

7.0 Landscape Management



7.0

Landscape Management

Landscape management addresses actions and processes that affect multiple species, habitats, and ecosystems. Individual fish and wildlife species are held in trust for the public benefit by the state of Washington (i.e., Department of Fish and Wildlife) and, for specific resources such as migratory birds and federally threatened or endangered species, by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Because of these other authorities, DOE-RL does not have the authority to directly manage species outside of impact assessment and status monitoring. However, this limitation does not necessarily constrain DOE-RL's ability to manage Hanford's biological resources. Most single species concerns are best addressed by maintaining functional native habitat and plant communities within a landscape-based perspective.

Thus, management topics addressed in this section cover such areas as fire management; habitat fragmentation; landscape-level human activities such as road construction and agriculture; revegetation practices; and administrative control areas.

7.1 Fire Management

Although many plant communities on Hanford and their associated wildlife species have evolved in the presence of natural fires, past and present land-use practices and the presence of non-native plant species have altered the frequency and severity of fires. More frequent and severe fires have reduced the availability of late-successional shrub-steppe habitat for species that are dependent on this habitat type for at least part of their life cycle. Also, in addition to fire itself, many plant communities on

Hanford are sensitive to and slow to recover from the impacts of certain fire-fighting activities (e.g., the creation of firebreaks).

7.1.1 Fire Ecology and Hanford Habitat Classes

Fire is both a natural and human-caused occurrence in shrub-steppe environments. Compared to historic times, vast expanses of unfragmented, high-quality (i.e., mostly native plant species composition) shrub-steppe no longer exist; however, high quality shrub-steppe occurs at Hanford in scattered tracts of land. When these areas are burned and altered by fire, it may result in the loss or degradation of much of the remaining high-quality shrub-steppe habitat within the Columbia Basin Ecoregion.

Typically, shrubs are killed by fire, but bunchgrasses are not. Recovery to a native habitat (even to bunchgrasses), however, is today less certain given that the surrounding lands may be a ready source of non-native plant seeds of the type that may enjoy a competitive advantage following a fire. Many animal species dependent on the sagebrush component of the southcentral Washington shrub-steppe are species of concern (e.g., sage sparrow).

Fire management is today an important factor in biological resource management at Hanford because Hanford contains high-quality shrub-steppe habitat of significant regional value, the nature of shrub-steppe fire ecology makes recovery following fire less certain, and human-caused fire can increase the rate of habitat loss from fire.

Portions of the Hanford Site where plant species composition has been badly degraded and now consists largely of invasive, non-native annual plants (e.g., the abandoned old fields¹) are not of immediate concern for fire protection, because fire will not degrade their species composition or habitat value any further. Post-fire habitat areas (i.e., those areas burned within the last 20 years or so) or those areas that have intermediate value as habitat to species of concern, warrant protection from fire because they have current habitat value for some shrub-steppe species or because they represent future high-quality habitat if allowed to recover unimpeded by burning. Fire management for Hanford's biological resources is most important for those areas containing element occurrences and for those habitats of concern having an abundance of mature sagebrush shrubs.

7.1.2 Consideration of Biological Resource Values in Fire Management at Hanford

Fire management policy for Hanford's habitats of concern (includes post-fire, late-successional shrub-steppe and element occurrence areas) is to minimize the potential for human-caused fires and aggressively fight fires. Fire management measures also may need to be applied to low-quality habitat areas (e.g., abandoned old fields) if they are adjacent to habitats of concern and can "carry" fires into these areas.

The use of heavy equipment to create fire breaks around the perimeter of a burn can result in permanent damage to the soil and existing vegetation. Plowed fire breaks also facilitate the establishment and spread of weedy species (primarily non-native) into areas where they may have not existed previously. For areas without shrubs but with native understory (i.e., grasses and forbs), which on Hanford are areas that have been burned previously but where past soil disturbance from activities such as farming have not occurred, and areas otherwise containing element occurrences, fire-fighting should emphasize minimizing the creation of new fire breaks to the extent that life or property are not put at greater risk.

The land cover map for the Hanford Site shows the locations of shrub-dominated areas and post-fire

areas. This map, along with the map of element occurrences, can provide the basis for discussions between the Ecosystem Monitoring Project and the Hanford Site Fire Department. These discussions will be aimed at identifying and planning for three specific categories of fire management for habitats/plant communities on the Hanford Site.

Category 1: Non-Habitats of Concern—These low-quality habitat areas receive the least consideration for protection from fire. Fire fighting in these areas should occur as necessary to protect structures and/or facilities or to prevent fires from spreading into category 2 or 3 areas. Category 1 areas are the preferred location to place fire breaks. Fire breaks do not require any post-fire treatment.

Category 2: Post-Fire and Other Habitats of Concern Not Already Addressed—Intermediate fire protection should be provided to these areas. Fires that threaten these areas should be aggressively fought; however, fire fighting actions should be tied to the need to protect structures and/or facilities. Any necessary fire breaks should be placed preferentially in category 1 areas. Any temporary firebreaks that may be constructed during fire-fighting should be reseeded with an appropriate mix of locally occurring native plant species and the edges of the break re-contoured.

Category 3: Element Occurrences and Late-Successional Shrub-Steppe—The maximum fire protection should be provided to these areas. Protection includes aggressively fighting fires that threaten these areas, independent of the need to protect structures and/or facilities, and by planning any necessary fire breaks to be placed preferentially in category 1 areas first and category 2 areas second. The decision to fight fires *within* a category 3 area should depend on whether the greater risk to long-term habitat/plant community condition is from the fire or from the fire-fighting actions themselves (e.g., creation of fire breaks). If the decision on whether to fight a fire that is impacting a category 3 area primarily is dependent on the need to protect biological resource values, then the Hanford Site Fire Department should make every effort to contact staff from the Ecosystem Monitoring Project to assist in planning the appropriate fire-fighting strategy. Any temporary firebreaks that may be constructed during fire-fighting should be reseeded with an appropriate mix of locally occurring native plant species and the edges of the break re-contoured.

¹ Land cover classes discussed in this paragraph are shown in Appendix D.

All fires over 10 ha in size should be delineated by a GPS and the data maintained in the Ecosystem Monitoring Project's GIS-based data base.

7.1.3 Prescribed Burns

Prescribed burning for the purposes of habitat management is not a current element of the Hanford Site biological resources management strategy. Small, controlled burns as an element of research programs can be considered on a case-by-case basis, but requires the approval of the Hanford Site Fire Department. Controlled burning of accumulations of dry plant material, particularly along roadways, is conducted to remove large potential sources of fuel that, if accidentally ignited, could provide a mechanism for rapidly accelerating uncontrolled burns.

7.2 Revegetation Practices

Revegetation on the Hanford Site is not conducted through a single program or even through a single contractor. Revegetation, however, is an important component of many Hanford Site activities, including waste site restoration or interim stabilization and mitigation actions.

7.2.1 Types of Revegetation Actions and Their Application

The specific protocol followed for a particular revegetation action will depend on the purpose of the action, the length of time the vegetation must remain viable and functional, and the desired revegetation endpoint. The latter is dependent on the location of the revegetation action. There are five major types of revegetation actions:

1. short-term interim stabilization
2. long-term interim stabilization
3. habitat improvement via habitat amendment
4. habitat improvement via reclamation or habitat creation
5. landscaping.

Short-Term Interim Stabilization—Short-term interim stabilization is appropriate when an exposed soil surface must be protected for periods of up to several months. For example, if habitat removal is

required for a project, it may need to be conducted before migratory birds begin nesting; however, the actual construction phase of the project may not be scheduled to begin until a later date. In the interim, the exposed soil surface may need to be vegetatively stabilized. This stabilization can be accomplished using a temporary ground cover such as sterile rye or spring wheat. The species selected should not be one that has a potential to escape from cultivation and become established in surrounding native plant communities. If stabilization is required for periods of only several weeks, chemical soil fixatives can be considered.

Long-Term Interim Stabilization—Long-term interim stabilization is appropriate when a site requires stabilization for an indefinite period of time, normally measured in years. In these situations, it is assumed that eventually the site will be re-disturbed for either final remediation or for other site development purposes. This is often the case for inactive waste sites (cribs, burial grounds, ponds, etc.) that will be re-disturbed and remediated at some point in the future.

Species used for long-term interim stabilization should be perennial bunchgrasses that are either native to the Hanford Site or introduced species such as crested wheatgrass. If an introduced species is used, it should not be one that can readily expand into adjacent native plant communities. In general, shrubs are not useful for interim stabilization because the site eventually will be re-disturbed (therefore, the added expense of planting shrubs would be unjustified) and, if the site is an inactive waste site, deep-rooted shrubs have a higher likelihood of contacting and uptaking radioactive or hazardous wastes than would bunchgrasses.

Habitat Amendment—Habitat improvement via habitat amendment is normally performed to fulfill all or part of a project's compensatory mitigation requirements. Habitat improvements are intended to increase the habitat value of a particular site for selected wildlife evaluation species. The site will often already have some habitat components required by the evaluation species. Habitat improvements of this type are intended to be permanent; therefore, the site should be identified as a Level IV biological resource area in appropriate land-use plans for the Hanford Site. Species used for habitat amendment should be native to the Hanford Site and should preferably be of locally derived genetic stock. Improvements may be made to the

understory (grass and forb components), to the shrub component of the community, or to both.

Reclamation or Habitat Creation—Habitat improvement via reclamation is necessary when an area has experienced intensive disturbance (e.g., an overgrazed area or previous agricultural area). Vegetation may be present; however, it typically is weedy or at worst, composed mostly of non-native species. The microbiotic crust is mostly absent. Habitat improvement via creation of new habitat is necessary when an area is essentially devoid of plants and some amount of soil amendments may be necessary to restore a vegetative cover (e.g., a waste site that has received extensive herbicide treatment, a borrow site, or an abandoned infrastructure site). For both types of habitat improvement, the desired endpoint depends on the intended land-use for the site.

Within areas to be used as wildlife habitat, the goal of reclamation or habitat creation will be to create functional wildlife habitat that resembles native plant communities in the vicinity. Other endpoints, however, are possible if alternative future land-uses of the site are envisioned or if an alternative type of habitat is desired. If native wildlife habitat is the planned revegetation endpoint, the plant species selected should be native to the Hanford Site and should preferably be of locally derived genetic stock. All habitat components should be included in the revegetation effort, including shrubs, perennial bunchgrasses, and forbs.

Landscaping—A recent Executive Memorandum (discussed at 59 FR 43122) directed the use of regionally native plants on federal landscaped grounds. Commensurate with other considerations, such as budget and availability, projects that have a landscape component should give strong consideration to the use of plant species native to the Hanford Site and of locally derived genetic stock.

For all types of revegetation actions, it is important that all materials (seed, mulch, soil amendments) are certified to be weed-free to prevent the inadvertent introduction of unwanted plant species to the Hanford Site. Procedural guidance for revegetation is currently being developed by the Environmental Restoration Contractor.

7.2.2 Selection of Appropriate Plant Seed and Stock Materials for Revegetation

The selection of appropriate plant species for revegetation depends on the goals of revegetation. In

almost all cases, the seed or plant materials used for habitat improvements should be (1) species representative of broad community (shrubs, forbs, grasses) to include species of plants that have cultural significance to the Tribes, (2) species native to the Hanford Site, and (3) the appropriate specific genetic or ecotypic derivation for Hanford. Stabilization or landscaping efforts that desire to use native plant material also should consider the preceding criteria.

Basis for the Use of Locally Derived Plant Materials—The use of plant material that simply has the correct native Latin binomial is not necessarily adequate. A species may show significant genetic differentiation and adaptation in response to factors such as climate, soils, aspect, and many other selective forces that may not always be obvious. This tends to be especially true for species with large geographical ranges. The Society for Ecological Restoration (1994) also recommends the use of regional ecotypes for revegetation projects. Linhart (1995) provides an excellent review of the genetic and evolutionary basis for the use of local plant material for habitat improvement.

Locally derived plant materials are preferable over non-local stock for two reasons. First, local populations have been exposed to hundreds or thousands of years of selective pressures under the local conditions and are therefore well adapted to those conditions. Plants materials collected from distant areas will most likely be less well adapted to the local conditions at a particular site than plants growing in nearby, similar areas. The uniqueness of Hanford's climate relative to its surroundings—as exemplified especially on the Columbia River plain by the low amount of annual precipitation and hot summers—make this an important consideration.

Therefore, the chances for successful habitat improvement are increased by using the best-adapted material available. Plant materials obtained from distant locations also run a higher risk of being contaminated with weedy species not locally present. The definition of “local” is by necessity species-specific and depends on factors such as life history, breeding systems, pollination mechanisms, and specific selective forces. In extreme cases (i.e., those with strong selective pressures), significant genetic differentiation has been shown over distances of as little as several meters (Aston and Bradshaw 1966; McNelly 1968). Even wind pollinated conifer trees can show significant differentiation over distances less than 500 m (Linhart et al. 1981).

Second, less-adapted genotypes introduced to a site may recombine with the surrounding native genotypes. The result could be a decrease in the fitness of the native populations. The genetic changes within populations that occur could lead ultimately to ecosystem disruption at various levels. For instance, genetic changes within a particular plant species population could cause a decrease in plant biomass production, which could then adversely affect small animal populations. Alternatively, genetic changes could render the indigenous plants less competitive with aggressive, non-native weedy species such as cheatgrass.

Prohibitions Against the Use of Non-Native Species—In general, the use of non-native species for habitat improvement, whether or not the intended end use is as wildlife habitat, is not recommended. Non-native plant species can seriously affect native plant community structure and composition, especially if the non-native species are capable of reproducing and expanding into the adjacent native communities. The best local example of this is the rapid spread of cheatgrass throughout the Intermountain-West over the past century (Mack 1981).

The Society for Ecological Restoration (1994) has issued a policy statement explicitly recommending that non-native species not be introduced as part of a restoration (i.e., revegetation) plan. This policy also recommends the highest priority be given to the control of those non-native species that potentially could replace key indigenous species, reduce native species diversity or richness, or that could significantly alter the structure or function of native communities or ecosystems. Because it can be difficult, if not impossible, to predict which non-native species may affect natural systems, none should be considered for use in habitat improvement actions, including waste site restoration applications.

Selective Use of Non-Native Species—On the Hanford Site, *interim* stabilization of inactive waste sites, via revegetation, is not specifically intended to provide wildlife habitat. The primary purpose of these plantings is to prevent contaminant uptake and migration and to minimize erosion. By definition, the stabilization is intended to be non-permanent (i.e., until the waste site is fully remediated and restored). Over the past 15-20 years a number of sites, primarily within the industrialized portions of the Hanford Site, have been planted with non-native grasses—primarily crested wheatgrass and

Siberian wheatgrass. Scattered individuals of these species are occasionally observed in areas where they were not planted, but in general, these species do not appear to spread extensively into the surrounding native plant communities. Therefore, these species may be used in the interim stabilization of inactive waste sites that will eventually be re-disturbed during the site remediation process; however, the use of native species is still strongly encouraged, especially in situations in which the waste site is located adjacent to native habitat.

Guidelines for Selecting Native Plant Material—For the purposes of habitat improvement on the Hanford Site, plant materials (i.e., seed, plant parts, or whole plants) should, at a minimum, be collected on or in the immediate vicinity of the Hanford Site. Preferably, collection should occur near the site to be revegetated, within the same soil type, and at roughly the same elevation. In the case of small projects, it may be possible to collect plant materials from areas immediately adjacent to the site to be revegetated. For larger projects that may not be practical. In such cases, materials should be collected and pooled from several different locations on or near the Hanford Site when feasible. Plant materials gathered outside the Columbia Basin Ecoregion should not be used for revegetation efforts. The application of these guidelines will help maintain or promote native genetic richness and will increase the likelihood that a well-adapted ecotype will be established on the site.

7.3 Management of Landscape-Level Attributes and Processes

With a landscape-based management approach, no specific species is targeted for management. All native species and species assemblages are considered important. Threatened and endangered species have achieved their status mostly because of habitat loss or degradation and, for the most part, can be protected when habitat is protected. Moreover, landscape management usually can be conducted in a more cost-effective manner than management for a variety of single species. The BRMaP emphasizes a landscape-based approach to biological resources management over a species-based approach for the Hanford Site.

Goals for the landscape-based approach reflect the broadly defined biological resources management goals identified in Section 2.2.2. The specific goals are to:

- maintain all native terrestrial and aquatic resident species at viable population levels
- have no adverse impacts on populations of migratory species
- maintain viable representatives of all native plant and animal communities
- maintain the functionality of both biotic and abiotic ecosystem processes.

These goals will be met in the following ways. First, management actions will be implemented in a graded approach that reflects the level of concern assigned to different habitats/plant communities (i.e., landscape attributes). The assigned levels of concern are in part based on state of Washington priorities for habitat/plant community preservation. The level or intensity of management is adjusted appropriately to fit each landscape attribute. Second, processes that operate at the level of the landscape, such as fragmentation, will be considered when designing appropriate management strategies.

7.3.1 Landscape Attributes of Concern Requiring Management

Landscape attributes requiring management include all habitats/plant communities identified as Level II, III, or IV. Management of landscape attributes will focus on three classes of management actions:

- evaluation and management of DOE-RL impacts
- status monitoring
- preservation actions.

Table 7.1 shows the graded management approach. Resource maps for individually defined resources (e.g., 100-year floodplain) are provided in Appendix D; composite maps for a particular resource level of concern (e.g., Level IV resources) are provided in Section 4.3.4.

Via the graded approach, impact management will be implemented at three levels. Impacts to habitats because of implementation of proposed projects will be evaluated during the ecological compliance review process outlined in Section 5.1. Details of this process are defined in DOE-RL (1995).

For Level II and III resources, the 100-year floodplain, wetlands, and late-successional shrub-steppe habitat (identified for medium-level impact management) are distinguished from the early-successional shrub-steppe habitat (identified for low-level impact management) in Table 7.1 because they either have specific impact assessment requirements (i.e., wetlands and floodplain impact assessment is required by 10 CFR 1022) or they are at higher risk from significant impacts compared with other habitats of concern (i.e., late-successional shrub-steppe). Additionally, designated onsite habitat restoration or rectification areas also are identified for medium-level impact management. When impacts are unavoidable, mitigation recommendations will show a preference for directing impacts away from habitats identified for medium-level impact management versus habitats identified for low-level impact management. Mitigation of residual impacts (i.e., via rectification and/or compensatory mitigation) is likely to be more costly at the medium level than at the low level.

For Level IV resources (all identified for high-level impact management in Table 7.1), impact management will rely initially on land-use “zoning” restrictions arising out of the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement (HCP EIS)* (DOE 1999). Level IV resource areas (i.e., rare habitats, element occurrences, and designated compensatory mitigation/habitat improvement areas) will be identified as areas major constraints against development.

Based on DOE-RL’s currently identified mission, DOE-RL programs and projects are expected to avoid consideration of Level IV resource areas for planned future activities. In the event DOE-RL’s mission changes and these Level IV resource areas are proposed to be impacted, the ecological compliance review process will assess the impact based on the significance of these resources within the Columbia Basin Ecoregion. Mitigation actions are expected to be costly and limited in options for Level IV resources (i.e., acquisition of in-kind resources may be the only option available for compensatory mitigation).

Status monitoring will be implemented at three levels and in one special case situation. With one exception, all monitoring of landscape attributes will be accomplished as part of the Hanford ecosystem integrity monitoring strategy (see Section 6.4.3). Status monitoring of habitat improvement areas, whether done as a commitment for mitigation or

Table 7.1 Management Levels for Landscape Attributes of Concern at Hanford

Landscape Attribute	Classes of Management Actions		
	Impact Management Level	Status Monitoring Level	Preservation Level
100-year floodplain	<p><i>Medium</i></p> <p>Avoid impacts to the maximum extent possible, and minimize unavoidable impacts. Mitigation of residual impacts via rectification and/or compensatory mitigation is recommended. The ecological compliance review report will specifically address impacts to biological resources within the floodplain.</p>	<p><i>Low</i></p> <p>No specific monitoring strategy is designed for the entirety of the floodplain. Instead, specific areas within the floodplain, such as sloughs, will receive attention at the medium level of monitoring.</p>	<p><i>Low</i></p> <p>Absolute protection from impacts is a low priority.</p>
Wetlands and associated deepwater habitats	<p><i>Medium</i></p> <p>Avoid impacts to the maximum extent possible and minimize unavoidable impacts. Mitigation of residual impacts via rectification and/or compensatory mitigation is recommended. The ecological compliance review report will specifically address impacts to wetland habitats.</p>	<p><i>Medium</i></p> <p>Level assignment does not indicate a lower level of importance for these areas; instead, it reflects that monitoring here will focus on ensuring conditions within these areas are not degrading.</p>	<p><i>Medium^a</i></p> <p>Protection from impacts is strongly encouraged but not mandatory.</p>
Late-successional shrub-steppe habitat	<p><i>Medium</i></p> <p>Avoid impacts to the maximum extent possible, and minimize unavoidable impacts. Mitigation of residual impacts above threshold values via rectification and/or compensatory mitigation is recommended. The ecological compliance review report will specifically address impacts to late-successional habitats.</p>	<p><i>High</i></p> <p>Monitoring information on this habitat has the highest priority. Together with the early-successional shrub-steppe habitat these areas represent a mosaic of good condition native habitat interspersed with some poorer quality habitat areas that may contain a non-native species component. How these respective habitat areas function ecologically relative to one another is poorly understood; however, combined they represent most of the land area of Hanford, especially on the Columbia River plain.</p>	<p><i>Low</i></p> <p>Absolute protection from impacts is a low priority.</p>

Table 7.1 Management Levels for Landscape Attributes of Concern at Hanford (continued)

Landscape Attribute	Classes of Management Actions		
	Impact Management Level	Status Monitoring Level	Preservation Level
Early-successional shrub-steppe habitat	<p><i>Low</i></p> <p>Avoid impacts to the maximum extent possible, and minimize unavoidable impacts. Mitigation of residual impacts above threshold values via rectification and/or compensatory mitigation is recommended. The ecological compliance review report will generally address impacts to these habitats.</p>	<p><i>High</i></p> <p>Monitoring information on these habitats has the highest priority. Together with the late-successional shrub-steppe habitats these areas represent a mosaic of good condition native habitat interspersed with some poorer quality habitat areas that may contain a non-native species component. How these respective habitat areas function ecologically relative to one another is poorly understood; however, combined they represent most of the land area of Hanford, especially on the Columbia River plain.</p>	<p><i>Low</i></p> <p>Absolute protection from impacts is a low priority.</p>
Rare habitats	<p><i>High</i></p> <p>Avoid the impact. Impact management will rely initially on land-use “zoning” restrictions arising out of the <i>Final Hanford Comprehensive Land-Use Plan Environment Impact Statement (HCP EIS)</i> (DOE 1999).</p>	<p><i>Medium</i></p> <p>Level assignment does not indicate a lower level of importance for these areas; instead, it reflects that monitoring here will focus on ensuring conditions within these areas are not degrading. Additionally, monitoring information from these areas will serve as controls for the resources identified for high level status monitoring.</p>	<p><i>High</i></p> <p>Protection from all human-induced impacts is the top priority for these areas.</p>
Element occurrences	<p><i>High</i></p> <p>Avoid the impact. Impact management will rely initially on land-use “zoning” restrictions arising out of the <i>Final Hanford Comprehensive Land-Use Plan Environment Impact Statement (HCP EIS)</i> (DOE 1999).</p>	<p><i>Medium</i></p> <p>Level assignment does not indicate a lower level of importance for these areas; instead, it reflects that monitoring here will focus on ensuring conditions within these areas are not degrading. Additionally, monitoring information from these areas will serve as controls for the resources identified for high level status monitoring.</p>	<p><i>High</i></p> <p>Protection from all human-induced impacts is the top priority for these areas.</p>

Table 7.1 Management Levels for Landscape Attributes of Concern at Hanford (continued)

Landscape Attribute	Classes of Management Actions		
	Impact Management Level	Status Monitoring Level	Preservation Level
Designated compensatory mitigation/ habitat improvement areas (see Table 4.5 and Section 4.3.3)	<p><i>High</i></p> <p>Avoid the impact. Impact management will rely initially on land-use “zoning” restrictions arising out of the <i>Hanford Remedial Action Environmental Impact Statement and Comprehensive Land-Use Plan</i> (DOE 1999)</p>	<p><i>Special</i></p> <p>See Section 6.4.4.</p>	<p><i>Special</i></p> <p>Protect from human-induced impacts for as long as needed to fulfill the mitigation commitment for which they were established.</p>
Designated onsite habitat restoration or rectification areas (see Table 4.5)	<p><i>Medium</i></p> <p>Avoid impacts to the maximum extent possible and minimize unavoidable impacts. Mitigation of residual impacts via rectification and/or compensatory mitigation is recommended. The ecological compliance review report will specifically address impacts to designated onsite habitat restoration and rectification areas.</p>	<p><i>Special</i></p> <p>See Section 6.4.4.</p>	<p><i>Medium</i></p> <p>Protection from impacts is strongly encouraged but not mandatory.</p>
<p>^a Some areas considered wetlands, specifically sloughs along the Columbia River and Snively Creek on the ALE Unit, are included with rare habitats for the purpose of identifying preservation priorities.</p>			

restoration, is considered special case monitoring and will be conducted in accordance with Section 6.4.4.

The low, medium, and high levels identify the priority each attribute will receive within the monitoring strategy. Thus, as compared with resources identified for low- and medium-level status monitoring, the frequency of monitoring, its extent, and the number of monitoring locations will be the most intensive for resources identified for high level status monitoring.

The levels outlined in Table 7.1 indicate different priorities for preservation. There are three levels and one special case. Preservation refers to a management action that specifically targets certain resources for protection from any human-induced

impacts. Thus, these are resource areas whose primary land use at Hanford is the preservation of their biological resource values. The Level IV resource areas, rare habitats, and element occurrences, fall into this land-use category. Compensatory mitigation areas and their associated habitat improvement areas represent a special case of preservation. These areas will be protected from human-induced impacts for as long as they are needed to fulfill the mitigation commitment that established them. Wetlands and associated deepwater habitats, except for those areas qualifying as Level IV resources, receive a medium priority for preservation, as do designated onsite habitat restoration and rectification areas. All other habitats receive a low priority for outright preservation.

7.3.2 Priority Habitat and Element Occurrence Management Guidelines

Priority Habitats—The Washington Department of Fish and Wildlife created the Priority Habitat and Species Program to ensure species and habitats of concern to the state are identified and managed correctly to ensure their long-term survival. The program develops management recommendations for different priority habitats through a comprehensive review and synthesis of the best scientific information available (www.wa.gov/wdfw/hab/phspage.htm). The program habitat management guidelines applicable to Hanford are still being developed.² Even after they are completed, they should be viewed as dynamic. As better information becomes available, the guidelines are updated. As the management guidelines for Hanford's priority habitats become available, DOE-RL will coordinate with WDFW to determine which recommendations are appropriate and can be implemented (if not already in place at Hanford).

Element Occurrences—The Washington Natural Heritage Plan (www.wa.gov/dnr) identifies different terrestrial, wetland, and aquatic ecosystem elements that are present in the state. The Natural Heritage Plan assigns to each ecosystem element a priority ranking based on the element's rarity, the degree of threat to its continued existence, and the adequacy with which it is currently protected. Terrestrial ecosystem elements usually are defined as plant communities and their dominant species by vegetational layer, whereas wetland and aquatic ecosystem elements are defined by their major physical environmental characteristic. Terrestrial element occurrences (areas qualifying for a priority ranking) for Hanford are shown in Appendix D. Wetland and aquatic element occurrences are included the rare habitat map.

Natural areas are administratively recognized locations, both state and federal, that contain element occurrences (or cells as used by the federal program) and are established for the protection of such occurrences. The ALE Unit is a federally designated Research Natural Area because of the element occurrences it contains.

The Natural Heritage Plan (www.wa.gov/dnr) provides a brief discussion on the management of natural areas. Management should recognize that

protecting just the elements themselves may not be adequate. Consideration also must be given to protecting the ecological processes that sustain the elements. Often what makes the occurrence of an element important is not just its condition; rather, it is the size of the element and its relative isolation from human-induced disturbance that makes it worthy of continued protection. These attributes also contribute to the maintenance of ecological processes.

As a result of the preceding considerations, management actions often can be passive provided the elements themselves are not directly impacted by human activities and adequate buffer areas are maintained around the elements. Management actions can be limited to status monitoring, maintaining the integrity of the natural area's borders, preventing the invasion of non-native species, and enhancing degraded resources that may exist within the natural area's boundary.

Both the ALE Unit and the area south of Highway 24 on the North Slope qualify as areas to be managed as natural areas. Currently, only the ALE Unit has received either federal or state status as a natural area. The DOE-RL will coordinate with the Washington Department of Natural Resources and U.S. Fish and Wildlife Service to manage the area south of Highway 24 on the North Slope as a natural area.

7.3.3 Landscape Processes Requiring Management

Fragmentation of habitat, either by natural or human-induced causes, can result in both a direct loss of habitat and the formation of habitat edges. Both effects can be detrimental to some native wildlife and plants, especially if the edges are unnatural (e.g., if the edge is created by the presence of a road). Unnatural habitat edges, and the associated disturbance that creates them, often are conducive to the establishment of non-native species. Although some species may require the maintenance of a mosaic of habitats, natural disturbance patterns that in the past created these mosaics are now altered by human activities. Instead of mosaics of different kinds of native habitat (i.e., different native shrub or grass dominants) and different seral stages, the human-induced pattern is more often disturbed (e.g.,

² The relationship of Hanford's habitats of concern map to Washington Department of Fish and Wildlife priority habitat designations is described in Appendix D.

contains non-native species) or developed areas interspersed with small patches of perhaps quality habitat.

The management approach at the Hanford Site will be to avoid or otherwise minimize fragmentation of Level II, III, and IV habitats / plant communities of concern. This strategy will be flexible enough to recognize that some fragmentation, such as from firebreaks, may be a necessary management method for increasing the overall resilience of shrub-steppe to disturbance in a human-impacted landscape. An avoidance strategy can be achieved in part by including within the ecological compliance review process an evaluation of whether a proposed action results in adverse fragmentation and by adhering to the land-use “zoning” restrictions referred to in Section 7.3.1 in which fragmentation becomes a major constraint. Additionally, when habitat improvement areas for compensatory mitigation are selected, the areas ability to recreate connectivity between habitat patches should be considered.

7.4 Administrative Designations Related to Resource Protection Areas

Some areas of the Hanford Site have administrative designations that to some degree have a biological resource protection element. Such designations can relate to particular geographic portions of the Site, particular resource areas, areas held under lease, withdrawn public land, or buffer areas that serve as protected areas for species of concern.

7.4.1 Hanford as a National Environmental Research Park

The National Environmental Research Park Program was established by DOE in the 1970s to set aside land for ecosystem preservation and study and environmental education (DOE 1994). The Hanford Site is one of seven such DOE sites. The Hanford National Environmental Research Park’s specific purpose is to provide a protected area for research demonstrations and education in ecology (PNL 1977). Procedures for the administration of

the Hanford area can be found in PNL (1977). Although execution of program missions of DOE sites must be ensured, ongoing environmental research projects and protected natural areas must be given careful consideration in any site-use decisions within a NERP (DOE 1994, Appendix: Charter for the National Environmental Research Parks).

7.4.2 Hanford Reach National Monument

In June 2000, President Clinton signed Proclamation 7319, establishing the Hanford Reach National Monument under the Antiquities Act of 1906 (34 Stat. 225 16 U.S.C. 431). The 195,000-acre Monument includes the Hanford Reach of the Columbia River, the Saddle Mountain National Wildlife Refuge, and parts of the Hanford Site—the Fitzner / Eberhardt Arid Lands Ecology Reserve Unit, Wahluke Unit, Hanford Dunes, and the old White Bluffs townsite. The U.S. Fish and Wildlife Service manages the Monument and is in the process of developing a management plan.

7.4.3 Arid Lands Unit

The ALE Unit was also designated the Rattlesnake Hills Research Natural Area as a result of an inter-agency federal cooperative agreement (PNL 1993). Designation of the ALE Unit as a research natural area was specifically identified in the permit by which DOE-RL transferred management authority to the U.S. Fish and Wildlife Service.³ Natural areas are examples of relatively unaltered ecosystems that represent storehouses of natural diversity. They are set aside to serve scientific and educational purposes and to act as baselines for comparison with similar, but intensely managed, areas. The state of Washington tracks the occurrence and status of natural areas throughout the state, including those on federal property. Research Natural Areas are the federally administered equivalent to the state of Washington system of natural areas. The ALE Unit currently is managed by the U.S. Fish and Wildlife Service.

The ALE Unit constitutes the single largest track in the federal RNA system for Oregon and Washington (Franklin et al. 1972; Rickard 1972). The

³ Section 1 of the U.S. Department of Energy, Richland Operations Office (DOE-RL) renewable land use permit—which grants the U.S. Fish and Wildlife Service use of the Fitzner / Eberhardt Arid Lands Ecology Unit— requires that the “FWS’ use of the property shall be for the purpose of operating the ALE Unit as a Research Natural Area.”

management of the ALE Unit is accomplished via the ALE Facility Management Plan (PNL 1993).

Because of the ALE Unit's status as an RNA, its management stresses the protection of biological resource values. Highlights of the ALE Unit's management requirements include:

- access is restricted to those activities related to research, education, Native American cultural practices, or facility/infrastructure maintenance
- agriculture and domestic livestock grazing are prohibited, except for experimental purposes
- access for mineral and energy resource exploitation is prohibited with the exception of two borrow sites located alongside Highway 240
- vehicular traffic off of established roads is expressly prohibited.

7.4.4 Areas Containing Element Occurrences

Areas containing a significant number or size of individual element occurrences can best protect these examples of rare plant communities and other natural features if they are managed as natural areas. The ALE Unit is a federally recognized natural area. Although not formally registered with the state of Washington's natural area system, the state's Natural Heritage Program data base does include the ALE Unit de facto because of its RNA status (WDNR 1995). Information gathered by The Nature Conservancy of Washington in 1994, 1995, and 1997 (TNC 1995, 1996, 1998, and 1999) and by the Natural Heritage Program in 1996 added additional element occurrence information for the ALE Unit (see Appendix D for details).

The TNC study also identified element occurrences on the North Slope south of Highway 24 (TNC 1995). These areas, leased to USFWS and WDFW, are not located within a formally designated natural area.

The 1997 TNC surveys (TNC 1998) and subsequent work by the Natural Heritage Program resulted in additional element occurrences on central Hanford.

The state of Washington's law (Revised Code of Washington 79.70) and regulations (Washington Administrative Code 332-60) regarding natural areas enable registration or execution of a cooperative agreement concerning protection of federal

natural areas, even if they are already protected, as components of the statewide Natural Area System (WDNR 1995).

7.4.5 Mitigation/Restoration Areas

Compensatory mitigation areas and their associated habitat improvement areas, once designated, are to be managed as Level IV resources. Thus, they will be:

- protected from impact for the length of time their presence is necessary to fulfill a mitigation commitment
- monitored to determine if mitigation commitments are met.

Should it be necessary to acquire a mitigation area off the Hanford Site to accomplish the mitigation goal, the area shall be administratively protected and managed. Mechanisms to accomplish this include:

- legislative set-aside or protective designation for public lands
- acquisition of a conservation (wildlife) easement
- acquisition of land in fee title or exchanges of land
- partnerships with natural resource agencies and other entities for management.

Onsite rectification and restoration areas, once designated, are to be managed as Level III resources. Thus, they will be:

- mitigated to replace their lost resource values should it be necessary in the future to impact their location
- monitored to determine if mitigation/restoration commitments are met.

7.4.6 Collection/Propagation Areas for Native Plant Materials

Mitigation and restoration actions at Hanford will require plant material that is locally derived (Section 7.2). The *Biological Resources Mitigation Strategy* (DOE-RL 1996) describes a number of approaches for acquiring such material. Depending on the approach taken, locations on Hanford may be used either as seed/transplant collecting sites or as areas

dedicated to the propagation of seeds (i.e., native grass farm) or of transplants (i.e., native plant nursery). To ensure that existing Site resources are not adversely impacted by such activities, the following requirements are established.

Seed collection shall cause negligible impact to existing resources. The method of collection shall leave the host plants intact. Excessive compaction or disturbance of the soil as a result of the collection method shall be avoided. No new access roads shall be built. As much as possible, seed collection should concentrate on the target species and not disrupt seed set in non-target species. Seed collection areas should be mapped for future reference. If not already identified as an area that contains a habitat/plant community of concern, the collection site should be evaluated for such designation.

Areas to be used for collecting transplant material generally should be located near the site where the plants will be replanted. The same restrictions described for seed collection sites relative to soil disturbance (other than that needed to remove a plant), road construction, non-target species, and mapping apply for transplant sites as well. Additionally, collection of transplant material should not result in the creation of extensive bare areas. The community shall be left in a viable condition. Sites to be used as a source of transplant materials require an ecological compliance review (unless the collecting site is to be disturbed as part of project already has been so reviewed).

Siting a native plant nursery or native grass farm will be in areas that do not qualify as habitats of concern and, as much as possible, are located next to existing roads. Siting such a facility will require an ecological compliance review.

7.4.7 Properties Used Under Permit and Leased Properties

Properties Used Under Permit that are Principally Managed to Protect their Biological Resource Values— The DOE-RL makes properties that serve as buffer zones during Hanford environmental restoration available to both the USFWS and WDFW for management. All of those properties are within the recently designated Hanford Reach National Monument.

The USFWS-managed properties include three distinct units, each with somewhat different management objectives. The ALE Unit is managed as a federal Research Natural Area as a condition of the permit (97-SID-311) from the DOE-RL. The Saddle Mountain Unit is managed for site preservation, and the Wahluke Unit is managed for recreation. Planning for future management of these three units is in progress by the USFWS, and is subject to the development of a management plan that is consistent with the DOE-RL's environmental restoration mission and the recently established national monument status of the Hanford Site. In addition, the Washington Department of Fish and Wildlife manages the Vernita Bridge Fishing Access Area, which lies west of Vernita Bridge, north of the Columbia River, and south of State Highway 223. Both the USFWS and WDFW land management agreements are by 30-day revocable permit.

- Domestic livestock grazing is not permitted on any DOE land.
- No new agriculture is permitted without the approval of DOE's Office of Site Services.
- No motor-powered off-road motor vehicles for recreational use are permitted; human-powered transportation must stay on established roads or designated pathways.
- Revegetation practices shall be consistent with the intent of maintaining native flora and fauna.

*Leased Properties—*The DOE-RL leases portions of the Hanford Site for a variety of purposes not related to biological resources management. Lease renewals and new leases should consider the provisions of BRMaP and, as appropriate, requirements for leaseholders should be consistent with BRMaP.

7.4.8 Bureau of Land Management and Bureau of Reclamation Parcels

*Bureau of Land Management—*Certain parcels scattered across the Hanford Site are Bureau of Land Management withdrawn lands that have been transferred to the control of DOE-RL. The Bureau retains an interest in these parcels, in part because of their natural resource values. Thus, DOE-RL, subject to its other mission requirements, will consider using these parcels in a manner that protects the quality

of natural resource values present and thereby provides food and habitat for fish and wildlife.

Bureau of Reclamation—Bureau of Reclamation parcels are concentrated on the North Slope. The DOE-RL uses Bureau of Reclamation parcels under a Memorandum of Agreement. Reclamation retains the right to construct, operate, and maintain the irrigation infrastructure on these parcels. An indirect result of some of this infrastructure has been the artificial creation of wildlife habitat (i.e., irrigation return ponds).

7.4.9 Species of Concern Administrative Control Areas

Bald Eagle Buffer Zones—The *Bald Eagle Site Management Plan* (Fitzner and Weiss 1994) specifies six primary night roost locations. All these locations require buffer zones to preclude disturbance of eagles, a state and federal threatened species, or their roosting habitat. Additionally, three locations at which eagles have attempted nesting are identified. One of these locations currently requires a buffer zone. These seven locations and their buffer zones are shown in Figure D.25.⁴ Buffer zone size is an 800-m radius circle. An exception is for the roost site at 100 K Area. Here, the buffer zone does not extend northeast beyond the fenceline between the roost and 100 K Area (the fence is within 100 m of the roost).

To avoid direct impacts to the eagles themselves, the buffer zones have temporal limits of November 15 to March 15 for the primary night roosts and January 1 to August 15 for nest locations (the actual duration of the latter timeframe is dependent on whether birds continue the nesting cycle instead of abandoning the site; Fitzner and Weiss 1994). Although a variety of activities, precluded when eagles are present, can occur outside these temporal limits, permission to conduct activities within buffer zones does not extend to activities that would result in modifications to the habitat (at all times of the year).

Fall Chinook Salmon and Steelhead Spawning Locations—Appendix D shows the locations of the major fall chinook salmon and steelhead spawning

areas within the Hanford Reach. All DOE-RL activities will be conducted in a manner that avoids or minimizes impacts to these areas.

Ferruginous Hawk Buffer Zones—At Hanford, most ferruginous hawks, a state threatened and federal candidate species, nest on transmission towers isolated from human activities (Fitzner et al. 1994). To avoid disturbing nesting ferruginous hawks, Fitzner et al. (1994) recommended avoidance of nest locations from March 1 through August 1 with a buffer distance of 1 km. Active or potentially active nest sites (i.e., historic nest sites should be avoided after March 1 until it is certain a particular location will not be used for nesting that breeding season) are to be avoided as described above. Impacts to nest substrates that occur during the non-breeding season are to be appropriately mitigated (e.g., if a historic nest platform is removed, an artificial platform should be erected elsewhere).

Plant Species of Concern (Level III and IV) Population Locations—Documented locations of plant species of concern populations are concentrated along the Hanford Reach, on the ALE Unit and Umtanum Ridge, and to a lesser extent in the central core. All these areas have been designated for some level of protection based on the combination of their resource values; therefore, no specific administrative areas for the protection of plant species of concern are recommended at this time.

7.5 Domestic Livestock Grazing

Domestic livestock grazing is not permitted within the central core area of Hanford because grazing is not compatible with activities associated with environmental restoration work being conducted by the DOE-RL. Grazing is also excluded from the balance of the Hanford lands outside the central core, including lands managed both by the DOE-RL (McGee Ranch and Riverlands) and the USFWS (Fitzner/Eberhardt Arid Lands Ecology Reserve Unit, Saddle Mountain Unit, and the Wahluke Unit) by Presidential Proclamation 7319 that established the Hanford Reach National Monument.

⁴ Subsequent to the issuance of the *Bald Eagle Site Management Plan* (Fitzner and Weiss 1994), eagles have attempted nesting at a fourth location. The location approximates the center point of one of the primary night roost locations that is situated southeast of 100 H Area.

7.6 Agriculture

The Hanford Site presents a number of biological resource management issues relative to agriculture. These include:

- potential agricultural uses of Hanford lands and the impacts of those uses on biological resources
- impacts of wildlife populations that at times migrate from Hanford to offsite agricultural areas
- Hanford's native biodiversity serving as a potential source of biological control agents for agricultural applications
- research value of Hanford's biological resources for evaluating impacts of agricultural chemical drift on natural plant and animal populations.

The only recent use of the Hanford Site for agriculture occurred on the Wahluke Unit when it was managed by the Washington Department of Fish and Wildlife. There, the Department of Fish and Wildlife maintained three separate lease arrangements on lands used for agriculture as well as several small agricultural plots that it maintains itself. The agricultural areas and their use relative to wildlife were as follows:

- a 70-acre parcel just north of the Ringold fish hatchery—10% of the leased area is left standing for wildlife as a grain crop; the remainder is harvested by the leasee.
- a 25-acre portion of a circle pivot field (the remainder is on private property) 5 or so miles north of Ringold on the eastern boundary of the Site—10% of the harvested crop is used to make forage for wildlife (e.g., deer pellets).
- a 12-acre portion of a circle pivot field (the remainder is on private property) 5 or so miles north of Ringold on the eastern boundary of the Site—Washington Department of Fish and Wildlife receives a cash payment from the leasee.
- three to four small plots totaling about 10 acres the Washington Department of Fish and Wildlife maintains to produce wildlife forage.

With the exception of the past wildlife management related farming (above), agriculture is not practiced on the Hanford Site and is not included as part of the land use plan for the future (DOE 1999). There is no specific reference to, or exclusion of, farming

in the Hanford Reach National Monument proclamation. Specific management practices for those portions of the National Monument managed by the USFWS are pending the development of a management plan for the Monument. At the time of this writing, it is unknown whether limited agriculture for the benefit of wildlife will be practiced on lands where such farming occurred in the recent past. It is also unknown whether the USFWS will develop, or has, a policy that specifically prohibits farming for wildlife on national monument lands under their management.

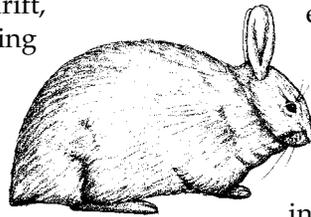
What is clear is that past land conversion in the Columbia Basin Ecoregion outside of Hanford has had a major impact on the occurrence, abundance, and distribution of native species and the habitats they depend on. The significance of impacts from any future planned development, including agriculture, will need to be carefully weighed for the Hanford Site. The Hanford Site now contains a significant amount of the few remaining examples of high-quality shrub-steppe habitat in all of the Columbia Basin Ecoregion.

Several animal species that occur on Hanford have destroyed, or are perceived to have destroyed, crops and livestock on adjacent private property. Issues raised by local farmers and ranchers have included damage to crops by elk and sheep kills by coyotes, both of which supposedly originated from Hanford. Rock doves that occupy Hanford facilities also are known to frequent near-by private feed lots in search of grain. By monitoring populations of animals that are potential agents for damage to nearby agricultural interests and by sharing that information with the Washington Department of Fish and Wildlife and other agencies involved in wildlife management, DOE-RL will be able to minimize potential liability from wildlife damage claims.

The relative isolation of much of Hanford from agriculture has resulted in recent interest from the agricultural research community in using Hanford as a source for identifying parasitic insects with the potential for use as biological pest control agents. There is a general recognition, supported by recent Nature Conservancy studies (TNC 1995, 1996, 1998, and 1999), that Hanford contains perhaps the greatest remaining biological diversity in the North American shrub-steppe. The primary reason is that habitat loss from development and the use of pesticides elsewhere have resulted in the

elimination of many insect species. Substantial social and economic values may be derived from identifying pest-controlling predatory insects from within the biologically diverse fauna at Hanford. These values should be considered in any land-use decisions that could act to reduce biological diversity on the Hanford Site.

Since 1993, the U.S. Environmental Protection Agency has conducted herbicide drift-related studies on Hanford. The question being studied is whether agricultural herbicide drift is having a detrimental impact on native plants. Because of its large size and relative isolation, portions of the Hanford Site have been used as control areas for evaluating pesticide drift. Areas adjacent to agricultural fields are not suitable because they may be within the drift impact area of locally applied chemicals. Thus, the Hanford natural plant community, to the extent that it is remote, and free from herbicide drift, provides a research laboratory for evaluating impacts of agriculture on the environment. Hanford's importance as a control area should be considered in any land-use decisions that could act to impact native plant communities on the Hanford Site.



The following specific management actions are established in regard to road/railroad/utility corridor maintenance and usage and their impact on biological resources of concern:

- identify and post all roads for seasonal or limited access that approach known primary roost and nesting locations for sensitive bird species (e.g., bald eagles and ferruginous hawks).
- identify unimproved roads that transect Hanford habitat of concern areas and post closure signs that identify the roads as closed to vehicular traffic unless entry is required for official business.
- through the ecological compliance review process, advise on an annual basis all road, railroad, and utility corridor maintenance organizations on the Hanford Site of the occurrence (general locations), seasons of use, and sensitivity of nesting migratory birds, raptors, and other species of concern that could be adversely impacted by routine maintenance activity. These organizations should incorporate this information into their maintenance planning schedules to minimize adverse impacts to disturbance-sensitive species.

7.7 Road/Railroad/Utility Corridor Construction, Maintenance, and Usage and Off-Road Restrictions

Because it leads to habitat fragmentation, new road/railroad/utility corridor construction should be avoided. When new roads/railroads/utility corridors are unavoidable, they should be built, as much as possible, through already disturbed areas. Roads/railroads/utility corridors shall not be built through Level IV resource areas.

Road/railroad/utility corridor maintenance shall account for the biological resource values of the surrounding area and avoid unnecessary disturbances. Seldom-used roads should be closed to vehicular traffic when it is necessary to protect disturbance-sensitive wildlife species. When resources become available, roads that are no longer needed should be replanted with native vegetation.

No vehicles are permitted off established roads on the Hanford Site unless specifically approved by DOE-RL's Office of Site Services for conducted work activities or if required by an emergency situation. Before vehicles will be permitted off-road as part of a work activity, the activity generally will require an ecological compliance review. The Hanford Biological Resources Laboratory can be contacted for assistance in determining whether a review will be necessary.

Additionally, no motor-powered or mechanized off-road recreational vehicles are permitted onsite, including properties used under permit and leased properties. A Hanford Site policy that in general prohibits all off-road driving and the use of recreational off-road vehicles on Hanford will be advertised by the Office of Site Services in appropriate Hanford Site publications generally accessible to Site employees. This policy also will be made available to permit and lease holders.