APPENDIX VI

A Brief Look at Global Warming

In addition to the six Key Conservation Issues, the Stakeholder Advisory Committee for Oregon's Conservation Strategy identified global warming as an important issue that could impact fish and wildlife populations in the future. Oregon Department of Fish and Wildlife considered global warming to be beyond the scope of this Conservation Strategy. This issue is currently being addressed at a larger scale through the West Coast Governors' Global Warming Initiative and through other planning efforts. Here, we present a brief overview of the issue and acknowledge its potential impacts on Strategy Species and Habitats. Monitoring Strategy species and habitats will provide invaluable information about any potential effects of global warming in Oregon.

Efforts to address global warming at the national and state-wide levels

Climate greatly influences the distribution and abundance of species worldwide. There is growing consensus in the scientific community that the Earth's climate is changing, and that increasing greenhouse gas emissions appear to be contributing to the current warming trend. Recently the Intergovernmental Panel on Climate Change, an international workgroup of several thousand scientists, reviewed scientific evidence and concluded that global warming and greenhouse gas emissions represent a serious threat to human civilization and to species and habitats. The group also addressed broad-scale recommendations for managing and mitigating for global warming and other changes. To address global warming, political decision-makers must make management decisions while recognizing that these large-scale climatic processes cross political boundaries. Currently in the United States, many corporations and other entities have recognized the need to plan for the potential impacts of global warming, and their potential implications for the economy.

However, the impacts of these changes on Oregon's ecosystems are not clear. Global warming could potentially affect overall water availability by watershed; change the distribution and composition of habitat types; alter disease outbreak dynamics; and increase the intensity or frequency of wildfires, floods, droughts or other events. Evaluating these impacts requires an understanding of background levels of variability in climate data, and results vary depending on the scale considered (local, regional, global). Landscapes are already impacted by a variety of human activities, invasive species, and other disturbances. Global warming has the potential to interact with these processes in complex ways. For example, changes in landscapes that result from the changing climate could facilitate the spread of invasive species and could also affect native species at the margins of their range.


Benefits of addressing global warming in Oregon

Addressing global warming in Oregon can bring Oregonians many benefits, such as greater energy efficiency, stability of energy prices, and cleaner air and water. Farmers could benefit from cooler winters resulting in more consistent and reliable fruit crops, and cooler summer temperatures resulting in lower pest pressure and pesticide use.

Research needs include an imperative to understand links between climate and hydrology, to understand climate impacts on both unmanaged and managed habitats, and to understand the effects of increased atmospheric carbon dioxide on vegetation and runoff. There is an overall need for incentives to conserve and reallocate supplies as conditions change. Investing in these innovative technological ideas and market strategies will be vital to offset warming trends over the next decades, and bring broad economic and social benefits.
The ultimate results and impacts of global warming in Oregon are unknown. However, these impacts could significantly influence the measurement of objectives and targets identified for Strategy Species and Habitats, and the outcomes of conservation actions recommended in the Conservation Strategy. Therefore, efforts to continue evaluating and addressing the impacts of global warming are important aspects of a comprehensive conservation program.

**Potential effects of Global Warming on Strategy Species and Habitats**

In general, effects of climate warming on species are consistently predicted to have the greatest impact 1) alpine species, 2) coastal species, and 3) species at the southern end of their geographic range. Coastal dynamics are complex and influenced by marine processes. Alpine communities could be affected by changes in the timing of precipitation caused by global warming.

Species distribution could be an indicator for changes induced by global warming. For example, in California, range reductions in Edith’s checkerspot butterflies have been linked to global climate change. Distribution is often the basis for monitoring the overall condition of a species, for determining restoration targets, and for understanding its habitat requirements. Therefore, evaluating potential disturbances that alter species’ range and distribution is an important component in any conservation program.

Changes in habitats linked to global change are complex. In northern climates, boreal forest habitats could expand in distribution and productivity, with potential positive effects on industrial wood supply. However, global warming could also make forests vulnerable to disease, insect outbreaks, or competition by invasive species. Therefore, considering the local and regional dynamics is critical in evaluating and managing for global warming.

Changes in habitat that could result from anticipated global warming in Oregon include increased coastal and river flooding, snow pack declines, and lower summer river flows. Many of these changes are associated with lowered farm and forest productivity and with increased costs of energy. In Oregon, global warming can affect water resources, altering the timing and regional patterns of precipitation, increasing runoff, flood frequencies and drought frequency and severity and reducing stream flow. These changes differ by regional characteristics, historical climate and hydrology. For example, where most precipitation and stream flow is in the form of snowfall, such as alpine habitats, there could be a greater likelihood of flooding early in the year, and reduced availability of water during peak periods of demand (irrigation, etc).

Understanding historical range of variability and how to apply this understanding to natural resource management is important to manage for the impacts of global change on habitats. Restoration often assumes that desired conditions are well defined (e.g., “restore natural fire regimes; improve the health of fish and wildlife populations; rebuild forest structure”). However, this is not always the case: understanding and considering the range of variability is an essential first step in setting goals for management of impacts across the landscape.

Climatic change has a profound influence on habitat condition over time, and can influence the impacts of other factors on habitats. Therefore, efforts to evaluate and understand the impacts of global warming on habitats are an essential component to managing and monitoring the Strategy Habitats identified in this effort.

**Understanding global warming in Oregon: an opportunity for Conservation Strategy monitoring**

In support of Oregon’s Conservation Strategy, monitoring will take place to evaluate changes in species distribution, changes in vegetation and other measures of Strategy Species and Habitats. ODFW recognizes that global warming could impact Strategy Habitats, and could alter Strategy Species’ range and distribution. Information gathered in support of Conservation Strategy monitoring could contribute to understanding the potential impacts of global warming on species and habitats.
Appendix I: Statewide summary of Strategy Species