during remediation, if possible, and to avoid damage to the restoration project by any subsequent response actions.	Medium
I5: Takes into account regional planning and federal and state policies.	Projects will be evaluated for consistency with federal and state policies. Projects should also be justified relative to existing regional plans such as species recovery plans and fisheries management plans.	Lower

In addition to using these criteria to rank projects, the Trustees will evaluate the mixture of proposed projects and make selections so that a variety of benefits are achieved which correspond to the types of injuries observed in the KRE. Examples of types of benefits to be achieved include, but are not limited to, elimination of the need for fish consumption advisories; elimination of exceedences of water quality criteria; improvements in the quality of recreational fishing; improvements in the health of fish and benthic invertebrates; improvements in reproduction of bald eagles, mink and other piscivorous wildlife; improvements in hydrology altered by remedial activities; and protection of the KRE from future injuries to habitat or water quality. In the future, the Trustees may use separate requests for proposals for projects that provide different types of benefits or may employ some other mechanism for balancing the mixture of projects so that the range of injuries observed in the KRE is addressed through restoration.

**Table 4.4. Benefit criteria for restoration**

<b>Criteria</b>	<b>Description</b>	<b>Priority</b>
B1: Provides the greatest scope of ecological, cultural, and economic benefits to the largest area or population.	Projects that benefit more than one injured resource or service will be given priority. Projects that avoid or minimize additional natural resource injury, service loss, or environmental degradation will be given priority.	Higher
B2: Provides benefits not being provided by other restoration projects being implemented/funded under other programs.	Preference is given to projects, or aspects of existing projects, that are not already being implemented or have no planned funding under other programs. Although the Trustees may use restoration planning efforts by other programs, preference is given to projects that would not otherwise be implemented without NRDA restoration funds.	Higher
B3: Aims to achieve environmental equity and environmental justice.	Low-income and ethnic populations (including Native Americans) may suffer from pollution, and sometimes benefit the least from restoration programs. Therefore, a restoration program should not have disproportionate high costs or low benefits to low-income or ethnic populations. Further, where there are specific service injuries to these populations, such as subsistence fishing, restoration programs should target benefits to these populations.	Medium
B4: Maximizes the time over which benefits accrue.	Projects that provide benefits sooner are preferred. Projects that provide longer term benefits are preferred.	Lower

### 4.3 Proposed Restoration Projects

The Trustees solicited information on environmental restoration projects that might improve and enhance natural resource services in the KRE. State, regional, and local resource agencies, environmental nonprofit groups, citizen groups, and individual citizens provided a range of broad ideas and specific projects, which they consider important for the environment and the public's enjoyment of the environment in the Kalamazoo watershed. The entire list of ideas and proposals is presented in Appendix A.

In reviewing the list, the Trustees screened the proposals based on the acceptability criteria (Table 4.1) and categorized the ideas and proposals that passed this screen into several broad categories based on the types of projects and the benefits they could provide (Table 4.5). The proposals were grouped into three broad classes: habitat restoration, nonpoint source pollution control, and water-related human uses. Across those classes, the proposals were further grouped into ten general categories that were, in some cases, able to be further illustrated with additional subcategories for a total of 24 types of projects.

**Table 4.5. Summary of types of restoration projects proposed to Trustees and which meet the acceptability criteria**

Category	Subcategory
<b>Habitat restoration</b>	
Enhancement of existing habitat	<p>Restore hydrology and movement of fish in the Kalamazoo River and its tributaries, e.g., removal of dams and restrictive culverts and restoration of meanders</p> <p>Removal of waste and fill in floodplain to restore floodplain wetlands, including riparian forests, to pre-disturbance contours</p> <p>Softening of shorelines hardened by linear walls or rip-rap</p> <p>Enhance habitat in remediated areas by improving contours and structure, establishing native vegetation, or by other means</p> <p>Restore wetlands and in-stream habitats</p>
Land acquisition	<p>Acquire riparian land/easements to preserve continuity of the river corridor</p> <p>Acquire land/easements to reduce fragmentation and improve/preserve connections among large areas of habitat (e.g., connecting Kalamazoo River corridor with Gun Lake area)</p> <p>Acquire land/easements to improve/protect water quality and quantity in the Kalamazoo River</p>
Protect/enhance species	<p>Endangered species programs</p> <p>Re-establishment of native communities, e.g., vegetation, freshwater mussels</p> <p>Control of exotic species</p> <p>Programs to benefit top predators (e.g., raptor nesting platforms)</p> <p>Species reintroduction and stocking</p>
<b>Nonpoint source pollution control<sup>a</sup></b>	
Create riparian buffer zones	
Remove contaminated sediment in tributaries	
Improve land and water use practices	<p>Watershed and land use planning to protect affected resources</p> <p>Erosion and stormwater control programs</p> <p>Agricultural best management practices</p> <p>Education on watershed protection to promote stewardship</p>

**Table 4.5. Summary of types of restoration projects proposed to Trustees and which meet the acceptability criteria (cont.)**

Category	Subcategory
<b>Water-related human uses</b>	
Create and expand waterfront parks and trails	Expand and create recreational areas to promote enjoyment of the river  Shoreline improvements for human use, including fishing piers and boat docks/ramps
Improve recreational boating navigation	
Conduct additional studies of affected areas	
Conduct public education programs relating to affected resources	
a. Point source pollution control is not included because it did not meet the criterion of complying with all applicable laws and regulations. Since controlling pollution point sources falls under the purview of other state or federal regulatory programs, it is considered inconsistent with these programs for the NRDA to conduct such actions.	

## 4.4 Conclusions

The Trustees designed the restoration planning process described in this chapter to ensure fidelity to statutory goals, to take advantage of a wide range of practical restoration opportunities, and to allow meaningful public participation. Fidelity to statutory goals is achieved by applying objective criteria, which are rooted in CERCLA, the NRDA regulations, and Trustee agency mandates, to all restoration proposals and ideas. Importantly, criteria constrain restoration opportunities to those which address the public’s PCB-caused losses, by returning natural resources and their services to baseline, and by compensating for losses that occur in the interim. In addition, criteria ensure that the Trustees balance competing goals, such as preferences for quick baseline restoration on-site versus cost effectiveness.

A wide range of practical restoration opportunities is achieved by ensuring that as many restoration projects and ideas which address the public’s PCB-caused losses are initially included as is practical. In the Stage I restoration planning work, the Trustees sought restoration projects and ideas from diverse sources, including local experts, groups, and organizations with restoration experience; other NRDA’s with similar losses and/or restoration opportunities; the PRPs; and the general public. The Trustees do not wish to constrain the initial pool of restoration projects and ideas, thereby ensuring that restoration opportunities are diverse and based on practical experience. By setting objective criteria first, the Trustees can then efficiently evaluate

a wide range of projects. Thus, the Trustees hope to maximize restoration opportunities within the scope of public losses that are being assessed in the NRDA.

The Trustees will seek meaningful public participation by publishing the criteria before choosing the projects, and allowing the public to review the process as a whole. Public participation is also achieved by encouraging public input into the list of projects and ideas to be evaluated with the criteria by the Trustees. In addition, public participation is enhanced through public surveys designed to accurately measure public preferences and values, such as those described in this report. Finally, the Trustees will seek public input on a draft restoration plan developed in connection with any settlement with PRPs or award by the court. Therefore, the public is ensured input on restoration planning that helps to establish Trustee claims, as well as restoration planning to implement actual restorations after claims are resolved.

The Stage I Assessment includes important milestones for restoration planning. The Trustees have proposed for public review an overall process for restoration planning including restoration criteria based on factors identified in the DOI regulation [43 CFR § 11.82(d)], which can be used to evaluate a wide range of restoration projects and ideas. Also, the Trustees have presented initial results for a recreational fishing study and total value focus groups, which are important first steps for scaling the amount of restoration that may be needed. In addition, the Trustees have begun to assemble restoration projects and ideas that can be evaluated with the criteria. In general, these projects focus on habitat restoration, nonpoint source pollution control, and water-related human uses in the KRE.

As information becomes available about the likely amount, type, and timing of cleanup required by the response agencies, the Trustees will be able to predict residual restoration needs, restoration opportunities that can be integrated with cleanup activities, and the amount, type, and timing of restoration that will be required for the entire KRE. The Trustees hope that, ultimately, restoration planning will produce a vision of a restored KRE that can be supported by the Trustees, the PRPs, and the public.