The Role of Mitigation in a Restoration Strategy

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Introduction

Dozens of watershed coalitions and similar groups have been formed around Puget Sound to recover salmon (McCracken 2000), conserve marine resources (Smuckler 2001), protect water quality (McWilliams 2002) and address other natural resources. Many are developing plans to guide restoration and protection actions by governments and non-governmental organizations.

The cost of implementing such plans usually exceeds the available funding, making funding the most common obstacle for restoration (King 1991). At the same time, a tremendous amount of money is being spent by private and public entities to mitigate the environmental impacts of new projects and development. While many restoration strategies express concern about future development (*e.g.*, Hall *et al*. 2001, LWCSWSC 2002, SCMRAC 2003), they do little or nothing to influence the associated mitigation efforts.

In this paper, the term "restoration" applies to all projects and strategies where the primary purpose is to take an ecosystem closer to its condition prior to disturbance, independent of any activities that resulted in the disturbance. This does not require that the ecosystem be returned to a close approximation of its condition prior to disturbance, as restoration is defined by the NRC (1992). It includes projects that provide ecological benefits short of full restoration, which Clewell *et al*. (2000) term "rehabilitation." The term "mitigation," is used in this paper for any activity proposed to offset the ecological impacts of a project with some other primary purpose. This is different from some definitions of mitigation proposed in the literature (*e.g.*, Lewis 1989).

The distinction in these definitions is based on the purpose. The same activity (for example, revegetating a stream bank or enhancing a wetland) could be mitigation if it is done as a condition of a project (for example, clearing trees or filling a wetland on another part of the site), but restoration if it is done independently of any project that has adverse ecological impacts. Examples of mitigation would include projects required in a development permit, a federally approved habitat conservation plan, or as part of a natural resource damages settlement. Examples of restoration would be voluntary restoration projects and plans, such as federal recovery plans for threatened species, which are undertaken independent from the historical causes of the ecological degradation.

This paper begins by asking the question, "why should restoration plans address mitigation?" There are significant differences in the criteria and approaches that follow from the different purposes. At first glance, it may appear that mitigation and restoration, as defined here, are and should remain completely independent.

After building the case for addressing mitigation in restoration strategies, this paper examines three current case studies in Snohomish County where this has been considered. First, the Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Steering Committee is developing a watershed plan for salmon habitat conservation (LWCSWSC 2002) at the same time that a major regional wastewater plant is being planned (King County 2002). Second, the Snohomish County Marine Resources Advisory Committee is developing recommendations for restoration of marine resources (SCMRAC 2003) while a major railroad improvement is planned along the shoreline (Sound Transit 1999). Third, the Snohomish Basin Salmon Recovery Forum is developing a watershed plan for salmon habitat conservation (Hall *et al*. 2001) while a watershed-based mitigation approach is being tested for a highway-widening project (WSDOT 2003).

These examples show that it is possible for mitigation activities to advance restoration goals, although the initial results are mixed. They also illustrate some of the challenges that must be met to successfully include mitigation in a restoration strategy. Three major challenges are discussed, along with specific suggestions for meeting them.

1. Avoid competition for scarce restoration opportunities.
2. Break out of the "development versus environment" paradigm.
3. Develop an explicit strategy before trying to use it.

If restoration plans can meet these challenges, then they have the potential to influence where and how mitigation efforts are directed. Even if each mitigation project seeks to do only the minimum required for no net loss of ecological functions, directing the effort to priority areas and issues can advance the goals of the restoration plan. Furthermore, restoration plans that do not explicitly present a strategy for mitigation could be ignored or misused by, which could make it more difficult or expensive to reach the goals of the restoration plan.

The case for incorporating mitigation into restoration strategies

There are several major differences between typical restoration and mitigation projects. By definition, restoration projects seek to move ecological systems toward predisturbance conditions. If a project did not result in a net gain in ecological conditions, it would not fit this definition of restoration. Mitigation, on the other hand, generally aims for no net loss in ecological conditions by taking steps to offset or mitigate additional ecological disturbance or degradation.

Restoration projects and plans are typically undertaken when the disturbance or degradation is the cumulative result of many actions, and it is difficult or impossible to identify all of the causes of degradation or to apportion responsibility. Mitigation, on the other hand, is project or event specific. At least some of the parties responsible for the degradation or requesting permission to disturb ecological systems must be identified, and their responsibility for mitigation must be reasonably connected with and proportional to the disturbance.

The geographic scale and location is also different. Restoration planning is often done at an ecosystem scale, which may be a watershed, basin, estuary, or drift cell. Identification and prioritization of projects is done at this scale based on ecosystem priorities or factors limiting recovery. Mitigation is associated with a particular disturbance site, which might not correspond to a natural ecosystem boundary. Current regulations emphasize mitigation that is "in-kind" and "on-site:" replacing the same functions that were lost, in the same area, regardless of their relative value in a larger context.

As a result, mitigation is often limited to addressing a narrow set of specific impacts on ecosystem functions and values. This approach can fix some structural disturbances, and it can miss many underlying issues with watershed processes. For example, restoring an adjacent area of natural shoreline may replace a habitat area that is eliminated by shoreline armoring and still fail to address the alterations in sediment and energy regimes. Restoration planning is more frequently grounded in the processes that form and maintain ecosystems. The most effective restoration is often aimed at the causes, rather than the structural symptoms, of disturbance.

The criteria for selecting mitigation projects can also differ dramatically from restoration priorities. For example, salmon recovery (GSRO 1999) and marine resource protection (Scinto 1999) strategies in Washington State are based on the idea that it is cheaper to protect remaining high quality habitat than it is to restore degraded habitat, and protection is given a high priority for grant funding (SRFB 2001). Wetland mitigation requirements take a nearly opposite view, giving a strong preference to enhancing, restoring and creating wetlands, and allowing only a small portion of the mitigation to be through protecting existing wetlands. This follows directly from the no net loss goal for wetlands, and it makes it more complicated to integrate mitigation and restoration plans.

Given all of these differences and potential conflicts, why should anyone try to include a role for mitigation in a restoration strategy? The answer comes in six parts: funding, opportunities, information requirements, tools, regulatory teeth, and the consequences of not doing so.

Funding is the most common obstacle to implementing restoration plans (King 1991), and little has been published about how society is going to pay for restoration (Holl and Howarth 2000). The case studies reveal a huge gap

between the amount of funding needed and the amount currently available. Furthermore, economic conditions are making it difficult to sustain the current amount. Even under depressed economic conditions, there will continue to be substantial investments in public and private development. The cost of mitigating development projects has been increasing as development moves into areas with more significant environmental challenges, and the cumulative investment in mitigation far exceeds the investment in voluntary restoration. If even a small portion of mitigation spending can be shifted toward the highest priorities in a restoration strategy, it could make a big difference. Mitigation banks may help consolidate small, isolated investments into substantial sums that can tackle big projects, and even individual mitigation projects could be reprogrammed to higher priorities.

There are some opportunities for regulations to require restoration beyond what is needed to mitigate project impacts. For example, the proposed new guidelines for shoreline management plans in Washington State include requirements for restoration, although the amount of restoration that can be achieved through regulatory mechanisms is limited by legal and practical constraints. Even without trying, some efforts to clean up natural resource damages already result in net improvements to damaged sites (Phillips 1998) and more would be able to do so with financial incentives. Restoration plans could take advantage of this opportunity to influence mitigation.

Similar information needs are another reason to coordinate mitigation with restoration. Whether doing an environmental project out of legal necessity or philanthropy, the same scientific principles apply. In each case, it is important to know the pre- and post-disturbance conditions, and how to achieve a desired result.

Mitigation can also add a new set of tools to the restoration toolbox. Condemnation, for example, is often used for transportation and other projects with certain kinds of well-defined public purposes. It is rarely used to acquire private land for ecological purposes. Mitigation activities done in conjunction with a transportation project, such as acquisition of wetlands or other areas for restoration, may require condemnation. That can provide ecological benefits in priority areas that would not have been available if acquisition depended on willing landowners, especially if a project some depends on acquiring all the land in a certain area.

The regulatory requirements applicable to mitigation projects often include performance bonds and mandatory monitoring for some number of years. Many restoration programs do not require these measures. The level of confidence in the success of a restoration project might be increased if it had to meet the standards that would be applied in a mitigation context. Even with the regulatory teeth, there are questions about the effectiveness of mitigation projects, so some work is still needed in this area.

In addition to missing opportunities, there are three other important consequences of not defining a role for mitigation in a restoration strategy. First, there is the potential for the restoration plan to be misused. Projects in the plan might be implemented as mitigation for additional disturbances without considering the ecosystem context or timing of the project. This could undermine the effectiveness of the proposed project.

Second, if this occurs frequently or if restoration opportunities are scarce, this could make it more expensive or even impossible to meet the restoration goals. This is one of the major challenges discussed below.

Third, when mitigation is left out of an ecosystem-scale restoration plan, it is difficult to know whether a proposed mitigated project is or is not consistent with the overall restoration plan. Any important information contained in the plan might be ignored by developers and others as they undertake major mitigation efforts. This can lead to large amounts of money being spent in mitigation in areas that are low priority or that do not contribute to the overall restoration of the ecosystem. For the recovery of many species, the location of restored habitat can be as important as the quantity of restored habitat (Huxel and Hastings 1999). Small patches of habitat might not support self-sustaining populations, and isolated patches might not be recolonized. By providing a regional context for mitigation, restoration plans may be able to increase the ecological benefits of mitigation work without increasing the cost. This can help with individual projects and it may be especially valuable in the context of mitigation banking.

Case 1: WRIA 8 salmon habitat and new wastewater treatment plant

The Lake Washington/Cedar/Sammamish Watershed (WRIA 8) Steering Committee is developing a salmon habitat conservation plan (LWCSWSC 2002) at the same time that King County is planning a major new regional wastewater treatment plant called "Brightwater" (King County 2002).

The salmon planning group published a near-term plan to guide actions over the next five years while the final plan is under development. This near-term plan includes 238 salmon habitat restoration capital projects. It does not include cost estimates, but the total implementation cost would appear to be well over $100 million. Less than $2 million per year is generally available from grant sources to implement these projects, leaving a substantial funding gap.

The proposed plant is close to a salmon-bearing stream in WRIA 8, and the influent and effluent conveyances will run along and across several streams and water bodies. Some affected areas are considered "core production subareas," some are important "migratory and rearing corridor subareas," and some are "satellite production subareas." The estimated cost of the new facilities is $1 billion, of which 10% or $100 million is the anticipated mitigation budget.

There was substantial information sharing between the two planning efforts, and some of the same people participate on both. However, the restoration plan does not include any specific guidance for mitigation. Even if it did, it was not completed in time to be used in preparing the draft environmental impact statement (DEIS) for the treatment plant. The near term restoration plan was distributed in September 2002 and the DEIS was published just two months later.

As a result of coordination, there is some overlap in projects, including land acquisition projects in Little Bear and North creeks as well as instream, riparian, and fish passage restoration projects. The overlap in people will continue to promote coordination, but there is no agreed method for determining whether the mitigated wastewater treatment plant project will actually advance the goals of the restoration plan.

Case 2: Snohomish County marine resources and railroad improvements

The Snohomish County Marine Resources Advisory Committee (MRC), a citizen group, is developing recommendations for restoration of marine resources in Snohomish County (SCMRAC 2003) while a major railroad improvement is planned along portions of that same shoreline. The railroad track improvements are required for a Sound Transit commuter rail proposal that would increase passenger train traffic (Sound Transit 1999).

Two people are participating in both efforts. There have been informal discussions about opportunities to integrate the restoration planning with the mitigation. The draft EIS for the Sound Transit proposal described alternative mitigation projects that were not included in the preferred alternative, and the MRC considered pursuing additional grant funding to complete them. If a comprehensive, science-based marine resources restoration plan were in place, then it could have influenced the selection of mitigation sites instead of the other way around.

Sound Transit has coordinated with Snohomish County and sought input into the mitigation plan all along, but the MRC was just getting started when the draft EIS was completed so there was no restoration plan in place. In addition, the MRC has focused on small projects that could be funded with available grants of about $50,000, and has not yet developed a comprehensive plan that could include large-scale mitigation and restoration projects.

Case 3: Snohomish River basin salmon habitat and highway improvements

The Snohomish Basin Forum is developing a watershed plan for salmon conservation (Hall *et al*. 2001) while a watershed-based mitigation approach is being tested by the Washington Department of Transportation (WSDOT) for a highway widening project in the basin (WSDOT 2003). The highway project is close to an area of the Snohomish River that is considered a high priority area by the watershed planning group, but the direct impacts are on uplands and small tributaries that do not support large numbers of salmon.

The highway project proponent, WSDOT, made substantial efforts to reach out to the WRIA 7 restoration planning group and technical committee and ask for input. Representatives of the Governors Salmon Recovery Office made local involvement a priority and arranged special meetings and check-in points. The WRIA 7 group provided scientific reports and the near-term action plan for salmon restoration, which included dozens of project ideas. WDOT continued to send all updates and reports to local representatives throughout the project. Some committee members were skeptical about getting involved in a road-widening project because they felt it ran counter to their restoration objective.

None of the specific projects in the restoration plan were incorporated in the mitigation proposal because they did not meet the criteria for location and related functions of the smaller tributaries that will be impacted by the project. However, the characterization of watershed functions and processes was very consistent with the local watershed planning effort, and the mitigation design was done in that context.

These case studies demonstrate that development project proponents are willing and able to develop mitigation plans consistent with restoration priorities. This is an opportunity for restoration planning groups to increase the resources directed toward achieving restoration goals. It is possible for mitigation activities to advance restoration goals, even though none of the case studies fully realized the opportunity. To successful integrate mitigation into future restoration plans, restoration planners must overcome three major challenges.

Challenge 1: Avoid competition for scarce restoration opportunities

A hypothetical example of wetlands in a small watershed can illustrate this challenge. Suppose that the pre-development condition of the watershed included four wetland areas and one additional area with topography and soils that could support a created wetland (Figure 1a). Over the years, development effectively paved over two of the wetlands and degraded a third. The current conditions include one intact wetland, one degraded wetland, and one suitable site for creation of a wetland (Figure 1b).

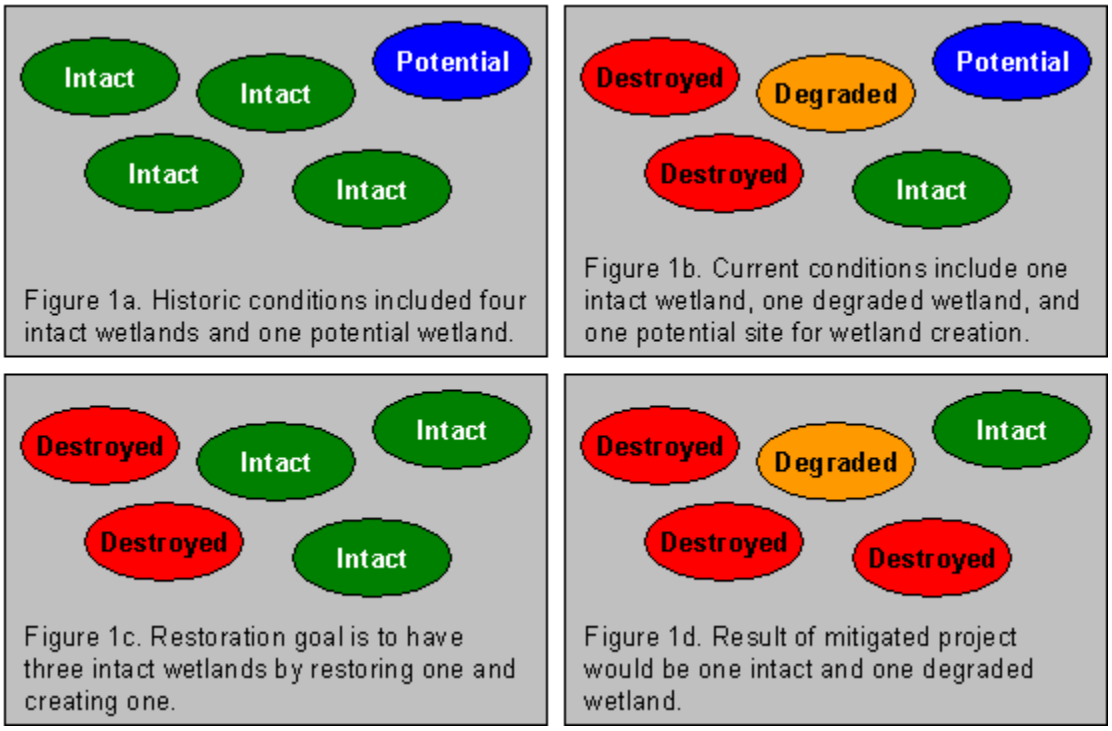

Figure 1. A hypothetical watershed with scarce wetland restoration opportunities, illustrating that opportunities can be foreclosed by mitigated developments that initially appear to result in no net loss.

Now suppose that a restoration group determined that the lack of wetlands in the watershed is a high priority problem, and they set a watershed goal of three intact wetlands. They developed a restoration plan to meet their goal by restoring the degraded wetland and creating a new wetland (Figure 1c).

At the same time, suppose that a proposed infrastructure project would pave over the only intact wetland left in the watershed. The applicant proposes to mitigate for the destruction of the wetland by creating a new wetland on the suitable wetland creation site. The new wetland would be designed to provide all the functions and values of the one that will be destroyed. The result of the project would be no net loss of wetlands compared to current conditions. There would still be one intact wetland (the new one) and one degraded wetland that was not affected by the project (Figure 1d). The applicant may even cite the restoration plan as support for their project, because they are paying to create the wetland called for in the plan.

Unfortunately, the project would result in a significant net loss. The number of wetlands would be the same as in current conditions, but the project would consume the only remaining opportunity to increase the amount of wetlands in the watershed. There would no longer be a way to reach the restoration goal of three intact wetlands without tearing up existing developments.

Reality is rarely as simple as hypothetical examples. There are typically many more restoration opportunities, and each one is usually unique. Even where it remains possible to reach watershed goals, it may become more difficult and more expensive to do so as restoration opportunities are consumed as mitigation for other environmental damages.

If all the good projects are done as mitigation for the adverse impacts of additional development work, they will not result in any net gain in ecological function. Most existing regulations and policies only require mitigation to offset adverse impacts. In some cases, the replacement ratio may be greater than 1:1, but this is to compensate for the risk that replacement at 1:1 may result in a net loss of function in some cases due to uncertainties.

Meeting this challenge requires identifying potential restoration locations and determining whether they are at risk of future degradation. If there are very few potential locations, then they may need to be protected from future impacts until they can be restored. This suggests acquisition or regulatory protection of areas that are already degraded, if the restoration goals depend on future restoration of those areas, to avoid foreclosing future restoration options.

Challenge 2: Break out of the "development versus environment" paradigm

Despite considerable discussion about pursuing environmental restoration goals and economic development goals at the same time, many people appear stuck in an old "development versus environment" paradigm. That paradigm is costly, ineffective, and contrary to social values.

In the case studies, all the development proponents appeared genuinely interested in meeting environmental goals in addition to their primary project goals. Since all three cases dealt with public agency proponents of infrastructure projects, this observation might not reflect the typical views of other developers. The increasing focus on topics such as green building and low impact development, however, suggests that there is some interest in the private sector.

The more challenging finding is that restoration groups were less inclined to consider the perspectives of developers. Few of the people involved in restoration planning appeared genuinely interested in advancing economic development goals along with their primary ecological goals. As a result, planning groups have not engaged in active outreach to the development community to seek partnerships and support for restoration goals.

The difference in attitudes may partly result from the development community's long experience with environmental regulation. The restoration planning community, on the other hand, does not always shoulder a similar regulatory burden to consider economic development. Federal recovery plans must consider economic impacts, but they generally do so as a compliance matter after the plan is complete. The approach could be more forward thinking by integrating economic concerns into the entire plan development process.

Restoration planning groups could seek to embrace the inevitability of development and work hard to encourage design standards and mitigation that are consistent with restoration goals for developed areas. The only way to find win-win situations is to look for them, and that requires understanding and appreciating what each group is trying to accomplish. If mitigation can be directed to priority areas to increase environmental benefits without significantly increasing costs, the development community may be very willing to try it.

The regulatory community must also be flexible and open to new approaches, such as the watershed-based mitigation effort in the third case study. That effort was driven by a legislative mandate to seek a better approach. In other cases, it will take strong advocacy from the development community and the environmental community together to overcome the traditional dependence on rigid mitigation requirements.

Challenge 3: Develop an explicit strategy before trying to use it

In all three case studies, the restoration plans and the mitigated project proposals were in development at the same time. None of the groups involved had a clear strategy for how to integrate mitigation with restoration plans, nor even a consensus that it would be desirable to do so. Furthermore, all the groups felt considerable pressure to complete their work on a short timeline, so they did not have much time to collaborate on new approaches with other groups. This made it very difficult to maintain even a low level of coordination, and so each group had to rely on its own information and analysis.

Requests for mitigation (or, for that matter, restoration) project ideas often come with short timelines. Restoration planning groups don't have the capacity to develop a new approach for every development proposal or request that comes along, so they can't respond effectively without an explicit strategy.

The best way to overcome this challenge is to get an explicit strategy in place early, before trying to coordinate the implementation of the strategy with specific project proponents. The strategy can be most useful in directing mitigation and restoration if it includes quantitative goals for future ecological conditions, measurable desired net outcomes from each project, and an explicit description of the role that development and associated mitigation can play in meeting the goals.

By establishing goals for future ecological conditions rather than for implementation of specific projects, progress can be tracked more effectively. If a watershed currently has 3,000 acres of mature forest and the goal is to have 5,000 acres, progress toward the goal would reflect reforestation efforts as well as any additional clearing. If the goal were to reforest 2,000 acres, on the other hand, it could be met even if another 2,000 acres were cleared, resulting in no net gain in forests. This simple example demonstrates that monitoring the successful implementation of projects does not necessarily provide any insight into whether ecological goals are being met.

This same need for defining and measuring net outcomes exists at the level of individual projects. Figure 1 shows how misleading it would be to credit the developer for implementing one of the two wetland projects in the plan.

Effective strategies would describe how development projects as well as restoration projects can be consistent with restoration goals. Restoration plans should also be explicit about what could happen if development and its associated impacts are not factored into the plans: restoration efforts could be offset by future impacts as in the reforestation example above. This happens already and it has been discussed by the planning groups in the case studies, but it has not been quantified or resolved in any of the plans. If restoration groups do not measure or estimate the impact of development relative to restoration plans and goals, it will be difficult to determine whether the restoration plan can actually achieve its goals.

The projects that are typically listed in restoration plans may or may not be appropriate for mitigation efforts, depending on the specifics of the projects. A set of criteria could be established to determine when it is appropriate to pursue implementation of a project with funding through mitigation. For the mitigation project to be consistent with the restoration plan, it must contribute to net outcomes in priority areas. It must not foreclose other restoration options, as illustrated in Figure 1. It also must not take away from other goals, for example, by destroying an important wetland to create a new side channel.

Finally, for the strategy to be useful to a broader community, it must be well publicized. It is in the best interest of the restoration group to make the plan and its mitigation strategy well known and keep it well known so that project proponents will choose to look to it for ideas as they design their mitigation for future projects.

If restoration plans can meet these challenges, then they have the potential to influence where and how mitigation effort is directed. Even if each mitigation project seeks to do only the minimum required to achieve no net loss of ecological functions, directing the effort to priority areas and issues can advance the goals of the restoration plan. Furthermore, if restoration plans do not explicitly discuss regulatory issues and present a strategy for mitigation, then the restoration plan could be ignored or misused by proponents of development projects.

Conclusions

In conclusion, it is clear that mitigation can contribute to restoration, and that this opportunity has not been fully realized. Furthermore, failure to consider mitigation within a restoration plan may actually make it more difficult and more expensive to achieve the restoration goals.

Since there are fundamental differences between mitigation and restoration, it is not a trivial matter to integrate them. The case studies illustrate three keys to success. First, avoid competition for scarce resources. Identifying and prioritizing restoration projects is difficult and time-consuming. If the projects with the greatest restoration potential are offset by additional disturbances, as is typical in a mitigation context, then completing the list of projects will not result in any progress at all toward the restoration goal.

Second, break free of the "development versus environment" paradigm. It is destructive and contrary to social values, and it leads to missed opportunities and wasted effort. While many people talk about trying to promote both development and environmental restoration, most of the individuals in the case studies still appear to view development as a force in direct opposition to ecological restoration.

Finally, the strategy for integrating the two must be explicit, and it is best to have it in place before trying to apply it to specific situations. The role of mitigation should be spelled out explicitly to ensure that it supports the restoration goal. In particular, the plan should require that mitigation contribute to net outcomes in priority areas, that it not take away from other goals, and that it not foreclose other restoration options.

This may appear to leave very few opportunities for mitigation to contribute. However, given the large investment in environmental mitigation compared to restoration, even that small role can make a big difference.

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