

Incorporating Climate Change Considerations into NEPA: Environmental Impact Statements

Table 1. Critical climate-related questions to consider in Environmental Impact Statements.¹

	Description	Critical Climate-Related Questions	Information Sources (EcoAdapt & Others)
Purpose and Need	Articulate the purpose of the initiative/project and why the action is needed	<p><i>Need:</i></p> <ul style="list-style-type: none"> • Will exposure to climate change likely result in impacts to the resource(s) of concern? <ul style="list-style-type: none"> ○ What are the relevant projected climate changes for the project geographic area and/or resource(s) of concern? ○ What are the direct effects of climate change on the resource(s)? Indirect effects? ○ Could climate change exacerbate the impacts of or be exacerbated by other threats (e.g., land use conversion, invasive species, demand for water)? How? <p><i>Purpose:</i></p> <ul style="list-style-type: none"> • How will this initiative/project address the climate impacts or threats articulated by the project need? <ul style="list-style-type: none"> ○ Consider what climate impacts or vulnerabilities may be minimized or avoided through implementation of this project 	<p><i>Need:</i></p> <ul style="list-style-type: none"> • Habitat vulnerability assessment summaries • Climate changes table • Habitat vulnerability assessment report (for complete literature review) – <i>Coming soon!</i> • California Climate Commons <p><i>Purpose:</i></p> <ul style="list-style-type: none"> • Adaptation summaries • Habitat adaptation strategies report (for complete review) – <i>Coming soon!</i>
Proposed Action and Alternatives	No Action	<ul style="list-style-type: none"> • How will climate change impact the ability of the No Action alternative to meet the Purpose and Need? • What climate vulnerabilities or threats may remain under the No Action alternative? <ul style="list-style-type: none"> ○ Answers to questions above under Purpose and Need can help highlight the ways in which climate impacts to the resource(s) of concern may fail to meet the Purpose and Need 	<ul style="list-style-type: none"> • Habitat vulnerability assessment summaries • Adaptation summaries • Habitat adaptation strategies report (for complete review) – <i>Coming soon!</i>

¹ Table 1 adapted from guidance in Delach and Matson 2013. Reasonably Foreseeable Futures: Climate Change Adaptation and the National Environmental Policy Act. [Defenders of Wildlife Climate Change White Paper](#), 35 pp.

	Description	Critical Climate-Related Questions	Information Sources (EcoAdapt & Others)
	Alternatives and Proposed Action	<ul style="list-style-type: none"> • Does the alternative reduce the likelihood or severity of climate change impacts on the resource(s) of concern or the project itself? How? • Is the alternative itself vulnerable to climate change impacts? How? <ul style="list-style-type: none"> ○ For example, will culvert size be sufficient given projected future changes in high flow or peak flood events? • How will climate change impact the ability of the alternative to meet the Purpose and Need? Consider eliminating those alternatives that fail to meet the Purpose and Need due to projected future climate impacts. 	<ul style="list-style-type: none"> • Ameliorates effects tables – <i>Coming soon!</i>
Affected Environment and Environmental Consequences	Compare the environmental effects of implementing the alternatives on various elements of the affected environment	<ul style="list-style-type: none"> • See questions above under Proposed Action and Alternatives • Also consider: <ul style="list-style-type: none"> ○ What climate vulnerabilities or threats may remain under each alternative? ○ Will the effects of climate change compound the impacts of a given alternative on the resource? How? ○ Will climate change exacerbate the cumulative effects of other past, present, and reasonably foreseeable actions on the resource? ○ Are there human responses to climate change that will themselves become cumulative effects (e.g., increased water withdrawals to meet agriculture demand during drought)? ○ How do the various alternatives differ in their aggregate impacts when climate change is factored in? 	<ul style="list-style-type: none"> • Habitat vulnerability assessment summaries • Habitat vulnerability assessment report (for complete literature review) – <i>Coming soon!</i> • Adaptation summaries • Habitat adaptation strategies report (for complete review) – <i>Coming soon!</i> • Ameliorates effects tables – <i>Coming soon!</i>
Monitoring	Though not required, an important part of any plan is monitoring to ensure the effectiveness of management actions	<ul style="list-style-type: none"> • What indicators or metrics are currently measured that may provide information about climate changes and impacts? Describe the information they provide. • What indicators or metrics can be added to help detect climate changes or impacts relevant to the resource of concern? • What indicators or metrics can be added to help evaluate the effectiveness of management actions (e.g., adaptation strategies) on minimizing or avoiding climate impacts? 	<ul style="list-style-type: none"> • Habitat adaptation strategies report – <i>Coming soon!</i> • Examples of monitoring metrics in existing projects that can be used to detect climate change effects – <i>Coming soon!</i>

Examples

PURPOSE AND NEED

[Yakima River Basin Integrated Water Resource Management Plan \(Integrated Plan\)](#)

Need: The current water resources infrastructure, programs, and policies have not been capable of consistently meeting aquatic resource demands for fish and wildlife habitat, dry-year irrigation demands, and municipal water supply demands. Specific problems that the Integrated Plan is proposed to address include:

- Climate change projections indicate that there will be changes in runoff and streamflow patterns, which would increase the need for prorationing and reduce flows for fish. These changes include: decreased snowpack; decreased spring and summer runoff; increased crop and municipal water demand; increased frequency of drought conditions; and increased impacts to fish from decreased flows, increased air and water temperature, and changes in timing of streamflows affecting fish migration.

The identified problems have created a need to restore ecological functions and provide more reliable and sustainable water resources for the health of the riverine environment, and for agricultural, municipal, and domestic needs. The specific needs include:

- Climate change. Increased flexibility in the water supply to adapt to changes, including increased crop demand, increased municipal and domestic demand, earlier runoff, and more frequent droughts; and improved streamflows and habitat conditions to help resident and anadromous fish withstand climate change.

Purpose: Implement a comprehensive program of water resource and habitat improvements in response to existing and forecast needs and develop an adaptive approach for implementing these initiatives and for long-term management of basin water supplies that contributes to the vitality of the regional economy and sustains the health of the riverine environment.

[Idaho and Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment](#)

Need: This effort responds to the USFWS's 2010 Finding which identified the inadequacy of existing regulatory mechanisms (i.e., conservation measures embedded in Land Use Plans) as a significant threat to Greater Sage-Grouse (GRSG) habitat or range. Changes in management of GRSG habitats are necessary to avoid the continued decline of populations that are anticipated across the species' range. These plan amendments will focus on areas affected by threats to the GRSG habitat; major threats to GRSG include wildfire, expansion of invasive species, conifer invasion, infrastructure, grazing, human development and uses, and climate change, among others.

Purpose: The purpose of the Land Use Plan Amendment is to identify and incorporate appropriate conservation measures into Land Use Plans to conserve, enhance, and restore GRSG habitat by reducing, eliminating, or minimizing threats to that habitat.

ALTERNATIVES AND PREFERRED ALTERNATIVE/PROPOSED ACTION

[Yakima River Basin Integrated Water Resource Management Plan \(Integrated Plan\)](#)

Preferred Alternative: The Integrated Plan is also intended to provide the flexibility and adaptability to address potential climate changes and other factors that may affect the basin's water resources in the future.

[Biscayne Bay Coastal Wetlands Integrated Project Implementation Report and Environmental Impact Statement](#)

Preferred Alternative: Taking into account sea level rise, the period of maximal project benefits will occur during the period between 10 and 20 years post construction. After 20 years until the end of the project life 30 years later, project benefits are expected to decrease as a result of sea level rise. Within the 20-year planning horizon, less than 10% of the project ecosystem benefits are likely at risk to sea level rise.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

[Willapa Bay National Wildlife Refuge: Final Comprehensive Conservation Plan and Environmental Impact Statement](#)

Alternative 1: Under this alternative, current maintenance and management actions would continue as defined by the refuge purposes, and no significant changes to the hydrology are anticipated. If predicted trends and models on climate change continue, with sea level rise over time, dike maintenance would prove much more difficult, and extensive repairs may be required.

[Yakima River Basin Integrated Water Resource Management Plan \(Integrated Plan\)](#)

Fish

No Action Alternative: With the No Action Alternative, existing problems with water availability and habitat quality would likely worsen with current land use activities, increased population and climate change. Anadromous fish would continue to have no access to headwater streams because no fish passage facilities would be provided at major reservoirs. Streamflow conditions would continue to be unfavorable to enhancing fish populations.

Integrated Plan Alternative: All of these Integrated Plan elements will provide improved habitat conditions that will benefit fish and help meet fish production and survival targets. These improvements may help fish withstand the impacts of climate change.

Climate Change

No Action Alternative: Changes in precipitation, snowmelt, and runoff that may occur as a result of climate change could affect river operations as well as projects. There may be changes in water availability for irrigation, fish, and municipal uses. Without a comprehensive, integrated management program, projects would be completed in a piecemeal fashion, reducing the potential for coordination and increased efficiencies in implementation. An uncoordinated approach may reduce the potential to adapt water management strategies and adjust to changing climatic conditions. Depending on its severity, climate change could cause existing water supply shortages and adverse effects on streamflows and fish in the basin to become significantly worse. Because of predicted increased temperatures and decreased summer streamflow, adverse effects on water quality due to climate change are also likely.

Integrated Plan Alternative: As an integrated package, this alternative would provide multiple benefits to water supply, agriculture, and fish while improving the ability of water managers to adapt to future climate changes. Approaching management on a basin-wide level could provide additional consistency in water management across agencies and jurisdictions. Additional water storage and improved irrigation operations would provide a more reliable water supply for agriculture during dry periods. Improved streamflows and fish habitat, along with access to upper river tributaries, would produce enhanced fish populations that would be better able to withstand habitat changes caused by climate change. As climate change places new stresses on water resources and aquatic habitats in the future, the Yakima River basin's upper watersheds will become even more vital to ecosystem health and water supply. Reopening historic fish habitat through fish passage facilities will improve conditions for anadromous fish.

Socioeconomics

No Action Alternative: Current economic patterns and trends would likely continue into the foreseeable future. Climate change and population increases would impact the relation between natural resources and the economy in the basin.

Integrated Plan Alternative: Potential increase in the value of goods and services derived from the basin's water and related resources in the long term; reduction in uncertainty and risk.

[Draft Environmental Impact Statement for Greys Mountain Ecological Restoration Project](#)

No Action Alternative: There would be no direct effects to late seral, closed canopy coniferous habitat under this alternative. There is a potential for indirect effects under the no action alternative, as the continued immediate threat of wildfire would remain unabated. In failing to make an attempt at density management of the stands, the eventual changes through drought stress and subsequent insect and disease mortality acceleration would exacerbate the threat of stand replacing fire. Additionally, the high probability of a drying climate throughout the Western United States would have the potential to further compound these effects.

Alternative 2/Proposed Action: Channel stabilization and conifer removal would improve hydrologic function of the meadows and would have a beneficial effect on the watershed. Meadow condition would move towards upper moderate or high ecological condition where late successional species are well represented on the site, which is the desired condition. Restoration effects in the long term may improve resiliency of the meadow and riparian vegetation in relation to climate change.

Alternative 2/Proposed Action: Alternative 2 actions attempt to change forest structure so that the forest is capable of surviving climate changes as well as reduce fuels to adapt fire behavior that occurs under current climate and ignition conditions.

[Idaho and Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment](#)

Alternative B: Under Alternative B, restoration projects would be prioritized in seasonal GRSG habitats thought to be limiting the distribution and abundance of GRSG. Re-establishment of sagebrush cover and desirable understory plants would be the highest priority for restoration efforts. Native seed would be required for restoration treatments and the establishment of designated seed harvest areas for sagebrush seed collection in fire prone areas. Climate change would be a consideration when proposing native seed collection. Management under Alternative B would ensure

the long-term availability and resiliency of native seed for restoration treatments by establishing native seed harvest areas which incorporate climate change effects. This and post-treatment management plans would improve the success of restoration treatments and the future persistence of GRSG and their habitat. Vegetation treatment rates would be greater than under Alternative A and would further reduce the impacts of invasive grasses, affecting the population areas where invasive grasses are a substantial threat. Treatment rates would further reduce the impacts of conifer encroachment on the population areas where conifer is a substantial threat. Trends for habitat at 10 and 50 years would improve compared with Alternative A.

Alternative D: When reseeding following fire, using species varieties that are adapted to a warmer climate may, in combination with potential climate change, reduce potential for unnatural levels of fire frequency and intensity.

[Ross Lake National Recreation Area General Management Plan/Environmental Impact Statement](#)

No Action Alternative: In response to severe weather events and the destruction of facilities, clear and repair damage to campground entrance road in the event that the campground is impacted by flooding, debris flow, and/or erosion, as necessary.

Alternative B: In response to severe weather events and the destruction of facilities, take proactive management actions to prevent campground from being impacted by flooding, debris flow, and erosion. Close affected portions of the campground, as necessary, in the event that the campground is impacted by these events.

DESIRED CONDITIONS, GOALS AND OBJECTIVES, STRATEGIES AND GUIDELINES

[Idaho and Southwestern Montana Greater Sage-Grouse Approved Resource Management Plan Amendment](#)

Objective (Vegetation) 1: Reconnect and expand areas of higher native plant community integrity/rangeland health to increase the extent of high quality habitat and, where possible, to accommodate the future effects of climate change.

[Proposed Action for Forest Plan Revision: Nez Perce-Clearwater National Forests](#)

Desired Condition: Vegetation management supports native forest composition and structural diversity as described across biophysical settings in the face of changing climate conditions.

Desired Condition: Conserving Population Stronghold Watersheds and establishing additional Population Stronghold Watersheds provide resilience to watershed scale disturbances and anticipated changes associated with climate change (e.g., earlier runoff and reduced summer streamflows).

[Proposed Action in Support of the NOC Items and NOI for Forest Plan Revision for the Inyo, Sequoia, and Sierra National Forests](#)

Desired Condition: Vegetation conditions, particularly structure and composition, are resilient to climate change, the frequency, extent and severity of ecological processes such as fire in fire-adapted systems, drought, and flooding in riparian systems. Functioning ecosystems retain their components, processes and functions. Native insect and disease populations are generally at endemic levels with occasional outbreaks. Vegetation structural diversity usually restricts the scale of insect and disease

outbreaks to local levels.

Desired Condition: Sagebrush ecosystems are resilient to fire, disturbances (e.g., grazing, recreation), invasive species (including cheatgrass) and climate change.

Desired Condition: Adequate quantity and timing of water flows support ecological functions, including aquatic species and riparian vegetation consistent with existing water rights and claims. Affects to quantity and timing from climate change, such as changes in runoff timing and patterns, should be taken into account.

Desired Condition: Wetlands and groundwater-dependent ecosystems, including springs, seeps, fens, wet meadows, and associated wetlands or riparian systems support stable herbaceous and woody vegetative communities that are resilient to drought, climate change and other stressors.

Strategy: Promote heterogeneity in plantations and young stands by encouraging more diversity in species composition and tree ages and increasing heterogeneity using initial planting and plantation management techniques. Consider climate change when determining appropriate species and seed sources for planting. Manage plantations to contribute to mature and old forests over time.

Strategy: Identify whitebark pine stands of conservation and restoration priority. Identify climate refugia for whitebark pine that may serve as areas for restoration and conservation.

Strategy: Educate the local community about principles and methods for sustaining forests in a changing climate.

Guideline: If available and needed to support restoration activities, projects should use native species seed appropriate for the ecological unit to restore the desired native species composition of the area. Consider the effects of climate change in selecting appropriate seed.