

To: All Department of Fish and Wildlife Scientific and Lands Management Staff

Subject: Addressing Ecosystem Services in Department Operations

## **POLICY STATEMENT**

The Department of Fish and Wildlife (Department) shall incorporate ecosystem services into its program activities as described further in this document and subsequent guidance, and maintain and publish a periodic inventory of ecosystem services provided by the Department's actions. The inventory shall include a qualitative description of ecosystem services provided by program areas; a summary of that information on a Department-wide level; program/activity-level actions to incorporate ecosystem services into planning, input to other agencies, management actions, and other Department activities; and where feasible, quantitative assessments of the ecosystem service benefits provided by Department actions.

### **I. Scope**

Ecosystem services are the benefits that people accrue from ecosystem functions. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services such as nutrient cycling, soil formation, and natural bioremediation that maintain the conditions for sustaining life on Earth. These services come from ecological functions that are encompassed within the Department's Mission, and in many of the Department's mandates.

Local, state, and federal agencies are increasingly incorporating consideration of ecosystem services into their policies, planning, decision-making, and management. Promoting a wider understanding of the larger benefits that agency actions provide is a critical part of communicating the value of our work to the public and lawmakers alike. Such understanding provides a clearer connection to the potential for multi-benefits to people and the environment from conservation activities. It also more fully informs economic cost-benefit analyses, and can inform and guide impact assessments and mitigation programs.

### **II. Discussion**

The Department manages for ecosystem functions that provide a wide range of benefits to the public, as well as to the resources we steward. However, in most areas the Department has not explicitly considered or reported ecosystem services. There is a

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need to do so, in order to: refine our approach to resource management; better depict the benefits of Department activities to the public; and to better collaborate with other agencies and nongovernmental partners as they increasingly emphasize ecosystem services in their actions. This will help fulfill the Department's Mission by increasing public awareness and support for conservation and management of California's natural legacy.

Additional direction on implementing this policy will follow.

*Signed original on file.*

Charlton H. Bonham  
Director

Attachments:   A. Background.  
                  B. Preliminary table of ecosystem services relevant to the  
                  Department's actions.

## **ATTACHMENT A. BACKGROUND**

Ecosystem functions provide goods and services of both monetary and non-monetary value; these ecosystem goods and services (“ES”) are recognized as critical to human well-being, and are highly influenced by conservation and resource management actions. Some examples are pollination services provided by wild pollinators; storm surge attenuation resulting from coastal vegetation; flood attenuation provided by functioning floodplains; contribution to fisheries harvest from fish and shellfish reared in estuaries; the direct provision of water, forage and timber; soil formation; maintenance of air and water quality; recreation; cultural values; and increased property values due to the proximity of natural lands. Analyses of ecosystem services have been performed at a variety of levels internationally, nationally, and in California. These studies highlight the importance of the services provided, and the importance of entities like the Department dealing with ecosystem services in an intentional and explicit manner throughout the broad implementation of our Mission.

For example, the Department’s portfolio of over 1 million acres of natural landscapes, and the additional areas maintained in conservation status through collaboration with the Wildlife Conservation Board contribute significant ecosystem services to the citizens of California. To date, these services have not been documented nor quantified in a comprehensive manner. Our land management plans direct habitat and ecosystem management which provide ecosystem services, but these services are usually not explicitly considered in developing or evaluating the plans. Considering them now, could serve to facilitate future funding, increase public awareness of the values provided by conserved lands, and increase the general benefits to the public from state-supported land management.

In the past, many of our grant program solicitations have focused on improvements to, or long-term management of ecosystem functions; more recently, they have also included the ecosystem services of climate change adaptation and resilience. Depiction of ancillary ecosystem service benefits resulting from grant projects could improve public support for those projects. Similarly, our CEQA comment letters rarely mention specific ecosystem services beyond limited, site-specific impacts, and we do not usually explicitly consider ecosystem services in our capacity as a CEQA Lead Agency. While the Department’s legal authority to address ecosystem services as a CEQA lead, responsible or trustee agency is limited to those services which are coincidentally related to items within our stated authorities, addressing those could provide increased public benefits.

Incorporating definition, evaluation and consideration of ecosystem services that result from Department actions within our legal scope of authority does not increase the Department’s regulatory scope. It does provide better information to internal and external decision-makers on the benefits that result from the Department’s actions to manage ecosystem functions, and an additional perspective from which to view Department actions. It also prepares us to better collaborate with local, state, federal and non-governmental partners on conservation actions.

## Classifications of Ecosystem Services

There are various ways to classify ecosystem services, and these systems continue to evolve. As with most classification systems, there are areas of both congruence and difference among them. However, there is an identifiable subset of ecosystem services that are most relevant to the Department's Mission and mandates. (See Attachment B for this initial subset of relevant ES).

In the context of how the Department provides ecosystem services, and incorporates their consideration into its actions, there are some important concepts that frame those issues. These include defining which ecosystem services are of core value to the Department's Mission, and what other benefits not aligned with our Mission might accrue from them; distinguishing among ecosystem services which stem from active management versus passive conservation; and how to measure the extent and values of any ecosystem service.

## Core and Collateral Benefits of Ecosystem Services

An ecosystem service may provide "core" benefits that are critical to the Department's Mission and mandates. An ecosystem service may also provide "collateral" benefits that are not critical to the Mission and mandates, but still provide tangible benefits to people. For example, Department actions to conserve and manage natural lands provide habitat that sustains native pollinators. The pollination services these provide help maintain populations of native plants, and support resilient ecosystems. These are "core" ecosystem service benefits, supporting a key part of our Mission. The same habitat and pollinators also facilitate pollination of commercial crops, increasing crop yields and economic returns to agriculture. This is a "collateral" benefit, providing real value to nearby farmers, but not part of the Department's Mission.

## Managed and Non-Managed Ecosystem Services

Some ecosystem services are provided by specific decisions or focused management actions, such as wetlands managed for waterfowl production and harvest. These benefits can therefore be directly associated with those actions. Other benefits are provided through the conservation and maintenance of natural processes, such as soil formation on natural landscapes, or bioremediation of toxic substances in non-managed ecosystems. The conservation of sites that provide these ecosystem services is a deliberative action, but the actual ecosystem functions that provide the services are more passive in nature. Nonetheless, there are public benefits from this "passive" management.

## Assessment and Evaluation of Ecosystem Services

There are numerous ways of reporting ecosystem service benefits. They range from general and qualitative, to quantitative, to economic valuation of the benefits provided. In some cases, surrogate measures are used as an index of potential effects, such as acres of wetland and riparian buffers as an index of maintaining water quality; in other cases, there may be site or region-specific data that allow more precise evaluation

(such as visitor days to wildlife areas). Economic analyses employ a variety of approaches and modelling to estimate economic values of ecosystem services. For example, there are studies that define the economic values of fish and wildlife-based recreation to local economies, and increased crop production from the contribution of native pollinators supported on conserved lands. These are relatively direct benefits. In a more complex context, the preservation of areas with cultural value (open spaces, spiritual sites, cultural and historic areas), is widely considered an ecosystem service, and can be considered as within the Department's Mission ("...use and enjoyment by the public."). However, it is difficult to quantify this benefit. It might be best described by a narrative of the cultural value of a specific site or sites, augmented with some indication of active visits related to cultural practices. Economic models could then be applied to some of this information, if desired.

**ATTACHMENT B.**

**PRELIMINARY TABLE OF RELEVANT ECOSYSTEM SERVICES RESULTING FROM DEPARTMENT ACTIONS.**

<b><u>Ecosystem Service</u></b>	<b><u>Description</u></b>	<b><u>Core Benefits</u></b>	<b><u>Collateral Benefits</u></b>	<b><u>Possible Metrics For Core Benefits</u></b>	<b><u>Possible Metrics For Collateral Benefits</u></b>
<b>Habitat to sustain viable populations of plants and animals</b>	Maintaining or improving habitat for all life stages of wild populations, to sustain viable wild populations.	Essential resource management supporting healthy ecosystems. Public use and enjoyment. Decreased groundwater overdraft. Increased groundwater recharge.	Overall ecosystem health supporting populations of plants and animals used and enjoyed by the public. Decreased groundwater overdraft. Increased groundwater recharge.	Acres conserved, listed and non-listed native species protected and number and/or miles of corridor connections. AF of water stored, conserved or supplied.	Acres conserved, listed and non-listed native species protected and number and/or miles of corridor connections. AF of water stored, conserved or supplied.
<b>Harvest of wild plants and animals</b>	Recreational, subsistence, and commercial harvest of fish, wildlife, plants and fungi for human consumption.	Public use and enjoyment.	Food, recreation, commerce	License sales, and public use and harvest data.	License sales, and public use and harvest data. Related industry and business incomes.
<b>Ecological Resilience and Climate Change</b>					
- Biodiversity and landscape resilience	Maintaining of improving conservation of biodiversity, and increased functionality of preserves (e.g.,	Increased viability of preserves and species / populations	Long-term sustainability of ecosystems.	Acres and number of different important conservation targets preserved; overall extent of preserves and buffer areas; degree of	Acres and number of different important conservation targets preserved; overall extent of preserves and buffer areas; degree of connectivity vs. fragmentation (degree of

	through buffers, reduce fragmentation, etc.); securing elevational corridors.			connectivity vs. fragmentation (degree of discontinuity where important as a conservation value, such as in Delta aquatic systems); preservation of elevational corridors and biodiversity hotspots; number of listed and non-listed species conserved	discontinuity where important as a conservation value, such as in Delta aquatic systems); preservation of elevational corridors and biodiversity hotspots; number of listed and non-listed species conserved
- Connectivity	Maintaining or improving connections between preserve areas; securing identified linkages;	Increased viability of preserves and spp populations	Long-term sustainability of ecosystems, and associated benefits.	Corridors and connecting habitat preserved and restored.	Corridors and connecting habitat preserved and restored
- Climate change refugia	Securing areas identified as probably climate change refugia for species or communities at risk	Increased viability of preserves and spp populations, and availability of refugia for future use in conservation	Long-term sustainability of ecosystems, and moderation of climate change impacts.	Identified climate change refugia preserved.	Identified climate change refugia preserved.
- Resilience to climate change (sea level rise)	Securing elevational gradients in coastal areas; restoration of salt marsh and shallow water habitats to maintain them as sea levels rise;	Maintaining coastal and estuarine resources, such as estuary nursery grounds for fish and shellfish, salt marshes, and	Protection of coastal communities and infrastructure. Harvest and observation of marine species dependent on estuarine and	Area of shallow water habitats preserved or prepared for adaptation; miles of shoreline protected.	Miles of shoreline and areas of property and infrastructure protected.

	adaptations to changed salinity zones in bays and estuaries.	near-shore shallow water habitats.	shallow water habitats.		
- Carbon sequestration and storage	Reducing GHGs in the atmosphere through carbon uptake in plants, and increasing carbon storage above- and below-ground in biomass and soil.	Reduce or decelerate impacts of climate change (e.g. negative impacts to ecosystem function).	Reduce or decelerate impacts of climate change (e.g. negative impacts to ecosystem function).	Metric tons CO <sub>2</sub> e sequestered, or avoided emissions.	Metric tons CO <sub>2</sub> e sequestered, or avoided emissions.
<b>Water Quality</b>	Maintaining or enhancing water quality (e.g., wetland filtration, reduction of urban or agricultural runoff, water temperature management, pollution prevention and response)	Healthy aquatic and riparian resources.  Public use.	Water for consumption and other uses; healthy aquatic resources for commercial or recreational use and enjoyment.	Water quality: constituents and temperature relevant to ecosystem resources. Use of vertebrates, invertebrates, and plants to measure water quality (e.g. Index of Biotic Integrity)	Water quality: constituents relevant to human use and consumption.
<b>Water Supply</b>	Securing water for habitat use; capturing and storing water (e.g., reservoirs, watershed vegetation restoration)	Healthy aquatic and riparian resources.  Public use.	Water for agricultural, municipal, industrial and recreational.	Acres of watershed and riparian and drainages restored and preserved. Actual water supplies dedicated to conservation uses (AF).	Acres of watershed and riparian and drainages restored and preserved. Increased groundwater recharge (AF).
<b>Pollination</b>	Role of native habitat supporting pollinators of native and domestic plants.	Maintaining viable populations of native plants	Improved crop production; availability of native plants.	Acres of conserved areas and number of native plants and native pollinators (when known).	Acres of conserved areas within 2.4 km of agricultural crops. Number of native plants and native pollinators (when known).

<b>Biological Control</b>	Role of native habitat supporting native predators, providing buffers, or otherwise acting to control pests and invasive exotic species.	Maintaining viable populations of native plants and animals.	Improved crop production, reduced effects of invasive exotics, reduced use of pesticides and herbicides.	Acres of actively managed lands and percent cover by native species in healthy condition; reduction in invasive species cover.	Acres of actively managed lands and percent cover by native species in healthy condition; reduction in invasive species cover. . Crop production in vicinity of natural lands. Reductions in pesticide and herbicide use.
<b>Soil Retention</b>	Preserving soils in place	Better functioning ecosystems	Reduced erosion, sedimentation and deposition; maintenance of agriculture; water resources; wildlands-dependent uses. Acres of erodible areas restored and preserved. Reservoir storage and flood channel capacity maintenance.	Acres of degraded areas restored and preserved. Acres of natural landscapes preserved.	Acres of erodible areas restored and preserved. Measured erosion, deposition, and air quality parameters. Human health indices
<b>Soil Formation</b>	Geologic and biological processes of forming soil	Long-term process supporting long-term conservation.	Long-term environmental quality	Acres conserved, listed and non-listed native species protected, resilience bottlenecks during to population contractions, and number and/or miles of corridor connections.	Acres of degraded areas restored and preserved. Acres of natural landscapes preserved.
<b>Genetic Resources</b>	Maintaining the widest range possible of genetic material, usually in the wild, to allow	Essential resource management.  Public use.	Potential applications for domestic plants and animals, and people;	Acres restored and conserved; distance to nearby developed areas and roadways; number	Acres conserved, listed and non-listed native species protected and number and/or miles of corridor connections. New

	further natural selection, promote viable populations, possible application of genetic material to domesticated species, and possible intentional manipulation for management in the wild.		pharmacological and genetic resources; stability of wild resources for public use and enjoyment.	of nearby cities and roadways, visitor use data, user valuation surveys.	pharmacological, genetic material, etc., discovered.
<b>Natural Lands, Open Space, Aesthetic Landscapes</b>	Scenic areas, open space in general.	Public use and enjoyment.  Landscape scale conservation, buffers, etc.	Public passive or active uses; property values; urban / exurban transition.	Acres conserved adjacent to parks; acres conserved that include limited public access; visitor use data, user valuation surveys.	Acres restored and conserved; distance to nearby developed areas and roadways; number of nearby cities and roadways, visitor use data, user valuation surveys; nearby private property values.
<b>Recreation, Public Use, Tourism</b>	All non-commercial uses by the public, and associated tourism economy	Public use and enjoyment.	Public use and enjoyment and associated commercial benefits.	Number of places of cultural or historical significance conserved; acres conserved that include limited public access to places of cultural or historical significance; visitor use data, within the context of the Department's Mission and mandates.	Acres conserved adjacent to parks; acres conserved that include limited public access; visitor use data, user valuation surveys.

<p><b>Cultural, Historical, Spiritual</b></p>	<p>Preserving known locations of cultural, historical or spiritual significance in a form that maintains their value to the involved population. Providing opportunities for cultural and spiritual practices to continue</p>	<p>Public use and enjoyment.</p>	<p>Preservation of traditional practices and beliefs, sense of place, history and identity. Public health.</p>	<p>Number of conserved areas with access for research and education; number of education and research programs and projects in California related to Biological resources encompassed by the Department's Mission</p>	<p>Number of places of cultural or historical significance conserved; acres conserved that include limited public access to places of cultural or historical significance; visitor use data.</p>
<p><b>Science and Education</b></p>	<p>Furthering scientific knowledge, and education at all levels related to resources within the Department's scope.</p>	<p>Essential information to support resources management. Public use and enjoyment.</p>	<p>Opportunities to improve education and research for overall better understanding, appreciation, and management of public resources. Educational and research support to institutions, school districts, and individuals.</p>	<p>Area of natural land preserved (maintenance).  Area of new vegetation, retired tillage and roads.  Reductions in use of materials contributing to acidification, nitrification or herbicide/pesticide drift.</p>	<p>Number of conserved areas with access for research and education; number of education and research programs and projects in California related to Biological resources encompassed by the Department's Mission</p>

<b>Air Quality</b>	Maintaining or improving air quality. (e.g., reductions in particulates from road closure of land retirement; increase in vegetation; reduction in deposition of airborne herbicides and pesticides, acidic compounds, and Nitrogen, )	Potential maintenance or improvement of: ecological health; plant vigor; water quality; plant and animal physiological functions; native vegetation assemblages.	Public health; increased crop production.	Not usually applicable	Acres of land in conservation, and restored from agricultural or mining to conservation lands. Could be broken down into airsheds if warranted.
<b>Ornamental Plant Resources</b>	Maintaining habitats that support known or possible sources of native plants that could be used for ornamental purposes.	Public use	Known or potential landscaping applications	Not usually applicable	Acres conserved; numbers of ornamental native species conserved, Extent of “water wise” landscaping, and water use reductions from such, due to use of native species.
<b>Medical Resources</b>	Maintaining habitats that support known or possible sources of human medicines	Public use	Known or potential medicinal applications		Harvest of medicinal resources, and development of medicinal applications from native organisms.