THE INTERIOR COLUMBIA BASIN STRATEGY

(Developed 2003, Revised April 2014)

A Strategy for Applying the Knowledge Gained by the Interior Columbia Basin Ecosystem Management Project to the Revision of Land Use Plans and Project Implementation

I. Introduction

The Interior Columbia Basin Ecosystem Management Project (ICBEMP) was initiated from Presidential direction to develop a scientifically sound, ecosystem-based strategy for management of 64 million acres of lands administered by the Forest Service (FS) and the Bureau of Land Management (BLM) within the Interior Columbia Basin, and portions of the Klamath and Great basins in Oregon. The Project was based on concerns over forest and rangeland health, uncharacteristically intense wildland fires, threats to certain fish and wildlife species, and concerns about local community social and economic well-being. At the time, there was little broad-scale scientific knowledge of the ecological, biophysical, social, and economic conditions, trends, risks, and opportunities within the planning area.

The Eastside Ecosystem Management Project Charter was the catalyst for the Interior Columbia Basin Ecosystem Management Project (Project) in January 1994. The Charter, signed by the Chief of the Forest Service and the Director of the Bureau of Land Management, directed the agencies to develop and adopt a scientifically sound, ecosystem-based strategy for managing all FS and BLM administered lands within the Interior Columbia Basin. A scientific assessment of the Basin was undertaken to provide a better understanding of the scope and possible broad-scale causes of current resource conditions. These scientific findings formed the basis for an array of management strategies evaluated by the Project.

A Final Environmental Impact Statement (FEIS) and Proposed Decision were published in December 2000. The State Directors and Regional Foresters elected not to prepare a Record of Decision and instead chose to complete the Project through use of this "The Interior Columbia Basin Strategy", herein referred to as "Strategy". The Strategy provides principles that incorporate the science data and resource information developed by the Project, as well as more recent science, into land use plans (FS land and resource management plans and BLM resource management plans) and project implementation. The Strategy identifies key principles that are relevant to future planning efforts.

The Strategy will be used to inform the amendment and revision of land use plans, as applicable, for FS and BLM within the Interior Columbia Basin (east of the Cascade crest and outside the Northwest Forest Plan Area) and portions of the Klamath and Great basins in Oregon. Applicable administrative units include:

> Forest Service: Boise, Payette, Salmon- Challis, Sawtooth, and portions of the Caribou-Targhee, Humboldt-Toiyabe, and Bridger- Teton National Forests in Region 4; the Idaho Panhandle, Nez Perce-Clearwater, Kootenai, Lolo, Flathead, Helena, Deerlodge, and Bitterroot National Forests in Region 1; the Ochoco, Malheur, Umatilla, Wallowa Whitman, Colville and portions of the Fremont-Winema, Deschutes, and, Okanogan-Wenatchee, National Forests in Region 6.
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> Bureau of Land Management: Boise, Coeur d'Alene, Idaho Falls, and Twin Falls Districts in Idaho; Missoula Field Office in Montana; and the Prineville, Lakeview, Burns, Vale, and Spokane Districts in Oregon and Washington.

The Strategy includes a framework (Framework) for developing and incorporating the Columbia Basin science into the aquatic and riparian habitat components of land use plans. The Framework (Appendix 1) does not change the Strategy but clarifies, interprets, and in some instances, enhances the principles found in this Strategy. It facilitates consistency among plans by promoting inclusion of several fundamental elements of riparian and aquatic conservation. The Framework describes the importance of and underlying expectations for those conservation elements, but allows flexibility in how they are addressed within individual plans.

II. Vision

The land management and regulatory agency Regional Executives within the Interior Columbia Basin are committed to the planning principles presented in this Strategy. The agencies agree that concepts presented here are relevant to land use planning (revisions and amendments), while recognizing that variation exists among agency missions and that not all of these principles fall within the responsibilities and line authorities of individual agencies. This Strategy does not constitute standards and guidelines or agency direction, nor does it establish new land management planning requirements.

The vision of the Strategy includes: 1) An assurance that agency personnel will work with the public, relevant regulatory agencies, tribal governments, State and local governments, and the science community to conserve rare ecosystems, restore degraded ecosystems, and provide benefits to people within the capabilities of the land; 2) A commitment that the science used for the management of FS and BLM administered lands will be periodically updated and refined based on new information and consideration of the best available science that is relevant to the Interior Columbia Basin and its resources; and 3) A recognition that management of FS and BLM administered lands within the Interior Columbia Basin will contribute to:

- Sustaining and restoring the health of forest, rangeland, aquatic, and riparian ecosystems Predictable and sustainable flows of socio-economic benefits within the capacity of these ecosystems.
- Diverse recreational and educational opportunities within the capability of the ecosystems.
- Recovery and delisting of species listed under the Endangered Species Act (ESA), and of 303(d) listed impaired waters.
- Preventing future species listing under the ESA.
- Managing natural resources consistent with treaty and trust responsibilities to Tribal governments.

III. Science Foundation

The planning principles and guidance presented in this Strategy are based on the *Integrated Scientific Assessment for Ecosystem Management (PNW-GTR-382, September 1996)*; *An Assessment of Ecosystem Components in the Interior Columbia Basin and Portions of the Klamath and Great Basins (Volumes I through IV - PNW GTR-405, 1997)*; the analyses supporting or developed as part of the ICBEMP; and current best available science. It is the expectation of the Regional Executives within the Interior Columbia Basin that the findings of the ICBEMP science, new information, and the consideration of the best available science from a variety of sources (e.g., federal agencies, universities) developed during the life of this Strategy will be used in the development, amendment, and revision of land and resource management plans, and in the design and implementation of resource management projects.

The ICBEMP science characterizes the Basin as a region of tremendous ecological and socioeconomic diversity. While substantial variability exists in resource conditions and capabilities, resource elements are, in many cases, strongly interconnected. The *Highlighted Scientific Findings (PNW-GTR-404, 1997)* summarizes three themes that are integral to land use plans:

1. Risks to ecological integrity and economic well-being shall be recognized and managed.
2. Risks and opportunities differ significantly across the Interior Columbia Basin. Land use plans shall recognize this variation.
3. Individual sites are linked to landscapes and landscapes are linked to ecological processes and human activities. These links must be understood and considered.

IV. Planning Principles

This Strategy identifies planning principles that may be used to frame land and resource management plan revisions or amendments. The planning principles were developed collaboratively and identify key principles and concepts supported by Federal land managers and regulatory executives within the Interior Columbia Basin. The agencies also collaborated on more specific guidance for riparian and aquatic conservation. That guidance is provided in the attached Aquatic and Riparian Framework (Appendix 1).

Current land use plan direction includes interim PACFISH & INFISH direction with applicable consultation and biological opinions, as well as Eastside Screens for Oregon and Washington National Forests. Until land use plans are amended or revised, management will continue under current plans, which includes this direction. Upon completion of amendment and revision efforts, land use plans will replace interim PACFISH & INFISH direction and Eastside Screens, as appropriate.

The planning principles outlined in this Strategy are organized below into six topical areas: landscape dynamics, terrestrial species and habitat management; aquatic/riparian species and habitat management; social-economics, tribal relations, and other elements.

A. Landscape Dynamics

Landscape dynamics are driven by disturbances, ecosystem processes, and environmental constraints. Each of these agents can be considered across a spectrum of spatial and temporal scales. For example, disturbances vary in spatial extent, frequency, and intensity. Disturbances range from the localized effect of a downed tree to large-scale effects of wildfires, epidemic disease, or drought. Human activities create additional disturbances through forest and rangeland management, urban development, agriculture, and transportation corridors. Healthy landscapes are resilient and resistant to local disturbances and catastrophic events. Ecosystem processes also vary in scale, from nutrient flow off a salmon carcass to changes to biological diversity after a biological invasion. Environmental constraints include soil conditions, elevation, or global climate regimes.

Planning Principles:

- Recognize the dynamic nature of ecosystems, and address natural and human disturbances and ecosystem processes across a range of ecosystem types (i.e., terrestrial and aquatic/riparian habitats)
- Integrate restoration of terrestrial and aquatic ecosystems with other management actions (e.g., roads, recreation, and timber harvest).
- Address succession and disturbance regimes (such as fire, insects or floods) and ecosystem processes (such as the flows and cycles of nutrients, fuels, water, and biological diversity), and their interactions. Recognize the spatial and habitat connectivity within and between watersheds. Floodplains, wetlands, upslope areas, headwater tributaries, and intact habitat refugia provide lateral, longitudinal, and drainage network connections. These network connections can contribute to high water quality, natural flow regimes, and riparian/aquatic and terrestrial habitat needs.
- Recognize the ecological role of fire on the landscape especially in light of a changing climate.
- Address road-related impacts to water quality, fisheries, and wildlife, while still providing the road network needed for public, tribal, and land management access.
- Provide for hydrologic processes (e.g., maintained water table, accessible flood plain, sediment transport) essential to creating and sustaining functioning riparian, aquatic and wetland habitats. These habitats should be maintained or restored through management actions that take into account existing, chronic disturbances in the watershed.
- Integrate invasive species management strategies that prevent, reduce, or eradicate invasive species.

B. Terrestrial Species and Habitat Management

The ICBEMP science defined 'terrestrial source habitats' as those plant communities that contribute to stable or positive population growth for wildlife species in a specified area and time (Wisdom et al. 2000). The Science found that some source habitats, including old forests, early successional forests, and sagebrush steppe, have declined substantially in geographic extent from historical to current periods, and thus are of concern at the Basin scale. Important source habitats are included with the terrestrial habitats discussed below.

Forested Ecosystems

Late-successional and old growth forest habitats

Late-successional forests are those forest seral stages that include mature and old-growth age classes. Wisdom et al.

(2000) identified old forests as an important source habitat for wildlife, and found that these forests have undergone strong, widespread decline, especially at low to mid elevations. Definitions of late-successional forest differ depending on forest type and geographic area. Federal lands contain the vast majority of late-successional forest remaining across the Interior Columbia Basin. Management of habitat related to late- successional and old-growth forest is one of the primary goals of forest management on Federal lands in this area.

Planning Principles:

- Restore, maintain, and enhance appropriate levels of late-successional and old-growth forests to conserve the species dependent on them. These forest ecosystems should be well-distributed, functional, and interconnected.
- Consider natural range of variation and climate change when developing strategies to sustain late-successional habitats to improve their resilience to disturbance.

Mid- or Early Successional Forest Habitats

Mid- and early-successional forest habitats are a complex and diverse mosaic with a geographic extent that, overall, has changed little since the historical period. Depending on elevation, declines in these stages are offset by increases elsewhere in the Basin. However, the extent of shade intolerant forest species (such as western white pine, ponderosa pine, western larch, whitebark pine and aspen) has decreased with associated decline in forest ecosystem processes and functions.

Early- and mid-seral montane forests are influenced by cycles of wildland fire disturbance that move mid-seral forest to early-seral and early-seral forest to mid-seral. Disruption of natural fire regimes impacts forest health by altering forest structure and encouraging catastrophic events such as destructive fires and disease outbreaks. Many of the practices designed to restore old-forest habitats also can restore early-seral habitats. For example, long-term restoration of more natural fire regimes will hasten development of both early and late-seral structural conditions, and minimize area of mid-seral habitats, which few if any species depend on as source habitat.

Planning Principles:

- Promote healthy, sustainable forest ecosystems by protecting soil and water resources, maintaining ecological processes, providing for ecological diversity, accelerating restoration and improvement of public lands.
- Set restoration goals, and identify restoration priorities using a combination of ecological need, efficacy of treatments, and public support.
- Recognize that current landscape conditions generated by human-made disturbances (logging, livestock grazing, agriculture, urban development) may necessitate treatments that result in short-term habitat loss in order to develop sustainable long-term landscapes.
- Use risk management strategies to address uncertainty, in particular uncertainty of future climatic conditions.

Rangelands

Rangelands include natural grasslands, savannas, shrublands, some deserts, tundra, and wetlands. Many grass, forbs and shrub communities in the Basin, particularly within the sagebrush and shrub steppe cover types, have been altered over time. In general, quality of herbland, shrubland, and woodland source habitats (Wisdom et al. 2000) declined from historical to current periods because of conversion to agriculture, successional transitions caused by fire exclusion, and excessive livestock grazing.

Planning Principles:

- Restore, maintain, or enhance the long-term health and productivity of rangelands by balancing and sustaining soil integrity, natural vegetation, and water, as well as rangeland ecological processes.
- Recognize that current conditions generated by human-made disturbances (livestock grazing, agriculture, urban development) may necessitate treatments that result in short-term habitat loss in order to work toward sustainable healthy ecosystems.

Special Status Species

The term "special-status species" includes federally listed species, species proposed for listing, Candidates, BLM Sensitive Species, and FS Sensitive/Species of Conservation Concern. The planning process should address the persistence of these species within the Interior Columbia Basin, the ecological conditions needed to support them, and key risk factors that threaten their persistence.

Planning Principles:

- Emphasize maintenance or restoration of ecological processes and disturbance regimes upon which special status species depend. Manage species habitats to promote their conservation and to avoid additional ESA listings. .
- Contribute to recovery of federally listed species, and conserve proposed and candidate species.
- Emphasize habitat conservation measures that avoid new species listings and that contribute to recovery of listed species.
- Design plans, programs, and projects, at the appropriate spatial scale, that are consistent with objectives for managing special status species and their habitats.
- Include provisions to maintain and restore functional critical habitat for ESA listed species and address habitat conditions in accordance with recovery plans.

C. Aquatic/Riparian Species and Habitat Management

Maintaining and restoring the health of riparian and aquatic resources on FS and BLM administered lands are necessary to sustain aquatic and terrestrial species and provide water of sufficient quality and quantity to support beneficial uses. Federal lands in the Interior Columbia Basin frequently contain headwater areas crucial to the ecological processes that maintain aquatic habitat and water quality downstream, including municipal water for local communities. The PACFISH and INFISH (1995) amendments to FS and BLM land use plans, and the resulting Biological Opinions, provided a common framework for managing streams, riparian areas, and watersheds on Federal lands. These amendments and biological opinions were intended to prevent watershed and stream degradation, maintain healthy watersheds and streams, and to restore degraded ones. Since implementation of PACFISH/INFISH, monitoring has shown steady improvement in watershed conditions on the broad scale (Roper et al 2014). Retaining these common goals of aquatic and riparian management is essential for continuing progress toward healthy watersheds.

As new plans are developed that are not all subject to a single set of direction such as PACFISH and INFISH, the need remains for plans and projects developed under plans to continue promoting and achieving conservation of riparian and aquatic resources. Plans developed under this Strategy should have certain characteristics and considerations for riparian areas and streams. Several fundamental elements are listed and described briefly below, and developed in more detail in the Framework (Appendix 1).

Riparian management areas

Riparian management areas are designated based on the best available science and appropriate ecological and geomorphic criteria.

Planning Principles:

- Provide for physical integrity of aquatic ecosystems.
- Provide an amount and distribution of wood sufficient to sustain physical and biological complexity.
- Provide adequate summer and winter thermal regulation.
- Provide appropriate amounts and distributions of source habitats for riparian- or wetland-dependent species.
- Restore or maintain water quality and hydrologic processes.
- Restore or maintain naturally functioning riparian vegetation communities.
- Protect the structure and function of features outside riparian areas that are important to the integrity of riparian areas and water bodies, such as landslide-prone areas.
- Provide for management of riparian areas for protection and restoration of aquatic/riparian habitats, water quality, and drinking water.
- Provide for treatments that meet aquatic/riparian objectives and balance short-term ecological impacts (e.g.

temporary reduction in shade on streams) against long-term gains (e.g. increased resiliency to disease within riparian stands) for the enhancement of aquatic and riparian resources while providing economic and social benefits.

Protection of population strongholds for listed, proposed, or special status species

Planning Principles:

- Identify sub-watersheds that are population strongholds for listed, proposed, or special status species
- Recognize that conservation and restoration of small watersheds will ensure short-term persistence of important aquatic populations, while conservation and restoration of habitat networks throughout large basins will provide for long-term stability, productivity, and biological diversity.
- Identify watersheds which provide refugia for listed fishes and other aquatic/riparian-dependent special status species.

Aquatic multi-scale analysis

Planning Principles:

- Incorporate results of landscape analysis(es) from multiple scales, recovery plans for listed aquatic/riparian-dependent species, and recovery plans for water quality impaired 303(d) listed water bodies.

Aquatic restoration priorities

Planning Principles:

- Provide management of FS and BLM lands that enhances networks of properly functioning watersheds supporting aquatic/riparian-dependent species at the landscape scale.
- Maintain and restore healthy watersheds and aquatic/riparian ecosystems within the context of broad ownership patterns and in collaboration with partners.
- Manage for elimination, reduction, and mitigation of adverse effects from roads on aquatic/riparian resources, and address closure and rehabilitation of unneeded roads.
- Maintain and restore stream access for all life stages of aquatic species except when preventing or reducing movement of nonnative or invasive species.

Aquatic monitoring and adaptive management

Planning Principles:

- Include aquatic and riparian monitoring components at both site-specific and broad scales.
- Provide a feedback loop so that management direction may be evaluated and modified based on monitoring results and other new information.

D. Social-Economics

The Interior Columbia Basin is endowed with vast natural resources. Federal lands are a large proportion of the natural resource base and contribute to socioeconomic well-being by providing forest and rangeland resources that support consumptive, non-consumptive, commercial, and noncommercial uses, as well as an array of employment opportunities.

For more than 60 years, Federal lands in the Interior Columbia Basin have been an important source of raw materials for the timber industry. A vital forest products industry is essential to forest restoration, which often depends on Federal agencies' ability to modify and remove excess forest fuels. Timber production also contributes receipts to the Federal treasury, counties, and rural schools and roads. In addition, Federal rangelands in the Basin have been an integral part of livestock grazing operations for over 130 years. Livestock grazing on Federal lands helps sustain the western livestock industry and the communities that depend upon productive, healthy rangelands.

Planning Principles:

- Plans to contribute to socioeconomic systems that produce steady supplies of goods and services at a predictable rate while not impeding benefits for future generations.
- Consider trends in socioeconomic resiliency in identifying strategies and in developing desired conditions for land use plans.
- Engage in early collaboration with land users, neighbors, governments, tribes, and the public with mutual recognition of legislative mandates, obligations, and responsibilities.
- Engage representatives of other Federal, state, tribal and local agencies, as well as the public throughout the planning process.
- Consider the estimated value, either qualitative or quantitative, for both the market and nonmarket components of ecosystem services.
- Consider the current and potential growth of the wildland urban interface (WUI) and potential avenues to address the impact of increasing human population.
- Promote healthy sustainable rangeland ecosystems, to enable restoration and improvement of public rangelands to properly functioning conditions that provide for sustainability of communities that are dependent upon productive, healthy public rangelands.
- Recognize the importance of providing ecosystem services including but not limited to clean water, clean air, fish and wildlife habitat, outdoor recreation, and carbon sequestration as well as timber, non- timber and rangeland products.

E. Tribal Relations

The intent of the Basin's strategy for federal trust responsibility and tribal rights and interests is to address as fully as possible, tribal concerns and interests and to reflect consideration of federal responsibilities both to tribes and Native American Indian people as expressed through treaty language, federal laws, executive orders, and federal court judgments.

Planning Principles:

- Consult with tribal governments regularly and make adjustments where necessary to honor tribal rights and interests.
- Cooperate with affected federally recognized tribes to identify restoration opportunities and possible cooperative restoration approaches or actions.
- Cooperate with tribal efforts regarding research and restoration of treaty/trust resources.

F. Other Elements

Multi-scale Analysis

Information developed through analysis at multiple scales provides additional context that is beneficial in understanding how land use plans and projects can be developed that meet multiple management objectives, including reducing risks to sensitive or unique resources.

Planning Principles:

- Consult and integrate information from existing broad and mid-scale assessments and multi-scale analyses.
- Consider using multi- scale analysis, based on local data, in the amendment or revision process.
- Include in the analysis the rationale and scientific context for how multi-scale analysis may benefit future project-level decisions.

Consideration of Climate Change

Biodiversity of our Nation's forests, grasslands, and shrublands is an essential part of America's national heritage. These ecosystems supply the water Americans use for drinking, agriculture, and industry. Federal lands furnish fiber for paper,

lumber, and other wood products, as well as clean air, livestock feed, renewable energy, and recreation opportunities. It is in our national interest to protect and enrich the biodiversity of our ecosystems. Climate change affects all Federal and private lands across the Interior Columbia Basin. Plan revisions and amendments will give the BLM and FS an opportunity to establish goals and objectives that maximize the resiliency of our landscapes to changing climates, setting the stage for healthy ecosystems into the future.

Planning Principles:

- Include plan components that provide for adaptation to reduce the impacts of climate change on ecological, economic, and social systems.
- Consider the potential impacts of land management actions relative to their greenhouse gas emissions and carbon storage.
- Use scientific information, tools, and technology to understand predicted shifts in weather patterns and the impacts these would have on ecosystems. Use scientific information to identify adaptation and mitigation options.

Adaptive Management

Adaptive management is the process of regularly adjusting land and resource management practices in response to new information, knowledge, or technologies. Adaptive management recognizes that unknowns and uncertainties exist in the course of achieving management objectives identified in land use plans. Adaptive management takes an experimental approach to a complex task, makes clear assumptions, and periodically evaluates them in light of new information. It works best when performance, data collection, and evaluation methods are designed to provide the information managers need to make sound decisions.

Planning Principles:

- Encourage active learning and adaptation during implementation, including transfer of new knowledge to other projects in different locations and at different scales.
- Encourage development and testing of new management approaches that integrate and achieve ecological, economic, and social objectives.

Monitoring, Evaluation and Reporting

Monitoring is a critical component of adaptive management, and. is necessary to ensure that management actions are consistent with management direction and that they comply with applicable laws and policies. Monitoring determines, if desired results are achieved, and if underlying assumptions are valid. Monitoring plans must be realistic in terms of anticipated budget levels and availability of staff. At regional scales the focus of monitoring is effectiveness, whereas focus at the unit level is implementation, or how well plan objectives and goals are being met.

Planning Principles:

- Periodically report to the public results of implementation monitoring. Include not only data collection, but also its evaluation and application toward adjusting plan components.
- Land use plan monitoring should contribute to regional-scale monitoring.
- Land use plan monitoring should comply with existing biological opinions for ESA-listed species.
- Evaluate land use plan monitoring periodically to determine if questions and protocols are still relevant and if changes are needed.
- Emphasize interagency collaborations to improve consistency, enable sharing of methods, and reduce redundancy and cost when developing land use plan monitoring.
- Continue evaluating new science and technology to update monitoring strategies to improve quality and efficiency.

Conclusion

The Strategy provides principles that incorporate the science data and resource information developed by the Project, as well as more recent science, into land use plans and project implementation. The Strategy includes a framework

(Framework) for developing and incorporating the Columbia Basin science into the aquatic and riparian habitat components of land use plans. The Framework (Appendix 1) does not change the Strategy but clarifies, interprets, and in some instances, enhances the principles found in this Strategy. It facilitates consistency among plans by promoting inclusion of several fundamental elements of riparian and aquatic conservation. The Framework describes the importance of and underlying expectations for those conservation elements, but allows flexibility in how they are addressed within individual plans.

The Strategy and Aquatic and Riparian Framework (Appendix 1) have been updated to reflect new science and information and should be used to amend and revise land use plans, as applicable, for FS and BLM within the Columbia Basin. It is the expectation of the Regional Executives within the Interior Columbia Basin that the findings of the ICBEMP science, new information, and the consideration of the best available science from a variety of sources (e.g., federal agencies, universities) developed during the life of this Strategy will be used in the development, amendment, and revision of land and resource management plans, and in the design and implementation of resource management projects. This guidance replaces prior versions of the Columbia Basin Strategy (2003) and the Aquatic and Riparian Aquatic Habitat Framework (2008).

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Appendix 1

A Framework for Incorporating The Aquatic and Riparian Habitat Component of the Interior Columbia Basin Strategy into BLM and Forest Service Plan Revisions

INTRODUCTION

The purpose of this appendix is to provide a framework for use in developing the aquatic and riparian resource components for land management plan revisions. It is intended to provide a consistent foundation for implementation of the Aquatic and Riparian Habitat component of the 2013 Interior Columbia Basin Strategy[1] (Strategy) in BLM and Forest Service plan revision efforts. The Strategy recognizes that land and resource management plans provide the programmatic direction that governs management of Federal lands. This framework does not constitute a change in the Strategy but clarifies, interprets, and in some instances supplements the principles and guidance found in the Strategy. PACFISH and INFISH have provided a unified approach to aquatic and riparian conservation on National Forests and BLM Resource Areas in the Interior Columbia River Basin. Those interim strategies have already been replaced or adopted and augmented for the longer term in some plan revisions. The Strategy and this framework are intended to maintain consistency among revised plans by including fundamental considerations for aquatic and riparian conservation in the plan revision process and fundamental components of aquatic and riparian conservation in the plans.

While this framework facilitates consistency among plans in terms of the structure of the riparian and aquatic components, it also provides for a high level of discretion to agency decision makers in the substance of individual plan revisions. Responsibility for adopting management direction, including setting restoration priorities, rests with the agency official responsible for approving the management plan.

Specific guidance for aquatic and riparian conservation provided in this framework should be integrated with other management direction. Conservation of fish, wildlife, plants, and habitats at risk should be considered together with the full array of broad-scale ecosystem components addressed by the Strategy (i.e., landscape dynamics, terrestrial source habitats, aquatic species, riparian and hydrologic processes, social-economics, and Tribal governments).

Discussed below are seven components addressing aquatic and riparian management that should be incorporated into revised plans. The framework should be read in concert with the Aquatic and Riparian Habitat portion of the Strategy (pages 5-6). Five of these components are specifically addressed in the Strategy. The components titled “Management Direction” was not specified in the Strategy but was included in the 2008 version of the Framework; “Consideration of Climate Change” is an addition to the 2008 version of the Framework. For each component, a number of management considerations, and in some cases definitions and examples, are provided or identified.

Key references are included at the end of the document and are grouped by each of the seven aquatic and riparian conservation strategy components described below. Those references are provided as a tool to help ensure that local aquatic strategies are based on the best available science. Many of the details associated with the components are discussed therein. The list of references is not comprehensive.

The seven components of this Framework are as follows:

- Designation and Conservation of Riparian Areas to Maintain and Improve Riparian Function. These may be Riparian Conservation Areas (RCA), Riparian Management Areas (RMA) or other land use allocations that provide

[1] The Strategy applies specifically to USFS and BLM lands in the Columbia River Basin east of the Cascade crest, and also applies to USFS and BLM lands in Oregon that are part of either the Klamath River Basin or Great Basin.

direction regarding aquatic and riparian conservation (this document uses RCAs or RMAs to connote any such areas)
- Designation and Protection of Population Strongholds for Listed or Proposed Species and Narrow Endemics
- Multiscale Analysis
- Restoration Priorities and Guidance
- Management Direction (e.g., desired conditions, objectives, management actions; terminology differs between Forest Service and BLM planning direction)
- Monitoring and Adaptive Management
- Consideration of Climate Change

Framework components need not be addressed or displayed in plans exactly as written here. Because of differences between BLM and Forest Service planning processes, actual plans may name or display the components differently.

The intent is that all the components be incorporated into each plan, with the decision maker retaining discretion over how they are addressed. This provides for a level of consistency essential for effective conservation of aquatic resources that span multiple land management units. The components are intentionally general to preserve the discretion of local managers to fill in the details of their aquatic and riparian management direction. NOAA Fisheries, U.S. Fish and Wildlife Service, and EPA should be involved early in the process of developing aquatic and riparian habitat management direction.

Relationship to existing Aquatic Strategies (e.g., PACFISH & INFISH)

Both PACFISH and INFISH were designed as interim strategies for conserving special status fish species (salmon, steelhead, bull trout) until FS and BLM land use plans were revised with an appropriate aquatic conservation strategy. As stated in the Strategy "*the Strategy will be used to guide the amendment and revision of land and resource management plans for the administrative units of the Forest Service and BLM within the {interior} Columbia Basin…The Strategy provides principles that incorporate the science data and resource information developed by the Project {Interior Columbia Basin Ecosystem Management Project} as well as more recent science into land and resource management plans and project implementation.*" When plans are revised to incorporate a different aquatic conservation strategy than PACFISH/INFISH, at that point the biological opinions on PACFISH- and INFISH-amended plans will no longer apply to those management units. Management units within the Interior Columbia Basin but outside of the PACFISH/INFISH area are also expected to include an aquatic conservation strategy with the seven components described below when they revise their plans. "In an effort to provide a Regional aquatic framework to use in revising Forest plans in the Pacific Northwest Region, Region 6 of the Forest Service developed the Aquatic Riparian Conservation Strategy in 2008. That document (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5316591.pdf) considers each of the components listed below and may provide a helpful frame of reference."

FRAMEWORK COMPONENT 1 –**RIPARIAN CONSERVATION AREAS, RIPARIAN MANAGEMENT AREAS OR OTHER APPROPRIATE ALLOCATION (STRATEGY, PAGES 5-6)**

Land management plans should differentiate or delineate areas of value for aquatic conservation based on the riparian resources within each watershed. This may be accomplished in a variety of ways such as mapping, through establishment of standard widths, or through the use of criteria.

RCAs or RMAs shall include streams, ponds, lakes, wetlands, and areas adjacent to these areas , as well as unstable lands which are likely to affect the condition and/or function of the streams and habitat for aquatic species. Riparian ecological processes and values to consider in identification and management of RCAs or RMAs include: naturally functioning riparian vegetation communities, stream shade, current and future sources of instream large wood (where appropriate), fine organic litter, streambank stability, natural sediment routing, nutrients and other dissolved materials, water quality and hydrologic processes, riparian microclimate and productivity, natural disturbances , importance of small (perennial and intermittent) streams, importance of hill slope steepness/stability, source habitats for riparian and wetland-dependent species, and

connectivity for aquatic or riparian-dependent organisms. The management of RCAs and RMAs is for the benefit of riparian-dependent and aquatic species.

Management considerations

- RCAs or RMAs are areas where riparian-dependent resources receive management emphasis. However, they are not intended to be treated as 'no management' zones since treatments may be essential to achieving or maintaining desired riparian conditions. Plans should include guidance for situations where there are not practical alternatives to locating activities in RCAs/RMAs. In all cases, if activities are done in RCAs/RMAs, they should maintain riparian and aquatic functions where those have been achieved, and assist in or not hinder attainment of those functions where they have not yet been achieved.
- Delineation of RCAs and RMAs should reflect site conditions and the dynamic nature of stream channels and riparian vegetation, recognizing watershed-wide riparian condition and trends.
- Management actions on unstable lands should account for aquatic functions and values by minimizing risk of management-caused landslides and maintaining sources of large wood that can be delivered through natural landslides.
- Plans should allow for adjustment of RCAs to reflect site conditions and considering the dynamic nature of stream channels and riparian vegetation, recognizing watershed-wide riparian conditions and trends.

FRAMEWORK COMPONENT 2—**PROTECTION OF POPULATION STRONGHOLDS FOR LISTED OR PROPOSED SPECIES AND NARROW ENDEMICS (STRATEGY, PAGE 6)**

Plans should identify watersheds (e.g. 5th or 6th field Hydrologic Unit Codes (HUC)) to be managed to emphasize protection of populations of listed and proposed aquatic species and narrow endemics. The intent is to identify habitat networks of existing strongholds with robust populations and high quality habitat that will support expansion and recolonization to adjacent watersheds. These areas should conserve key processes likely to influence the persistence of populations or metapopulations (Rieman and Dunham 2000).

Management considerations:

- In general, these watersheds are at the species' subpopulation scale and contribute to their conservation and recovery.
- Characteristics or considerations for stronghold delineation include: high genetic integrity; habitat connectivity; genetic or phenotypic diversity, spatial distribution, and abundance/productivity for the population or species as a whole; and restoration and population expansion potential into adjoining watersheds.
- For wide-ranging species, use the best available science to identify areas of high value for survival and recovery, which will often build on existing definitions and delineations. Much work has already been done in defining and delineating strongholds (Interior Columbia Basin documents, PACFISH/INFISH key and priority watershed maps, Columbia Basin Federal Caucus, and FWS Pacific Lamprey and Bull Trout work)and more recent work has been done to update species and population status, limiting factors, and recovery goals (e.g. recovery plans, recovery team science documents, and status reviews). Use this work, in coordination with Federal and State agencies that manage those species, to adopt or refine identification of strongholds and develop appropriate management objectives and guidance for projects. It is also important to coordinate with adjacent land managers in describing these strongholds and management objectives for their riparian areas and streams.
- Plans should provide for additions, deletions, or modifications of strongholds based on new information. Changes in watershed conditions due to disturbances during the life of a plan may be temporary and may not call for changes in strongholds. Strongholds of fish production have likely shifted over decades and centuries with changes in watershed conditions caused by large and/or multiple disturbance events. However, watersheds also can recover quickly from single disturbances and their fish populations can recover subsequently through a combination of re-colonization from adjacent watersheds and increased growth and survival during periods when fish population density is reduced.
- As with RCAs, management activities in strongholds should emphasize achieving or maintaining the riparian and aquatic values, including key processes, for which strongholds are being managed. Active management within

strongholds may be required to achieve and maintain these values. Passive management strategies, such as altering grazing regimes, can also be an effective tool at meeting stronghold objectives in some watersheds.
- Watersheds may also be identified for purposes such as protection of other emphasis species, to provide for species diversity, or to benefit other high value riparian-dependent resources.

FRAMEWORK COMPONENT 3—**MULTISCALE ANALYSIS (STRATEGY, PAGE 6)**

The Strategy recommends that a plan's set of documents describe how multiscale analysis was used in plan amendments or revisions, and how multiscale analysis will be used in subsequent project-level decisions. Analyses should be at scales that are appropriate for the management issues.

Management considerations:
- The four potential analysis scales are: basin(3rd field HUC-3), subbasin (4th field HUC), watershed (5th field HUC), and subwatershed (6th field HUC) or project. Useful scales of analysis will depend on the size of the project, and for plan revision will depend on the scope of direction being developed. Analysis of broader areas provides needed context for (and thus improves) decision making for smaller watersheds .
- Plans are generally developed and analyzed at the scale of the land management unit, normally analogous to a subbasin (or group of subbasins).
- Subsequent finer detailed analyses, such as to refine management area-specific actions, restoration prioritization, and monitoring, should be conducted at a, 5th or 6th field HUC .
- Assessments at any scale should consider including evaluation of existing conditions, factors limiting aquatic species populations, resource risks, management needs, restoration opportunities, and interagency coordination.
- Information developed at the finer scale should be considered in implementation of framework components through projects (e.g., local information on habitat limitations used to identify a specific restoration need). Multiple fine scale analyses may also be used more broadly, e.g., to make adjustments or modifications to subbasin-scale restoration priorities described in plans.
- Multiscale analysis provides a basis for integration and prioritization of conservation measures for wide-ranging species.

FRAMEWORK COMPONENT 4—**RESTORATION PRIORITIES AND GUIDANCE (STRATEGY, PAGE 6)**

Plans should identify restoration priorities by type of restoration and geographic areas, normally as a part of desired conditions and objectives.

Management considerations
- Plans should identify desired conditions, objectives, and types of management actions likely to be used to achieve those objectives or desired conditions.
- Aquatic and riparian restoration objectives should be developed in coordination with other land management units administering lands in the same subbasins.
- Plans should integrate aquatic and terrestrial restoration priorities. Context for such integration is illustrated by Rieman et al. (2000). Methods for prioritization are also found in the references below.
- Emphasis should be placed on restoration opportunities that provide benefits for multiple resources.
- Restoration prioritization needs to be supported by analysis at the appropriate scale (e.g., subbasin, watershed).
- Finer scale prioritization, such as at the project level, is a part of plan implementation rather than plan development.

Consider restoration principles in the Strategy and the results of the multiscale analysis described above in developing restoration objectives and types of restoration actions for plans. Restoration should address limiting factors identified in recovery plans and recovery team science documents (e.g., NOAA Fisheries and USFWS recovery plans, NOAA Fisheries Technical Recovery Team products, Draft Bull Trout Core Area Recovery Plans, Source Water Protection Plans for specific watersheds).

FRAMEWORK COMPONENT 5—**MANAGEMENT DIRECTION (e.g., DESIRED CONDITIONS, OBJECTIVES, MANAGEMENT ACTIONS)**

Plans should provide management direction that identifies desired outcomes or future conditions (conditions, goals, and/or objectives) for aquatic and riparian resources. Terminology differs between BLM and FS planning direction. Desired outcomes, future conditions, or objectives should be based on indicators that are reliably measurable and relevant to the conditions described. Conservation of aquatic and riparian resources should include other plan components or direction (e.g., direction related to roads, forestry, and range) as needed to assure that actions are consistent with, and contribute to achieving desired outcomes. Relevant indicators that can be considered when describing desired outcomes, future conditions, or objectives include, but are not limited to:

- Water quality (temperature, fine sediment, nutrients)
- Habitat access (connectivity/barriers – culverts, diversion dams)
- Habitat elements (substrate, pools, large woody debris, off-channel habitat, refugia)
- Channel condition and dynamics (channel width, width/depth, or greenline-greenline width, stream bank stability, thalweg depth/max depth)
- Flow/hydrology (flow regime)
- Watershed conditions (disturbance regimes)
- Riparian vegetation (species composition, succession)

Those indicators and default ranges for their proper function are described in more detail in the NMFS matrix of pathways and indicators (1996) and USFWS' bull trout matrix (1998). PACFISH used a subset of those indicators and provided Riparian Management Objectives for those indicators. PACFISH/INFISH/Biological Opinions (PIBO) monitoring has used some of those indicators, and also others such as mean residual pool depth. Plans should consider and include a set of indicators that encompasses the key characteristics of fish habitat. As noted in the matrices and verified through PIBO monitoring, there is considerable variability in the numeric values of the indicators across unmanaged areas, and the default ranges may not be appropriate for a particular area. Locally derived information should be used where possible to develop riparian and aquatic objectives or desired conditions for plans. The ICEBMP document *Ecosystem Review at the Subbasin Scale* (Volume 1, Appendix G; http://www.icbemp.gov/implement/subbas.shtml) provides a graphic displaying indicators associated with riparian habitat and what scale is appropriate for analysis.

Management considerations:

- Plans should include qualitative and quantitative descriptions of an appropriate range of desired watershed, riparian, and aquatic conditions. These values should be based, where possible, on locally derived information, and be considered in the context of natural ranges of variability over time. In BLM plans these would be included in goals (including Land Health Standards) or objectives. In USFS plans, these would be included as desired conditions or objectives.
- Plans should include appropriate activity-specific standards and guidelines (Forest Service) or management actions (BLM) that support conserving or achieving those desired conditions.
- Consider using prescriptive and outcome-based approaches in combination to guide activities appropriate to achieve desired watershed, riparian, and aquatic conditions.
- The level of detail for describing desired conditions or objectives will vary from plan to plan depending on the amount of information available, the relative value of aquatic resources at stake, and the scope and extent of the potential effects of implementing the plan on aquatic resources. For some plans, general statements of outcomes may be appropriate, while for other plans more detailed descriptions of desired conditions and objectives may be necessary.
- Plans should address balancing short-term risks and long-term benefits to aquatic and riparian resources in managing toward desired conditions. Plans should provide direction to assure that projects are supported by appropriate analyses of both short and long term effects on riparian and aquatic functions.

FRAMEWORK COMPONENT 6—**MONITORING AND ADAPTIVE MANAGEMENT (Strategy, page 6)**

Plan monitoring is a process of gathering information through observation and measurement. Monitoring should (1) determine if a plan is being implemented correctly and is achieving desired results, (2) provide a mechanism for accountability and oversight, (3) evaluate the effectiveness of recovery and restoration efforts, and (4) provide a feedback loop so that management direction may be evaluated and modified.

Management considerations:

- Focus monitoring on key questions and proper sampling methods that inform decision making and allow adjustments to management.
- Monitoring emphasis and intensity should be commensurate with the importance of the question being asked. If adaptive decision making is being used, it will be important to monitor key parameters to the degree necessary to support the current course of action or to trigger an alternate approach.
- Outcome-based management approaches rely on monitoring for their success. These approaches typically require a different level and type of monitoring than prescriptive approaches.
- Monitoring should be coordinated and, where possible, consolidated with similar efforts of other agencies, such as those used for salmon recovery.
- Monitoring commitments in plans should be feasible and achievable.

PIBO Effectiveness and Implementation Monitoring: The Federal agencies should continue to implement the PIBO (PACFISH/INFISH/Biological Opinions) monitoring program, particularly where livestock grazing is an important component of the plan. This may occur as a part of land management plans or outside of the land and resource management planning process.

The PIBO implementation and effectiveness monitoring program is designed to evaluate the effectiveness of management practices in meeting stream and riparian management objectives for most desired outcomes. The program addresses the following key monitoring questions:

- What is the status and trend of stream reaches as indicated by in-channel indicators?
- What is the status and trend in watershed condition?
- What is the relationship between grazing practices (*implementation monitoring*) and stream reach condition (*effectiveness monitoring*)?
- What is the range of variability of numeric indicator measurements (such as bank stability or % fine sediment) for "reference" as compared to "managed" watersheds? This knowledge will enable development of appropriate management objectives for stream and riparian parameters.
- Considering the range of variability for "reference" and "managed" streams and riparian areas over time, are there differences in their trends?
- How effective are the aquatic and riparian conservation measures in achieving the management objectives for streams and riparian areas?

Answering these key questions will provide the basis for evaluating success of an agency's management of aquatic and riparian resources and for determining which adaptive management actions are needed to achieve management objectives for streams and riparian areas. Field units may conduct additional monitoring but should not develop any duplicative monitoring programs given that the PIBO program, with its database, field protocols, and analysis systems, is already in place. Historic and current PIBO effectiveness monitoring data as well as Designated Monitoring Area (DMAs) site photos are available to BLM and FS users at http://fsweb.r4.fs.fed.us/unit/nr/pibo/index.shtml. PIBO reports are available to all users at http://www.fs.fed.us/biology/fishecology/new.html#pibo_reports.

Where field units rely upon Ecosystem Management Decision Support (EMDS) or other decision support models to monitor watershed and stream condition, the PIBO monitoring data should be incorporated into model inputs. At a minimum, where

PIBO effectiveness monitoring is conducted at grazing DMAs, the PIBO implementation monitoring is to be conducted at the same DMAs to inform cause-and-effect relationships critical to answering the key monitoring questions listed above.

FRAMEWORK COMPONENT 7—**CONSIDERATION OF CLIMATE CHANGE**

That rising global temperatures are causing Earth's climate patterns to change has been recognized for some time, but only recently has climate change been given serious consideration in land management planning. This section provides climate change-related topics to consider in developing aquatic and riparian conservation components of management plans and monitoring programs. Agency decision makers retain discretion as to whether and how any of these topics are to be addressed within the parameters of existing and developing agency-specific guidance.

Although the existence of climate change has been widely accepted, considerable ambiguity remains surrounding the resulting impacts of global warming. The questions that remain are how these changes will vary across landscapes (IPCC 2007), and how they will influence the resources we manage. An excellent summary of potential effects of climate change in the northwest US along with additional information is provided on the University of Washington's Climate Impact Group website: http://cses.washington.edu/cig/pnwc/cc.shtml and these recent reviews (ISAB 2007; Rieman and Isaak 2010; Isaak et al. 2012; Luce et al. 2012).

While predicted climatic patterns vary at a global scale, predictions within the Pacific Northwest U.S. and Interior Columbia Basin are relatively consistent (Mote and Salathe 2010) and are being used to create future scenarios. This region is expected to see increasing air temperatures, with some regions areas warming slightly faster than others. Predictions of changes in the timing and amount of precipitation are less certain, but the general expectation is for more precipitation in the winter, less in the summer, and more falling as rain than snow (Mote el al. 2005, Mote and Salathe 2010). These projections suggest stream and river environments will be characterized by more extreme events (high flows and floods, low flows and droughts, temperature extremes; Hamlet and Lettenmaier 2007; Luce and Holden 2009; Isaak et al. 2010; Mantua et al. 2010; Isaak et al. 2012) that could cause species distributions to shift and will increase the risk of extinction for vulnerable populations (Mote et al. 2003, Rieman et al. 2007, Barnett et al. 2008; Isaak and Rieman 2013; Wenger et al. 2011).

For plan revisions, a more thorough treatment of potential effects of climate change may be warranted, including addressing the probable direction and magnitude of specific changes to water flow and temperature and how such changes may interact with Forest Service or BLM management to alter stream habitats. Other climate issues of which some are likely to arise in plan revisions and may merit consideration are: 1) indirect effects of climate change on water quality (e.g., O_2 saturation) and sediment, nutrient, and wood regimes; 2) effects of changing flow, temperature, dissolved O_2, or sediment on ESA listed and other at-risk species, particularly salmon and trout; 3) the interplay of risks and uncertainties for anadromous species under simultaneously changing ocean and freshwater conditions; 4) implications of changes in flow, temperature, dissolved O_2, sediment, etc. for land managers in developing direction to ensure projects will meet ESA and CWA/TMDL requirements; 5) increased demand for surface and ground water to meet municipal, domestic, industrial, hydropower, and other needs; 6) what mitigation measures land management agencies can implement to address the potential changes listed above, and 7) effectiveness of these mitigation measures in responding to climate change impacts (e.g., reservoir construction) on aquatic resources.

Since climate change will have an important influence in the success or failure of management actions, it will be helpful to consider the context it provides for management decisions and monitoring. At a minimum, decisions should be made to ensure that actions do not exacerbate increases in water temperatures and/or reductions in stream flow during summer and fall (ISAB 2007). Most current aquatic restoration decisions already keep these goals in mind (ISAB 2007). For example, riparian buffers designed to maintain or improve stream shade can offset some of the predicted increase in stream temperature (Wehrly et al. 2006; Cristea et al. 2010) although buffer effects will be inversely related to stream size (e.g., larger on small streams). Predicted changes in wildfire, insects, disease, and invasive species, as well as how these interact with climate change, are also important to consider. How managers respond to changing forest conditions and new management goals designed to sequester carbon (Millar et al. 2007) could also pose a novel threat to aquatic systems and require new solutions to help maintain functioning aquatic ecosystems.

Due to the uncertainty associated with predicting effects of climate change on aquatic systems, it is important that decisions reflect this uncertainty and be made in a manner that does not foreclose future options. In assessing land management decisions, there are at least three elements of climate awareness that will facilitate making the link between changing climate and land management decisions (Mote et al 2003). These include: 1) *sensitivity*—understanding how past climate fluctuations have affected important aquatic attributes; 2) *long-term planning*—incorporating climate-change projections into planning decisions, rather than relying solely on the past as a guide to the future; and 3) *policy*—proactively changing policies and institutions in order to develop greater adaptability to a changing climate (Mote et al. 2003; ISAB 2007; Hillborn et al. 2003; Rieman and Dunham 2000; Dunham et al 2003).

Regional guidance on the scientific issues surrounding climate change exists and may help land managers make informed decisions that will assure more sustainable outcomes. One example of this type of guidance is included in the Forest Service, Region 6's *Aquatic and Riparian Conservation Strategy* (ARCS) that guides plan revisions on National Forest System lands within Oregon and Washington (USDA Forest Service 2008).

Management Considerations

- Long-term planning—incorporate climate-change projections into planning decisions, rather than relying solely on the past as a guide to the future.
- At a minimum, decisions should ensure that actions do not exacerbate increases in water temperatures and reductions in stream flow during summer and fall (ISAB 2007).
- Use the most recent, high-resolution watershed-specific predictions for stream flow and stream temperature scenarios, such as those developed by the USFS RMRS (Wenger et al. 2010; Isaak et al. 2011) and available through these websites (NorWeST: http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html; VIC flow metrics: http://www.fs.fed.us/rm/boise/AWAE/projects/modeled_stream_flow_metrics.shtml). Predicted impacts from climate change on temperature and flow will tend to vary between areas and elevations within a Forest. Use those predictions where possible in data layers for listed species, e.g., to examine where habitat suitability may be reduced and where it may be retained in the planning area.
- Consider those projected flow/stream temperature changes when developing RCAs, population strongholds, restoration priorities, and related management direction. For example, within subbasins or watersheds where climate change is likely to narrow the range of suitable conditions that can be maintained/achieved for listed species, a more risk-averse approach to maintaining aquatic and riparian function may be needed. Also, the estimated effects of climate change should be considered in weighing the future stability of stronghold areas and where restoration projects will be the most effective for listed species over the long term.
- Invasions by non-native species, increased disturbance from wildfires, altered terrestrial conditions, and expanding human populations and water development needs may interact with the direct effects of climate change to exacerbate effects on aquatic resources and increase future uncertainties. Actions that enhance natural processes, provide resilience, and conserve evolutionary potential will help mitigate against uncertainties.

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