

Chapter 7. Environmental Effects

This chapter provides an analysis of the environmental consequences of implementing the alternatives described in Chapter 2. Impacts are described for the main aspects of the environments described in Chapters 3 through 6, including physical, biological, cultural, and socio-economic resources. The alternatives are compared “side by side” under each topic, to facilitate comparison. Both adverse and beneficial effects of implementing each alternative are described. The cumulative effects on the environment from implementing the various alternatives are presented in Section 7.7.

7.1 Summary of Effects

Table 7.1 provides an overview of the effects under each alternative by indicator. Effects are described in terms of the change from current conditions. Thus, Alternative 4, the no-action alternative (current management) has a neutral effect because no changes to management programs would occur under this alternative.

Although the analysis shows that none of the alternatives would be expected to result in significant effects, some positive (beneficial) or negative effects are expected. The terms intermediate, minor, and slight, are used to describe the magnitude of the effect. To interpret these terms, intermediate is a higher magnitude than minor, which is of a higher magnitude than slight. The word neutral is used to describe a negligible or unnoticeable effect compared to the current situation. For more detail, please refer to the remainder of Chapter 7.

Table 7.1 Summary of Effects under CCP Alternatives

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
EFFECTS TO WILDLIFE AND HABITATS				
Effects to Waterfowl	Intermediate positive effects from wetland improvements, increase in moist soil acreage, additional acreage planted to corn and other crops, and staggering of post-hunting crop knockdown.	Minor positive effects from wetland habitat improvements, moist soil acreage increase, and staggering of post-hunting crop knockdown.	Overall, minor negative effect stemming from combination of: loss of crop acreage, decrease in moist soil area, lack of actions to maintain open water in wetland areas, and lack of late or early season knockdown.	Neutral effect – same habitat actions as at present.
Effects to Shorebirds	Neutral effect – same habitat management as at present.	Minor positive effects from seasonal addition of habitat along river, seasonal fall flooding of some moist soil areas, and management of existing habitats to prevent vegetation encroachment, uplands habitat improvements for curlews, and	Slight positive effect from upland habitat improvements for curlews, and additional sanctuary at McCormack Slough.	Neutral effect – same habitat management as at present.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
		additional sanctuary at McCormack Slough.		
Effects to Threatened and Endangered Species	Neutral effect	Minor positive effect to bald eagles from improvements in riparian habitat and increase in cottonwood recruitment. Minor positive effect to salmonids through study and potential implementation of rearing habitat improvements.	Slight positive effect to bald eagles from improvements in riparian habitat and increase in cottonwood recruitment. Minor positive effect to salmonids through study and potential implementation of rearing habitat improvements.	Neutral effect – same habitat management as at present.
Effects to Wetland Habitats and Associated Wildlife	Intermediate positive effect stemming from habitat improvements. Public use disturbance would remain about the same as at present.	Overall neutral effect due to minor positive effects from habitat improvements but minor negative effects from new public use facilities that may increase disturbance.	Overall slight negative effect due to slight habitat improvement but minor negative effects from new public use facilities that may increase disturbance.	Neutral-slight positive effect as habitat improvement would proceed at about the same rate as at present and public use disturbance would remain about the same as at present.
Effects to Riparian Habitats and Associated Wildlife	Neutral effect – approximately same amount of habitat work as at present and about same level of public use disturbance as at present.	Minor positive effect stemming from habitat improvements. Public use disturbance would increase in some areas but these negative effects will be localized and limited to trails and thus are considered largely negligible.	Neutral-slight negative effect overall stemming from minimal habitat improvement work done and increase in disturbance effects in some areas (these disturbance effects will be localized and limited to trails and thus are considered largely negligible).	Neutral effect – approximately same amount of habitat work as at present and about same level of public use disturbance as at present.
Effects to River Islands and Associated Wildlife	Neutral effect – approximately same amount of disturbance as at present.	Intermediate positive effect – all islands closed to beach use and buffer enforced, reducing disturbance to island wildlife; a no-wake zone within 100 feet of islands and some restrictions on fishing tournament access near islands will reduce disturbance to island wildlife.	Intermediate positive effect – all islands closed to beach use and buffer enforced, reducing disturbance to wildlife; a no-wake zone within 100 feet of islands and some restrictions on fishing tournament access near islands will reduce wildlife disturbance.	Neutral effect – approximately same amount of disturbance as at present.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Effects to Shrub-Steppe Habitats and Associated Wildlife	Mostly neutral effect- approximately same amount of habitat improvement work as at present. Public uses mostly similar to present thus neutral effect from these.	Minor positive effect from habitat improvements, restoration of degraded habitats, and bitterbrush plantings. Public use disturbance would increase in some areas but these negative effects will be localized and limited to trails and thus are considered largely negligible.	Intermediate positive effects from habitat improvements, restoration of degraded habitats, and bitterbrush plantings. Public use disturbance would increase in some areas but these negative effects will be localized and limited to trails, thus are considered largely negligible.	Neutral effect – same amount of habitat improvement work as at present. Generally about the same level of public use disturbance as at present.
Effects to Talus, Outcrop, and Cliff Habitats and Associated Wildlife	Slight positive effect. Additional inventory and law enforcement would further protection efforts.	Slight positive effect. Additional inventory and law enforcement would further protection efforts.	Minor positive effect. Additional inventory, law enforcement, and corridor protection plan would further protection efforts.	Neutral effect.
PHYSICAL ENVIRONMENT EFFECTS				
Effects to Hydrology	Slight increase in water demand from more acres of croplands requiring irrigation.	Neutral effect	Slight decrease in water demand from fewer acres croplands requiring irrigation.	Neutral effect
Effects to Water Quality	Intermediate negative effects from herbicide or pesticide use on croplands, restored uplands, riparian, and aquatic areas.	Minor negative effects from herbicide or pesticide use on croplands, restored uplands, riparian, and aquatic areas.	Minor negative effects from herbicide or pesticide use on croplands, restored uplands, riparian, and aquatic areas.	Neutral effect
Effects to Air Quality	Slight negative impact stemming from gains in wildlife control efforts, offset by additional wind erosion of disked lands.	Slight positive impact stemming from gains in wildlife control efforts.	Slight positive impact stemming from gains in wildlife control efforts and diminished acres of croplands subject to wind erosion.	Neutral effect
Effects to Visual Quality	Neutral effect	Very slight negative impact from additional facilities.	Very slight negative impact from additional facilities.	Neutral effect

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
SOCIAL EFFECTS				
Overall visitation	Minor rise due to demographic trends, rising demand for outdoor recreation, and some Refuge actions to improve facilities and programs.	Intermediate rise due to demographic trends, rising demand for outdoor recreation, and Refuge actions to improve facilities and programs.	Intermediate rise due to demographic trends, rising demand for outdoor recreation, and Refuge actions to improve facilities and programs.	Minor rise due to demographic trends and rising demand for outdoor recreation.
Opportunities for Quality Wildlife Observation and Photography	Neutral to slightly negative effect because more visitors would arrive at the Refuges but the number of facilities available to accommodate them would remain approximately the same.	Minor positive effect because facility enhancements and habitat management actions would increase opportunities to see wildlife.	Minor positive effect because facility improvements and habitat management actions would increase opportunities to see wildlife.	Neutral to slightly negative effect because more visitors would arrive at the Refuges but the number of facilities available to accommodate them would remain approximately the same.
Opportunities for Quality Hunting	Neutral to minor positive overall effect stemming from: slight increase in acres available for hunting; several positive measures enhancing food availability and quality for waterfowl and gamebirds; other actions to reduce crowding and increase quality of hunt; phaseout of pheasant augmentation.	Neutral to slight positive effect overall stemming from approximately equal area available for hunting; slight increase in the area managed for waterfowl food; gain in area restored to shrub-steppe; other management actions to increase quality of gamebird hunt; and phaseout of pheasant augmentation.	Minor negative effect overall due to slight loss in acres available for hunting, loss in area available for waterfowl food, and lack of other management actions to increase quality of hunt; and phaseout of pheasant augmentation.	Neutral effect due to hunting acres and habitat management remaining the same as present.
Opportunities for Quality Fishing	Minor positive effect because of facility improvements and emphasis on education and orientation for	Minor positive effect because of facility improvements and emphasis on education and orientation for fishing visitors and because improved water	Mostly neutral effect because of lack of actions to improve facilities or improve wetland habitats. Some temporary loss of shoreline fishing	Neutral effect because of lack of actions to improve facilities or improve wetland habitats.

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
	fishing visitors and because improved water quality in Refuge ponds and sloughs through carp eradication efforts and vegetation management.	quality in Refuge ponds and sloughs through carp eradication efforts and vegetation management.	access areas could occur for habitat improvement projects.	
Opportunities for Quality Environmental Education	Slight positive effect because of staffing strategies that could result in enhanced volunteer support for the program.	Minor positive effect because of staffing strategies, trail improvements, and interpretation improvements that could enhance the program.	Minor positive effect because of trail improvements, and interpretation improvements that could enhance the program.	Neutral effect
Opportunities for Quality Interpretation	Minor beneficial effects due to inclusion of a consolidated McCormack facility and the kiosks at major fishing sites.	Intermediate beneficial effects due to additional interpretive pull-outs and signs along Highway 14, additional interpretive areas along trails at McNary and Wallula Units, by establishing an interpretive station at a consolidated visitor contact facility at McCormack Unit, and by providing kiosks at fishing sites.	Slight beneficial effect due to additional interpretive materials at McNary Headquarters Unit.	Neutral effect - no changes to interpretive facilities.
OTHER EFFECTS				
Effects to Cultural and Historic Resources	Intermediate potential for negative effects from wetland restoration work, upland restoration and disking associated with crops and moist soil management. Minor positive effects from various proactive measures taken for protection and management of cultural resources.	Minor potential for negative effects from: wetland restoration work; upland restoration disking associated with crops and moist soil management; construction of owl burrows; and increased trails and public facilities. Minor positive effects from various proactive measures taken for protection and management of cultural resources including closure of beach use.	Minor potential for negative effects from upland restoration and disking associated with croplands and moist soil work, and from increased trails and public facilities. Minor positive effects from various proactive measures taken for protection and management of cultural resources including closure of beach use.	Neutral effect

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Amount of Illegal Use	Minor-intermediate positive effects due to actions to deter illegal uses.	Minor-intermediate positive effects due to actions to counter illegal uses.	Minor - intermediate positive effects due to actions to counter illegal uses.	Neutral effect
Effects to Environmental Justice	Neutral to slightly positive effects on human health, and the social environment.	Neutral to slightly positive effects on human health, and the social environment.	Neutral to slightly positive effects on human health, and the social environment.	Neutral to slightly positive effects on human health, and the social environment.
Economic Effects	Minor-intermediate positive effect due to increased operational and visitor expenditures.	Intermediate positive effect due to increased operational and visitor expenditures.	Minor positive effect due to increased operational and visitor expenditures.	Neutral effect.
Cumulative Effects	Improvement of the capability of the Refuges to provide wintering food for waterfowl, with less emphasis on habitat improvements for other native species. However, actions will not reverse or halt the regional trend towards reduced biological integrity within the Columbia Basin.	Active improvement of shrub-steppe, riparian, and wetland habitats would increase or maintain the value of Refuge habitats for a wide variety of native fish and wildlife. However, actions will not reverse or halt the trend towards reduced biological integrity within the Columbia Basin. Biological diversity would probably remain about the same. Invasive species could become more prevalent on surrounding lands but on the Refuges, active efforts would be made to reduce their populations. The Service would improve the availability and quality of wildlife-dependent recreation, but regionally there would be little cumulative difference in recreational opportunity.	Active improvement of shrub-steppe, riparian, and wetland habitats, would increase or maintain the value of Refuge lands and waters for a wide variety of native fish and wildlife. However, actions will not reverse or halt the regional trend towards reduced biological integrity within the Columbia Basin. The Service would improve the availability and quality of wildlife-dependent recreation, especially under Alternatives 2 and 3, but within a regional context, there would be little cumulative difference in recreational opportunity.	Some improvement of shrub-steppe, riparian, and wetland habitats, would increase or maintain the value of Refuge lands and waters for a wide variety of native fish and wildlife. Invasive species could become more prevalent on surrounding lands and on the Refuges themselves.

7.2 Effects to Species and Habitats

Adverse effects to fish and wildlife species and habitats are considered significant if:

- An action would result in a substantial change in the amount or quality of available habitat for a wildlife species. (For wintering waterfowl, other migratory birds, or native resident wildlife, a substantial reduction in habitat resulting in a significant adverse impact would be defined as a reduction of 30 percent or more of the available acreage or 50 percent of the quality of habitat for these species within the Refuge; a significant beneficial impact would be defined as a 30 percent or greater increase in the quantity or 50 percent increase in the quality of habitat for wintering waterfowl, other migratory birds, or native resident wildlife).
- An action would substantially change the availability of habitat for interjurisdictional fish.
- An action would result in a substantial adverse effect; either directly or through habitat modifications, on any Federal threatened, endangered, candidate, or special concern wildlife or fish species. Also included would be species listed threatened or endangered by either Oregon's or Washington's Department of Fish and Wildlife.
- A substantial portion of native habitat would be removed or otherwise modified as to accommodate a proposed action.

A. Effects to Waterfowl

Alternative 1: Management to benefit waterfowl would be emphasized and maximized under Alternative 1. Management to open persistent emergent vegetation-choked areas to make them more accessible to waterfowl and encourage the growth of early successional wetland plants would be conducted on nearly 100 wetland acres per year or a total of 1,438 acres under Alternative 1. Carp management would be conducted on 4 wetland units on both Refuges under Alternative 1, to improve the quality of aquatic bed habitats resulting in increased plant and invertebrate forage available to waterfowl. Also under Alternative 1, undesirable invasive species in the wetland emergent zone would be reduced to an average maximum cover of 20% for all wetlands.

Though natural foods provide more balanced nutrition for waterfowl, agricultural crops can provide an easily accessible short-term source of high energy foods (Baldassare and Bolen 1994). The 2,100 acres of cooperatively farmed cropland supporting corn, wheat, and alfalfa on McNary and Umatilla Refuges provide forage for thousands of waterfowl annually, particularly Canada, Snow, and White-fronted geese, mallard, American widgeon, and Northern pintail. Crop acreage under Alternative 1 would be increased to 2,400 acres by replanting 300 acres of currently inactive croplands (25% of the total crop acreage would be available for wintering birds and 75% would be harvested by the cooperating farmer). Increased crop production might help compensate to a small degree, but would not replace, the decline in corn production that has occurred in Umatilla and Morrow Counties, Oregon since the mid-1980's (Figure 4.7). A minimum of 400 to a maximum of 580 acres would be planted to corn and reserved for the birds, and a minimum of 1,000 acres would be planted to green feed (e.g., alfalfa or winter wheat).

Further, Alternative 1 provides for post-hunting season knockdown of crops on 460 acres to extend the period of food availability into early March to benefit early spring migrants such as white-fronted

geese. Alternative 1 proposes increasing current moist soil acreage by 40 acres which would provide an additional source of more natural foods for waterfowl. Additionally, flooding 30 acres of existing moist soil wetlands prior to September 15 would increase the availability of natural foods for early fall migrants, under Alternative 1. All of these activities combined under Alternative 1, if carried out would create better habitat for waterfowl, thereby, possibly increasing the number of waterfowl on both Refuges during migration and winter. All of the habitat improvement activities described above if Alternative 1 is implemented would be beneficial to migrating and wintering waterfowl, however, the overall impact would not be significant.

Alternative 1 also provides for additional waterfowl hunting opportunities by opening a small section of Columbia River shoreline in the northwest part of the McCormack Unit on Umatilla Refuge. This new area would add about four new blinds. This action would result in increased hunter opportunity and perhaps increased waterfowl harvest overall, on the McCormack Unit; however, since the number of blinds is small and are they only available three days per week, the potential increased harvest would not be considered to be significant. No additional areas would be opened to hunting on McNary Refuge.

Alternative 2, which emphasizes all migratory birds, proposes to improve 1,000 acres (67 acres annually) of wetlands over the life of the plan. Carp management would be conducted on 250 acres. Further, under alternative 2, cover of undesirable invasive plants would be reduced to an average of 20% for all emergent wetlands over the life of the CCP.

Alternative 2, which places slightly less emphasis on providing foods for waterfowl than Alternative 1, would maintain cropland at the current level of 2,100 acres with 400 acres to 580 acres of corn reserved for the birds and at least 1,000 acres of green feed available each year. As in Alternative 1, post hunting season knockdown of crops on 460 acres for the benefit of late winter and early spring migrants, would be provided for under Alternative 2. An additional 10 acres of moist soil wetlands would be developed under Alternative 2. Early flooding by September 15 on 30 acres of moist soil wetlands would also be conducted under Alternative 2.

Alternative 2 also proposes opening additional hunting on the McCormack Unit as in Alternative 1 above. However, the East McCormack Slough would be closed to hunting, providing high quality sanctuary habitat for waterfowl, and perhaps offsetting any additional harvest from the new blinds. Overall, the implementation of Alternative 2 would have beneficial effects for waterfowl, however, these effects would not be expected to be significant.

Alternative 3, which emphasizes native biodiversity and historic conditions, provides for no improvement of emergent wetland habitat other than a reduction in undesirable invasive plant cover to an average maximum cover of 20%. Moreover, cropland would be reduced to a maximum of 1,850 acres under Alternative 3, however, this reduction is less than 30% of the total crop acreage, and therefore, not significant. Current inactive cropland and even some active cropland would be restored to shrub-steppe or short grass habitat for curlews. Moist soil acreage would be decreased by five acres under this alternative. Also, there would be early spring knockdown of crops and no early fall flood-up of wetlands under alternative 3.

No additional waterfowl hunting areas would be opened under Alternative 3. Additional sanctuary would be added under this alternative by closing the East McCormack Slough to hunting, likely

resulting in fewer harvested birds. Overall implementation of Alternative 3 would result in negative effects to waterfowl; however, these effects would not be expected to be significant.

Alternative 4 proposes the improvement of 500 acres of wetland habitat by opening up densely vegetated areas. No provision for reduction of invasive plant cover, however, is included in this alternative. Alternative 4 would maintain cropland at the current 2,100 acres with a minimum of 480 acres to a maximum of 580 acres in corn and at least 1,000 acres in green feed. There would be no extended post-hunting season knockdown of crops. Further, under Alternative 4, there would be no additional moist soil wetland acreage developed and no early season flood up of existing wetlands.

None of the 4 alternatives will cause any significant adverse effects to waterfowl. In fact, Alternatives 1 and 2 will have beneficial effects for waterfowl, though not considered significant under our threshold definitions.

B. Effects to Shorebirds

Alternative 2 provides the most benefits to shorebirds and shorebird habitat on the Refuges. Shorebird foraging habitat on the Walla Walla River Delta could increase by approximately 20 acres at times, during peak migration periods in fall and spring, under Alternative 2. This would be accomplished by working with the Corps to establish a soft restraint, to lower the McNary pool to 336-337 feet. Lowering the pool would not occur every day, but perhaps several days per week. Also, under Alternative 2, encroachment by wetland vegetation, both native and nonnative, would be managed to prevent the reduction of mudflats available to shorebirds. With more mudflats available for foraging, the annual shorebird numbers, currently 9,000 to over 10,000 birds, could potentially be increased. Alternative 2 also proposes additional shorebird foraging habitat by flooding 10 acres of moist soil wetlands annually, during August and September, at either the Wallula or McCormack Unit. None of these activities would be carried out under the other three alternatives.

Under Alternatives 2, current curlew breeding habitat would be increased by planting inactive cropland to short grasses, as well as converting some existing cropland to short grass habitat resulting in a net increase of acres.

Closing waterfowl hunting at east McCormack Slough under Alternatives 2 and 3 could benefit late migrating and wintering shorebirds by providing forage and resting habitat. Though potentially beneficial, the overall habitat increase for shorebirds would not be considered significant. Some minor disturbance could still occur on East McCormack Slough in the vicinity of the auto tour route and Heritage Trail as they pass near the slough.

Alternative 3: Alternative 3 includes the measure described under Alternative 2 to plant inactive cropland to short grasses. Under Alternative 3, additional breeding habitat for curlew would also be created by converting existing cropland (Field 5 on Umatilla's McCormack Unit) to short grass habitat. The Refuges would continue to monitor curlew populations by conducting annual spring breeding surveys.

Habitat improvements enacted under Alternatives 2 and 3 would provide beneficial effects to shorebirds, however, the effects would not be considered significant.

Alternatives 1 and 4: Under Alternatives 1 and 4, management efforts would be directed towards maintaining existing curlew habitat with little to no effort put into expanding habitat. The Refuges would continue to monitor curlew populations by conducting annual spring breeding surveys.

C. Effects to Threatened and Endangered Species

Bald Eagle: The McNary and Umatilla Refuges riparian habitats can host as many as 60 bald eagles from fall through early spring. Alternative 2 would potentially provide the most benefits for bald eagles by improving 926 acres of existing riparian habitat, and particularly by providing for 75 acres of cottonwood recruitment and enhancement over the life of the plan. Alternatives 3 and 4 would provide minimal benefits, while Alternative 1 provides no additional habitat benefits. Alternatives 2 and 3 propose closing the East McCormack Slough to waterfowl hunting. This would likely provide more foraging opportunities for eagles due to increased waterfowl present and less disturbance to the eagles themselves. Some of the reduced disturbance to eagles and wetland wildlife may be offset by changes to the auto tour route under Alternative 2; and proposed changes to the Heritage Trail under Alternatives 2 and 3. Overall, Alternative 2 appears to be the best alternative with respect to bald eagles. Any of the beneficial habitat improvements under Alternatives 2, 3, and 4, would not represent significant effects to bald eagles. None of the alternatives would have any significant adverse impacts to bald eagles.

Salmonids: Seven stocks of anadromous salmonids migrate through McNary and Umatilla Refuges via the Columbia, Snake, and Walla Walla Rivers. Backwater areas along the Columbia River such as Casey Pond and Paterson Slough are known to be used by some of these fish, particularly juveniles, in early spring for feeding (Easterbrooks 2000). Under Alternatives 2 and 3, other backwater areas on both Refuges could potentially be enhanced for juvenile salmonid rearing habitat, by breaching dikes and/or removing dense persistent emergent vegetation to provide more access for juvenile salmonids. The feasibility of this and any potential negative consequences, such as the potential for increased predation, would be assessed under Alternatives 2 and 3. If pre-project assessment proves positive, then funding will be pursued to implement projects. The effects to salmonids should be beneficial, but are not considered to be significant. None of the other alternatives call for enhancement of potential salmon habitat.

D. Effects to Wetland Habitats and Associated Wildlife

Alternative 1 (Habitat actions): Management activities proposed under Alternative 1 would provide the greatest benefit for wetlands and wetland-dependent wildlife. Alternative 1 provides for opening up and improving 1,438 acres (approximately 100 acres per year) of bulrush and cattail-choked marsh, providing more open water and a higher diversity of wetland vegetation. Carp management on four wetlands or wetlands units under Alternative 1, would further improve wetlands habitat for the benefit of waterbirds and other aquatic species. Also under Alternative 1, undesirable invasive species in the wetland emergent zone would be reduced to a maximum of 20% average cover for all wetlands.

Alternative 2 (Habitat actions): This alternative proposes to improve 1,000 acres (67 acres annually) of wetlands over the life of the CCP. Carp management would be conducted on 2 individual wetlands or wetland units. Further, under Alternative 2, cover of undesirable invasive plants would be reduced to an average of 20% for all emergent wetlands over the life of the CCP. Effects to wetland

habitats and associated wildlife would be beneficial under both Alternative 1 and 2, but not considered to be significant since the acreage to be improved represents less than 50% of the total wetlands available.

Alternative 3, which emphasizes native biodiversity and historic conditions, does not propose improvement of emergent wetland habitat other than a reduction in undesirable invasive plant cover to an average maximum cover of 20%. Alternative 4 proposes improvement of 500 acres of emergent wetland habitat over the life of the CCP. No provision for reduction of invasive plant cover is included in Alternative 4.

Effects from Public Use: Direct effects to wetland habitat from public use are hard to measure and would likely be minimal. Human disturbance to wetland wildlife is probably more of an issue of concern. Besides the obvious direct impact to game species through shooting, waterfowl hunters traveling to and from blinds in fee hunt areas, and moving through free roam areas, could disturb wintering birds of various species and other wildlife by interrupting foraging or forcing animals out of resting habitat or thermal cover causing an unnecessary expenditure of energy and possibly subjecting them to increased risk of predation or winter weather-related stresses. These disturbances will be quite difficult to measure, and are likely not significant, as waterfowl hunters typically will follow an established trail to get to a blind. Further, waterfowl hunting on many Refuge units is allowed only three days per week. Alternative 1 proposes opening a new area for waterfowl hunting on the Columbia River in the northwest part of McCormack Slough. Although new disturbance would be created around the new blinds on the river, it would likely not be significant. Alternative 2 proposes closing the East McCormack Slough portion of the fee hunt area on Umatilla Refuge, in exchange for a similar number of blinds on the Columbia River in the northwest portion of the McCormack Unit. This would likely result in a net reduction in disturbance to wetland wildlife in general, as East McCormack Slough probably offers better wetland habitat. Alternative 3 would close East McCormack Slough to hunting without opening any new areas, resulting in more undisturbed wetland habitat available during the hunting season for waterfowl and other waterbirds. Under Alternative 4, there would be no change in areas currently open to hunting.

Alternatives 1, 2, and 3 propose a different alignment for a portion of the Heritage Trail. Regardless of which alignment is selected, hikers using the trail will traverse a variety of habitats, including shrub-steppe, riparian, and wetlands. Hikers traveling near wetland areas in winter could disturb waterfowl and other waterbirds, including bald eagles, which could be critical in the winter as explained in the preceding paragraph. As long as hikers stay on the trail, this disturbance should be minimal and overall disturbance should not be significant.

Alternatives 2 and 3 propose establishing a birding trail at Wallula around South Wetland 3. This area is currently open year round. Uses include hunting when the season is open, fishing access, and bird watching. Once the hunting season has concluded, public use likely drops off significantly. Creating a designated, signed trail would likely create more awareness and use of the area at other times, especially in the spring, potentially resulting in more wildlife disturbance. The magnitude of this disturbance is difficult to quantify, however, is not expected to be significant.

Alternatives 2 and 3 propose expanding the existing McNary Headquarters nature trail to loop back to the education center as well as other trail modifications. This area is closed to hunting and therefore,

waterfowl and other waterbirds pack into this wetland unit by the thousands during winter. Wildlife disturbance could be increased by the addition of a loop around this wetland, but would likely not be significant if trail users stay on the trail and/or designated viewing areas.

E. Effects to Riparian Habitats and Associated Wildlife

Alternative 2 (Habitat actions): Alternative 2, which emphasizes management for migratory birds, provides for more riparian habitat improvement than any of the other three alternatives. Sixty-two acres per year of priority riparian habitat would be improved for a total of 924 acres (30% of total priority habitat) improved over the life of the CCP. This improvement would involve control of invasives and planting of native species and would be measured by a change in condition class to the next higher class (e.g., from poor to fair). Cottonwood stands would be improved at the rate of five acres per year for a total of 75 acres under Alternative 2. Effects to riparian habitats and associated wildlife under Alternative 2, though beneficial, would not be considered to be significant since the acreage to be improved is less than 50% of the total riparian acreage.

Alternatives 1, 3, and 4 (Habitat actions): Other than protection of existing riparian areas, Alternatives 1, 3, and 4 will provide little to no improvements for riparian habitat, therefore, providing little to no additional benefits to wildlife species inhabiting riparian areas. Under Alternatives 3 and 4, Refuge management to improve riparian habitats would be limited to five acres annually or 75 acres over 15 years. Any larger project would likely only be carried out if specific project funds are acquired. Under Alternative 1, no riparian improvement would be done.

Public Use Effects: Refuge riparian areas are used by hunters pursuing deer and upland game. Because these activities are basically free roam, it is difficult to quantify disturbance effects. Obviously deer hunting has direct impacts on the deer themselves, however, the activity is necessary and beneficial, in order to keep the deer populations at manageable levels which lessens excessive habitat damage from deer herbivory, and provides a recreational opportunity. Any other disturbance to wildlife from deer hunting is probably not of great concern because it is generally a well regulated activity and occurs early in the fall. Besides the obvious direct impact to game species through shooting, upland game hunters pursuing quail and pheasants in riparian habitats during the latter part of the hunting season could disturb wintering birds of many different species (including bald eagles), and other wildlife, by interrupting foraging or forcing animals out of resting habitat or thermal cover causing an unnecessary expenditure of energy and possibly subjecting them to an increased risk of predation or winter weather-related stresses. This disturbance will be dampened somewhat by the closure of the riparian area around east McCormack Slough to upland hunting, under Alternatives 2 and 3. Disturbances of riparian wildlife from upland game and deer hunters will likely be not significant because in most Refuge units' hunter numbers or days of use are controlled. Further, hunting is a wildlife-dependent compatible use that provides opportunities for recreation that would be considered beneficial.

Alternatives 1, 2, and 3 propose a different alignment for a portion of the Heritage Trail. Regardless of which alignment is selected, hikers using the trail will traverse a variety of habitats including shrub-steppe, riparian, and wetlands. Hikers traversing through riparian habitat in winter could potentially disturb bald eagles and other birds, mule deer, and other wildlife with effects similar to those listed in the preceding paragraph. As long as hikers stay on the trail, any potential habitat damage should not occur and disturbance to riparian birds and other animals should be minimal.

Alternatives 2 and 3 propose a 0.4-mile spur trail leading off the existing McNary Headquarters Nature Trail, northwest to the Corps' Hood Park campground on the Snake River. Part of this trail would traverse riparian habitat. Similar types of disturbance as indicated in preceding paragraphs could occur on this new trail, but would likely be minimized and not significant if hikers stay on the trail.

F. Effects to River Islands and Associated Wildlife

All alternatives (Habitat actions): No significant changes in the amount of island habitat are proposed or expected as a result of any of the alternatives. Corps management of the McNary and John Day pool levels for the benefit of salmon and recreational activities, which is beyond the control of the Refuges, will have more impact on island accretion or degradation. Alternatives 1, 2, and 3 do provide for monitoring and documenting rates of erosion.

Public Use Effects: Alternatives 2 and 3 provide for complete closure of the Umatilla Refuge islands. Therefore, potential habitat and wildlife disturbance would be eliminated under this alternative. Current seasonal swimming and beach use and associated other uses would be eliminated on all Refuge islands. Currently beach use is allowed on three designated sites within the Columbia River Islands: 1) a large sandy beach located on the far, east tip of West Blalock Island; 2) a large sandy beach located on the far, east tip of Big Sand Dune Island; and 3) a sand peninsula (sometimes a small sand island) located on the far, east tip of Crow Butte Island. Big Sand Dune Island supports great blue heron and black-crowned heron nesting colonies. Both West Blalock Island and Big Sand Dune Island support nesting Canada geese. All three islands support other breeding migratory birds, mule deer, and other wildlife. During the waterfowl hunting season both West Blalock and Big Sand Dune are closed to hunting, resulting in thousands of waterfowl and other waterbirds using the shoreline and shallow water around the islands for feeding and resting. Eliminating all beach use, including seasonal summer use, would eliminate any disturbance to colonial nesting birds, waterfowl and geese in particular, passerines including bank swallows, and shorebirds including long-billed curlews and large numbers of migrating shorebirds. Elimination of human disturbance during July will increase bird nesting activities, such as rearing of nestlings, and feeding of fledged but flightless juveniles which would still be occurring in July and early August. Beach users do not always stay on the designated use areas, so other impacts to nesting birds and the proliferation of litter and human waste will be eliminated. Beach use by humans brings the possibility of fire which could damage or destroy nesting habitat, especially the sagebrush habitat used by Canada geese and the large trees used by herons. Loss of either of these habitats would impact long-term future production of young.

Alternatives 2 and 3 would also include a no-wake zone within 100 feet of islands. In addition, special use permits (SUPs) for fishing tournaments would include no-access buffers of 0.5 miles from islands known to be supporting nesting colonies of American white pelicans between 15 March and 31 August, and a no-access buffer of 900 feet from all other Refuge islands from February 15-July 31, to prevent disturbance to nesting colonial birds. Both of these provisions would help minimize disturbance from boating and fishing to colonial birds and other wildlife using the islands.

G. Effects to Shrub-Steppe Habitats and Associated Wildlife

Shrub-steppe habitat protection, restoration, and improvement would receive greater emphasis under Alternative 3 followed by Alternatives 2, 1, and 4 in the order of most beneficial.

Alternatives 2 and 3 (Habitat actions): Alternative 3 provides for the improvement of 288 acres annually in the 15 priority areas resulting in a total of 4,322 acres (45% of the 9,605 total) of shrub-steppe being improved over the life of the CCP. Thirty percent (2,881 acres) of shrub-steppe habitat in the 15 priority areas would be improved over the life of the CCP under Alternative 2, or about 192 acres annually. This improvement would involve control of invasive plants and planting of native species, and would be measured by a change in condition class to the next higher class, e.g., from poor to fair. Restoration of bitterbrush as an important component of shrub-steppe would be emphasized under Alternatives 3 and 2. Alternative 3 would be the most beneficial for shrub-steppe habitat by proposing the planting of 100 acres of bitterbrush over the life of the CCP. Bitterbrush would be planted to 50 acres under Alternative 2. Alternative 3 would provide for the largest net gain of shrub-steppe habitat, by restoring 600 acres of inactive croplands, abandoned gravel pits, unnecessary roads, and waste sites, while Alternative 2 provides for the restoration of 350 acres of these types of areas. Both Alternatives 2 and 3 would provide beneficial effects to shrub-steppe habitat and associated wildlife. However, the expected benefits from implementation of either alternative would not be considered significant because the new acreage and the acreage to be improved represent less than 30% and 50% of current total habitat, respectively.

Alternatives 1 and 4 (Habitat actions): Under Alternative 1, management emphasis would be directed primarily towards waterfowl, waterfowl habitat, and public uses. Management and improvement of shrub-steppe habitats would be secondary and inconsistently conducted depending on budget and staff levels, as is generally the current situation (Alternative 4). While current shrub-steppe acreage would be maintained under both Alternatives 1 and 4, only 10% or 960 acres of priority shrub-steppe habitat would be improved over the life of the CCP, under either alternative. An 85-acre gravel pit area on McNary Refuge and approximately 25 acres of unneeded roads and trails on either Refuge would be restored to shrub-steppe, resulting in a net gain of 100 acres under Alternative 1, but not under Alternative 4. Further, no bitterbrush would be planted under Alternatives 1 and 4. Additionally, under Alternative 1, current inactive croplands on both Refuges could become active again, thus precluding these areas from being restored to shrub-steppe. None of these inactive croplands would be restored to shrub-steppe or reactivated as cropland under Alternative 4. Implementation of Alternatives 1 or 4 would provide some beneficial effects to shrub-steppe habitat and associated wildlife; however, these would not be significant.

Public Use Effects: Refuge shrub-steppe areas will be used by hunters under all alternatives pursuing deer, upland game, and even for pass shooting waterfowl. These activities can impact shrub-steppe habitat and disturb shrub-steppe wildlife. Because these activities are basically free roam, it is difficult to quantify disturbance effects. Obviously deer hunting has direct impacts on the deer themselves, but the activity is provided for under all alternatives, and it is necessary and beneficial in order to keep deer populations at manageable levels which lessens excessive shrub habitat damage due to deer herbivory, and provides a recreational opportunity. Because of the short season length and low number of hunters, habitat damage by deer hunters is likely negligible under all alternatives. Shrub-steppe habitat could be damaged by upland hunter traffic especially in popular areas that attract large numbers of hunters, however, this would also be hard to quantify. Besides the obvious direct

impact to game species through shooting, upland hunters pursuing quail and pheasants in the latter part of the hunting season could disturb wintering birds of many different species and other wildlife by interrupting foraging or forcing animals out of resting habitat or thermal cover, causing an unnecessary expenditure of energy and possibly subjecting them to increased risk of predation or winter weather-related stresses. This kind of disturbance would occur not just in shrub-steppe but in all habitats used by upland hunters including riparian and margins of emergent wetlands. The magnitude of this disturbance is hard to quantify due to the free roam nature of upland hunting. Each year an estimated 2,625 hunters participate in upland bird or small game hunting at McNary and 1,400 at Umatilla. The overall disturbance effect is negative, but mostly minor and not significant under all alternatives because: a) daily upland hunting on most of the units does not begin until noon; and b) on most Refuge units, upland hunting is allowed only three days per week and as the season progresses into the winter months, hunter participation tends to drop off. The McCormack Unit on Umatilla Refuge is the only upland area where the number of upland hunters is controlled by a permit system. Under Alternatives 3 and 4, the number of daily permits would remain at the current level of 25 per hunting day. Under Alternatives 1 and 2, the maximum number of permits per hunt day during the first two weekends would be reduced to 15, serving to dampen the wildlife disturbance effects due to free roam upland hunting, while providing a better quality hunt. Any direct impacts to habitat would, therefore, be reduced. Also, under Alternative 3, a portion of upland hunting habitat adjacent to the East McCormack Slough would be closed to upland hunting as part of the shift in waterfowl sanctuary provided for under Objective 1d, resulting in further disturbance reduction. Overall, shrub-steppe wildlife and habitat disturbance effects due to hunting of upland game and deer are not expected to have significant adverse effects. Further, hunting is a wildlife-dependent, compatible use that provides opportunities for recreation that would be considered beneficial.

Horseback riding is allowed on certain trails and roads on McNary and Umatilla Refuges under all 4 alternatives. One such trail is on the north side of the Wallula Unit. The trail begins at the Madame Dorion boat launch and runs 1.3 miles to the north and east around the north side of Sanctuary Pond ending at Ranger Road. Direct habitat damage to the shrub-steppe habitat from trampling and spread of invasive plant species could result, especially if the trail is heavily used. Horseback riders in spring and early summer could cause disturbance to nesting bird species such as savannah sparrow, western meadowlark, mallards, and California quail. This disturbance could result in the loss of nests and eggs directly from being crushed or from abandonment of the nest by the parent birds. Riders going off trail would cause more physical damage to the habitat and increase the potential area of disturbance to nesting birds, which are probably more of a concern than any other issues. As long as riders stay on the trail, which they are required to do, some of these potential wildlife disturbance impacts would be minimized and the effects not significant.

Alternatives 2 and 3 propose to promote bird watching by signing the Wallula horseback trail which may result in more use of the trail, thus increasing the frequency of disturbance, which should be localized and minimized, provided bird watchers stay on the trail. Bird watchers veering off the trail will increase the area of potential disturbance to nesting birds, and could over time cause damage to the habitat itself.

Alternatives 2 and 3 propose a 0.4-mile spur trail leading off the existing McNary Headquarters Nature Trail northwest to the Corps' Hood Park campground on the Snake River. Part of this trail would traverse shrub-steppe and riparian habitats. Similar types of disturbance as indicated above

could occur on this new trail, however, the effects are not likely to be significant. Other trail modifications and viewing opportunities are proposed for the McNary Headquarters Trail under Alternatives 2 and 3. As long as trail users stay on the trail and at designated viewing platforms, disturbance should be minimized.

Alternatives 1, 2, and 3 propose a different alignment for a portion of the Heritage Trail. Regardless of which alignment is selected, hikers using the trail will traverse a variety of habitats including shrub-steppe, riparian, and wetlands. As long as hikers stay on the trail any potential habitat damage should not occur, and disturbance to shrub-steppe and/or riparian birds and other animals should be minimal, and therefore, not significant.

H. Effects to Talus, Outcrop, and Cliff Habitats and Associated Wildlife

Mining and other extractive activities would be prohibited under all four alternatives; therefore, no change in the amount of these rocky habitats would be expected. Damage caused by recreational pursuits such as rock climbing and rock collecting would be minimal, because these are also prohibited activities under all alternatives. Though these habitats are open to hunting and hiking, much of the areas are inaccessible due to the steepness of the terrain, resulting in minimal habitat damage from these activities.

Alternatives 1, 2, and 3 provide for an inventory of plant and wildlife resources inhabiting these rocky habitats. Alternative 3 also proposes the development of a corridor management plan in partnership with neighboring landowners and other stakeholders. These activities would enhance awareness and management of these areas which should be beneficial in helping the public understand the fragile nature and importance of these habitats. Based on the analysis above, no significant impacts to talus, outcrop, cliff habitats and their associated wildlife are expected to result from implementing any of the 4 alternatives.

7.3 Effects to the Physical Environment

Topics addressed under the physical environment section include direct and indirect effects to hydrology, water quality, air quality, visual quality, and geology/soils. The criteria used in this document to determine if a particular impact represents a significant adverse effect are present below for each topic:

- **Hydrology** – An adverse hydrologic effect is considered significant if an action would result in a >1% reduction in Columbia River or tributary in-stream flows, increased flooding on- or off-site, a further deviation from historical hydrological patterns, or a reduction in the local groundwater table.
- **Water Quality** – Adverse impacts to water quality would be considered significant if the action would violate any water quality standards or waste discharge requirements, substantially increase downstream sedimentation, introduce persistent contaminants (nonpoint source pollution) into the watershed, or otherwise substantially degrade water quality.
- **Air Quality** – implementation of a proposed Refuge action would have a significant direct effect on air quality if the action would result in: emissions equal to or in excess of the standards set in local implementation plans for the Clean Air Act; large areas of soil becoming routinely exposed and subject to wind erosion; or sensitive receptors being exposed to substantial pollutant concentrations, including air toxics such as diesel particulates. Significant indirect effects to air

quality would occur if a proposed Refuge action results in frequent congestion on adjacent roadways. Significant cumulative effects would occur if the “de minimis” (minimum) thresholds developed by the EPA for proposed Federal actions in a nonattainment area are exceeded.

- **Visual Quality** – A proposal that would substantially alter the natural landform, or block public views to a public resource from designated open space areas or public roads, would be considered a significant adverse effect on visual quality.

A. Effects to Hydrology

None of the Refuges’ actions would be expected to have any significant effect on the local hydrology. Under all alternatives, the Service expects to make requests to the Corps for short-term pool level changes, to promote cottonwood regeneration in riparian areas (all alternatives), to allow for temporary drawdown of wetlands in order to eradicate carp (Alts. 1 and 2), and to provide additional mudflat habitat for shorebirds during fall and possibly spring migration. These minor changes to pool level would not significantly alter local hydrological patterns or the current hydrograph of the Columbia River within the vicinity of Lake Wallula or Lake Umatilla.

Under Alternative 1, 300 acres of former but currently inactive cropland would be brought under cultivation in the cooperative farming program, requiring additional irrigation. The water source for the crops would be the Columbia River. The volume required would be small (about 1 acre-foot/acre per year, equivalent to 300 acre-feet annually). Considering that the runoff of the Columbia River measures approximately 139 million-acre-feet annually (Washington Department of Ecology 2004), this withdrawal would not significantly affect the Columbia River hydrograph or local hydrological patterns. Under Alternative 3, cropland acreage would be reduced by about 250 acres overall. The Refuges would draw less water for irrigation under this alternative, with a small beneficial but insignificant effect to instream flows.

B. Effects to Water Quality

Minor short-term impacts to water quality could occur under all alternatives, stemming from the control of invasive plant species. Control would involve mechanical removal and the periodic application of herbicides. Although mechanical removal has the potential to expose soils to wind and water erosion, this activity would be limited largely to the use of hand tools (except in cropland areas) and would focus on individual plant removal, rather than the removal of large areas of vegetation. Therefore, the continuation of this control method is not expected to introduce substantial amounts of additional sediments into the local wetlands or rivers.

The use of herbicides or pesticides to control invasive plants or animals, or to control weeds or pests in croplands, also poses several environmental risks, including drift, volatilization, persistence in the environment, water contamination, and harmful effects to wildlife (Bossard et al. 2000). A larger number of acres would be subject to herbicide or pesticide use under Alternatives 1, the least number of acres would be subject under Alternative 4, and an intermediate numbers of acres under Alternatives 2 and 3 (see Table 7-2).

Table 7-2. Area potentially subject to annual herbicide or pesticide use

Maximum acres treated annually	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Croplands	2,400	2,100	1,850	2,100
Shrub-steppe uplands (areas restored plus areas improved)	164	542	888	64
Riparian	0	62	5	5
Carp Eradication	1,000	250	0	0
Total acres	3,564	2,954	2,743	2,169

Although there are a large number of acres on the Refuges potentially subjected to herbicide treatment, the potential for such risks under this alternative are considered minimal due to the types of herbicides used (non-persistent), the limited number of acres that would be exposed in riparian habitat, the efforts taken to drain wetland areas before eradicating carp, and the precautionary measures taken during application. Effects would not be considered significant under any alternative.

Some additional visitor facilities, kiosks and additional trails, would be established under Alternatives 2 and 3, with minor and short-term potential for water quality impacts during construction. The Refuge Manager’s office at Umatilla Refuge would be moved under Alternatives 1 and 2, potentially causing minor and short-term water quality impacts.

Mechanical soil disturbance would occur on river margins to facilitate cottonwood germination and also on the borders of wetlands to set back succession. This activity, mainly the shallow marsh improvement, would occur on more acres annually under Alternatives 1 (approximately 100 acres/year) than the other alternatives. Alternative 2 (77 acres/year), and Alternative 4 (approximately 30 acres/year) would have an intermediate number of acres disturbed mechanically, and Alternative 3 would have none. Some sedimentation into wetlands on the Columbia, Walla Walla, or Snake Rivers could occur, as a result of this activity, however, compared with sediment input into these rivers that stems from other sources off-Refuge each year (Jay and Naik 2002), this effect would be insignificant.

C. Effects to Air Quality

None of the alternatives would be expected to have significant effects to air quality. Air quality problems stemming from wildfire smoke could decrease slightly under Alternatives 2 and 3, which call for devoting additional resources to reducing wildfires. Any prescribed burning for habitat management would occur under the guidelines laid out in the Refuge’s Fire Management Plan (U.S. FWS 2001). The Service would adhere to all State and local smoke regulations.

The Refuges would experience some increases in visitation over the 15-year time horizon of the CCP (see Section 7.3), with a slightly higher overall increase under Alternative 2 than under the other alternatives. The increased visitation would generate additional traffic on local and Refuge roads. This increase would not degrade local air quality to any significant degree under any of the alternatives.

Local air quality is also influenced by windborne particulates, with bare loose soils being most vulnerable to wind erosion. Under Alternative 3, approximately 250 acres of ground would be restored to shrub-steppe, a change from its current use as annual croplands. Although there would be some time lag in establishing native vegetation during the restoration, this alternative would likely result in the greatest long-term reduction in wind erosion stemming from cultivated ground. Under

Alternative 1, 300 additional acres would be brought under cultivation, with the potential for bare ground and wind erosion before planting and after harvest. Under all alternatives, the Refuges' contribution to the local air shed's particulate matter would be very minor in the context of the extensive acreage of plowed agricultural lands surrounding the Refuges that contribute an overwhelming majority of particulate matter to the local and regional air shed.

Herbicide drift could contribute to minor localized impacts to air quality, but since these would rapidly dissipate, this effect is determined to be negligible under all alternatives.

D. Effects to Visual Quality

None of the alternatives would be expected to have more than very minor effects on visual quality (i.e. scenery). The Refuges' scenic beauty will remain undisturbed under all alternatives. A few minor developments, such as kiosks and signs, will be placed in a few areas under Alternatives 2 and 3, and to a lesser extent under Alternative 1. These improvements would be designed to enhance visitors' appreciation of the natural and visual resources contained within the area.

Three hundred acres of land would be brought under cultivation in Alternative. All of these acres would be derived from existing inactive croplands. These modifications would not substantially alter the landform or block views from public roads. Except for these minor modifications, there are no effects to visual resources under the CCP.

7.4 Social Effects

This section opens with an assessment of the change in Refuge user numbers expected under each of the alternatives. Following this assessment, how management actions under each alternative could affect quality opportunities for each of the Big Six uses is evaluated. In addition, opportunities for non-wildlife dependent recreation are examined, as is the amount of illegal uses.

Adverse effects to opportunities for recreational public uses would be considered significant if a proposed action resulted in:

- Substantial displacement of a wildlife-dependent public use (>25% of existing activities or opportunities moved to a different area or terminated at the Refuge); or
- Substantial reduction in the quality of the wildlife-dependent experience (crowding increasing by more than 50% or substantial anticipated losses of wildlife or habitat supporting the experience).

Positive effects to opportunities for recreational public uses would be considered significant if a proposed action resulted in substantial increase in opportunity for or quality of a wildlife-dependent public use (>25% increase over existing opportunity or quality of experience).

A. Projected User Numbers in 15 Years

As an overview to assessing the social effects of Alternatives 1 through 4, it is important to understand the broader context of McNary and Umatilla Refuges within the region and how recreational demand and public use is expected to change over time.

A growing visitor presence on the Refuges can be expected in the future. Many of the public use opportunities currently provided at the Refuges are very popular within the State, and are forecasted to attract increasing amounts of participants in the coming years

A 2002 report by Washington State's IAC (IAC 2002) estimated the percent of change in the number of people participating in recreational activities in the future compared to current levels. According to their study, it is estimated that "nature activities," including outdoor photography and wildlife observation, will increase 30% during the next 15 years. Hunting and fishing are expected to decrease (18% and 8% respectively) during the next 15 years. The IAC's estimates for future use were used in calculating future visitor activity numbers for McNary and Umatilla Refuges. In alternatives that improve or add visitor facilities, additional visitation is likely to occur and increase Refuge use above IAC's estimates.

According to statistics kept by the Friends of Mid-Columbia River Refuges, all but 150 of the 3,700 students that participated in formal activities at the McNary Environmental Education Center in 2004 were from within 25 miles of the Refuge.

Hunters applying for the McNary waterfowl fee hunt area were from the following locations: 65% from or within 30 miles of the Tri-Cities; 25% from the Portland area; and 20% from various other locations. Informal tallies taken by Refuge officers checking waterfowl hunters in the field reveal similar numbers but suggest a slightly higher percentage of local residents hunting the Refuge.

According to the 2002 *Banking on Nature* report, (Caudill and Henderson 2003) 85%-90% of nonconsumptive users (visitors participating in wildlife observation and wildlife photography) and 70% of anglers on Umatilla Refuge are residents of the area (defined as living within a 30-mile radius of the Refuge). Migratory waterfowl hunters are comprised of 50% nonresidents, big-game hunters are 75% nonresidents, and small-game hunters are 25% nonresidents. Informal tallies by Refuge officers checking waterfowl hunters on the Washington side of Umatilla Refuge show that the vast majority (70%) of waterfowl hunters using these units (Paterson, Ridge, and Whitcomb) are from the Tri-Cities area.

It is important to consider the significant amount of population growth forecast for the Tri-Cities, Portland, and Seattle areas. Population growth will occur regardless of which alternative is selected. Population growth and increasing recreational demand, particularly in nature activities will increase recreation on the Refuges.

Tables 7-3 and 7-4 show Refuge visitation (number of Refuge visits annually) estimates for each Refuge, under several categories, both current and expected under the different alternatives.

The following background information may be useful in interpreting the tables.

- Current visitation is based on visits tallied in the year 2004, as summarized in the 2004 Refuge Management Information System (RMIS) data.
- The future visitation estimates for Alternatives 1, 2, 3, and 4, represent the Refuge's best estimate of the number of visits in each category during the final year of the 15-year CCP time frame. These estimates are based on two factors. The first factor is the percent of change in the number of people participating in a recreational activity in the future compared to the current levels. Future

participation rates are based on the IAC's 2002 *Estimates of Future Participation in Outdoor Recreation in Washington State* (IAC 2002). Projected population growth is incorporated into these figures already. Some activities offered at the Refuges do not correspond exactly to the categories used in the IAC reports—the nearest equivalent was used. The second factor is that alternatives that emphasize or improve facilities for a type of recreational activity are given additional weight of 10%; those that diminish opportunities are reduced. Where actual permit numbers or group numbers are known based on area or staffing constraints, changing growth rates were ignored.

Table 7-3. McNary Refuge's Projected Annual Visitation in 15 Years, by Alternative

Recreational Activity	Current Visitation	IAC projected change ¹	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Waterfowl Hunting	10,600	-18%	9,560	9,560	7,830	8,700
Upland Game Hunting ²	1,400	-18%	1,400	1,400	1,400	1,400
Fishing	16,800	-7%	17,200	17,200	15,600	16,500
Environmental Education/ Interpretation	1,500— 4,000	+30%	3,000	3,000	3,000	3,000
Wildlife Observation/ Photography	57,000	+30%	74,100	81,500	81,500	74,100

¹ The IAC report estimated percent changes over 10 year intervals and 20 year intervals. The two intervals were averaged for our purposes in estimating changes over the 15- year lifetime of the CCP.

Table 7-4. Umatilla Refuge's Projected Annual Visitation in 15 Years, by Alternative

Recreational Activity	Current Visitation	IAC projected change, 15 years ¹	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Waterfowl Hunting	13,000	-18%	11,700	10,660	9,600	10,660
Upland Game Hunting ²	2,600	-18%	2,600	2,600	2,600	2,600
Fishing	20,000	-7%	20,700	20,700	18,800	18,800
Environmental ³ Education/ Interpretation	200	+30%	260	500	500	260
Wildlife Observation/ Photography	35,600	+30%	46,200	50,900	49,000	46,200
Big Game Hunting ²	28	-18%	28	28	28	28

¹ The IAC report estimated percent changes over 10 year intervals and 20 year intervals. The two intervals were averaged for our purposes in estimating changes over the 15- year lifetime of the CCP.

² Although statewide decreases in hunting are expected by the IAC, the popularity and status of hunting programs at these refuges, together with anticipated habitat improvements led the Planning Team to anticipate that there would be no change in hunter visits over the next 15 years.

³ Environmental Education on the Refuge is primarily limited by Refuge staffing and volunteers devoted to presenting EE programs. The public demand for EE programs far exceeds what the Refuge can provide. When funding permitted an interpretative park ranger position at McNary Refuge, the EE program grew from 150 visitors a year to over 4,000 visitors. The additional staffing also allowed for large volunteer and Friends programs to develop.

B. Opportunities for Quality Wildlife Observation and Photography

No significant adverse effects are expected under any of the alternatives, because none of the alternatives would displace any wildlife observation or photography activities. Although visitation will increase under all alternatives, mostly due to population increases and the growing popularity of wildlife viewing, none of the alternatives are expected to result in increasing crowding by more than 50% or in substantial anticipated losses of wildlife or habitat supporting the wildlife viewing or photography experience.

Alternatives 2 and 3: Facilities to improve opportunities for wildlife observation and wildlife photography (trails, photography blinds, and overlooks) would be expanded and enhanced under Alternative 2, and to a slightly lesser extent, under Alternative 3. These facility improvements would increase access to natural areas and improve wildlife viewing and photography opportunities.

Habitat improvements under Alternative 2 emphasize migratory birds and special status species. It would be reasonable to assume that the habitat improvements proposed under this Alternative would increase wildlife viewing and photography opportunities for these target species. Habitat improvements under Alternative 3, which emphasizes native biodiversity, would also improve the chances for visitors to see and photograph a greater spectrum of native plants and animals.

Under Alternatives 2 and 3, the positive effects to opportunities stemming from facility enhancements would not be considered significant because the proposed actions are not expected to increase the opportunities for, or quality of, wildlife viewing or photography by 25% or more over the existing conditions.

Alternatives 1 and 4: Only minor facility changes (realignment of the Heritage Trail) would occur under Alternative 1, and no changes to facilities would occur under Alternative 4. Effects would be neutral to slightly negative under Alternative 4 and Alternative 1, because growth in population and recreational demand means that more visitors would arrive at the Refuges, but the number of facilities available to accommodate the visitors under these alternatives would remain approximately the same.

C. Opportunities for Quality Hunting

Waterfowl and Upland Game Birds: The effects of the different alternatives on this activity were addressed in terms of the quantity of hunting acres available, the habitat condition, and other management actions that affect hunting opportunities. The chosen indicators for each alternative were 1) acres available for hunting; 2) overall habitat quality; and 3) other management actions that affect hunt quality.

Note that, technically, all of the acres open to waterfowl hunting are also open to upland bird hunting, but obviously the quality of the waterfowl and upland game bird hunt depends partly on the habitat area chosen.

Alternative 1 contains features to increase the number of acres available for hunting and also to increase habitat quality for game species. The actions outlined below would result in neutral to minor positive effects to opportunities for quality hunting, but the net effect would not be significant because there would be less than a 25% change in opportunity for or quality of hunting.

Acres available for waterfowl hunting: Approximately 25,952 acres would be open to both upland bird and waterfowl hunting, a 47-acre addition to the current area available (see Alternative 4). Forty-seven acres of additional river shore habitat would be opened to waterfowl hunting on Umatilla's McCormack Unit. One to five blinds would be established and managed under Umatilla's reservation system. This would increase the available blinds from 35 to 40, and give 10 to 20 more hunters per day an opportunity to draw a blind. Several goose blinds occupying approximately 100 acres of upland areas on the Peninsula Unit would be eliminated, but because these blinds are largely unproductive (these fields are seldom used by geese and thus rarely hunted anymore) and hunters could still use the area for free roam hunting if they wish. the overall effect of this alternative is still a net increase in the hunting area.

Acres available for upland game bird hunting: Upland game hunted areas would be the same as the acres available for waterfowl hunting.

Habitat quality waterfowl: Habitat quality improvements for waterfowl species under Alternative 1 include the following: (a) the Refuges would add 300 acres of cropland for a total of 2,400 acres farmed (crops on 25% of this acreage would be retained by the Refuge for waterfowl use). Though these additional croplands would be located in areas closed to hunting, they would increase (by 75 acres) the amount of "hot" foods available to all wintering birds during the coldest months; (b) 40 acres of moist soil management units would be created for the production of native food. These additional 40 acres would be located on areas of the Refuges currently open to waterfowl hunting; and (c) efforts would be made to increase open shallow water marsh habitat by as much as 96 acres per year on both Refuges. This would be done on areas both opened and closed to hunting. This could have the effect of drawing more birds to Refuge waters, and potentially increasing the quality of waterfowl hunting. All of these changes would be expected to result in a minor increase in the quality of waterfowl hunting under this alternative.

Habitat quality upland game: Habitat quality would also improve for upland game because: (a) Approximately 100 acres of goose hunting area on upland portions of the Peninsula Unit would no longer be managed (i.e. mowed or hayed) to attract geese. Instead, old fields in this area would be planted in native grasses. The aim here would be to replace poor quality goose hunting with higher quality upland bird hunting; (b) efforts would be made to restore old road beds, waste sites, gravel pits, and former cropland to upland shrub-steppe habitat. Under this alternative, Objective 7e calls for restoring as much as 100 acres. This, in combination with the 100 acres of former goose hunting land, would add 200 acres of restored upland for bird hunters. This could increase the ability for the land to support more birds.

Other management actions: This alternative includes several management actions to increase the quality of the upland game bird hunt, as follows: (a) Standardization of hunt days and start times would be implemented. All units on both Refuges would follow State start times, except the fee hunt units, where upland bird hunting would not start until noon of each hunt day. (b) Crowding and pressure on the McCormack upland permit hunt would be reduced by requiring permits for the opening two weekends and reducing allowable permits to 15 per

day. (c) The present pheasant augmentation program on McNary would be phased out due to Service policy prohibiting non-native stocking. This initially could reduce the ability for hunters to bag birds since some of the lands are degraded and can't support enough birds to sustain the hunting pressure. The Refuges would continue upland and riparian restoration efforts, which should result in higher quality upland habitat capable of supporting more birds.

Alternative 2 strives to provide a quality hunting program in concert with other Big Six uses and habitat programs on the Refuge. The actions outlined below would result in neutral to slight positive effects to opportunities for quality hunting, but the net effect would not be significant because there would be less than a 25% change in opportunity for or quality of hunting.

Acres available for waterfowl and game bird hunting: Approximately 25,739 acres would be open to waterfowl and upland bird hunting. This is a reduction of 166 acres from the current area (25,905 acres). The change would result from trading an area that is currently open (east McCormack hunt unit on Umatilla) with an area that is currently closed (river shoreline at Umatilla). The two areas would change status. No net loss of huntable area would result – the same number of blinds would be available as at present. The east McCormack slough would then function as sanctuary, but the birds using it would likely move through the hunt area as they moved back and forth from the river.

Habitat quality waterfowl: Refuge cropland would be maintained at current levels (2,100 acres) and moist soil management units would be increased by 10 acres from the current level. New moist soil units would provide natural foods for some of the earlier migrants like northern pintails. As in Alternative 1, open water shallow marsh areas would be created and maintained at a rate of approximately 67 acres/year.

Habitat quality upland game birds: As compared to Alternative 1, more land would be restored back to native shrub-steppe. An additional 250 acres would be converted by taking inactive croplands which are unneeded or unsuitable for production. This would be added to the 100 acres gained from restoration of highly degraded uplands for an increase to 350 acres of restored native shrub-steppe. This would result in an intermediate net gain of habitat and habitat quality for upland game birds.

Other management actions: Other actions designed to increase the quality of the upland bird management strategies would essentially mirror those in alternative 1. The goose pit blinds on Peninsula would be eliminated, as well as the fall mowing. Hunt days and start times would be standardized, McCormack upland permits would be reduced to 15 per day on the opening two weekends, and the pheasant release program would be phased out.

Alternative 3 would enact changes aimed at more aggressive restoration of natural habitats. The actions outlined below would result in minor negative effects to opportunities for quality hunting, but the net effect would not be significant because there would be less than a 25% change in opportunity for or quality of hunting.

Acres available for waterfowl and upland game bird hunting: As in Alternative 2, the east McCormack slough hunt area would be turned into waterfowl sanctuary, thus eliminating three hunt blinds from the Umatilla fee unit program. No additional blinds or hunt areas

would be added on the Refuges to replace the lost hunting area. The total hunt area available would decrease by 207 acres, to 25,698 acres. Fall mowing would be eliminated on the Peninsula Unit goose blinds; however, the middle unit goose blinds would still be maintained.

Habitat quality waterfowl: Under Alternative 3, the overall cropland acreages of both Refuges would decrease to 1,850 from the current 2,100. The conversion of 250 acres of existing cropland to shrub-steppe habitat (meaning a loss of about 63 acres of crops dedicated to wintering waterfowl) could have an adverse impact on the Refuge's ability to attract and hold birds during the winter, resulting in a minor loss in habitat quality, with a minor indirect effect to hunting quality.

Habitat quality upland game birds: This alternative would restore as much as 600 acres of native grasslands and shrub-steppe habitat restoring 250 acres of active waterfowl grain production croplands; 250 acres of inactive croplands and 100 acres of degraded uplands, old road beds, and gravel pits. This would result in a minor positive effect to game bird habitat quality.

Other management actions: This alternative maintains the current program (start times, number of permits, etc.) for upland game birds, except the present pheasant augmentation program on McNary would be phased out, due to Service policy prohibiting nonnative stocking. Initially, this could reduce hunters' ability to bag birds because some of the lands are degraded, and can't support enough birds to sustain the hunting pressure. As described above, the Refuges would place additional emphasis on upland and riparian restoration efforts, which should eventually result in higher quality upland habitat capable of supporting more birds.

Alternative 4: Under Alternative 4, no changes would be made to current management practices.

Big game hunting. Very minor changes in the big game hunt program are proposed under Alternatives 1, 2, and 3. Hunting would continue to provide both recreation and deer population control, to prevent adverse impacts to vegetation. Umatilla would continue to conduct special permit hunts for the purpose of population control and habitat health on the McCormack and Paterson Units. The population target level for deer on McCormack would be set at 80-100 deer and the total number of hunting permits would increase slightly over the present level, to attain this population level. The Stateline and Juniper Canyon Units of McNary would continue to be managed and opened to hunting in accordance with State regulations. The only other unit opened to hunting on McNary Refuge would be the Wallula Unit, which is currently according to State regulations, with special regulations allowing the use of shotguns or bows and arrows only. Habitat conditions would be monitored to determine if any special hunts were needed for deer population control. None of the alternatives would result in significant effects to the big game hunting program.

D. Opportunities for Quality Fishing

A vast majority of the areas available to fishing on both Refuges are accessible by boat or by car and are within reasonable walking distances from available parking. These areas include open water and shoreline along the Columbia and Walla Walla Rivers in the Wallula and John Day pools. Other

areas include backwater sloughs and channels adjacent to or connected to the Columbia River. No significant adverse effects are expected under any of the alternatives, because none of the alternatives would displace fishing activity from >25% of the sites now available, nor would any of the alternatives be expected to result in crowding increasing by more than 50% or substantial anticipated losses of fish or habitat supporting the fishing experience.

Alternatives 1 and 2: Currently there are seven developed and four undeveloped boat launches located on or near the Refuges that provide adequate access to Refuge fishing resources. Under Alternatives 1 and 2, the actual mileage of shoreline access available may not actually increase since most of these areas are already accessible under current conditions. The major changes under these alternatives are upgrading existing facilities by improving parking and boat launches at several sites on each Refuge. In addition, under Alternatives 1 and 2, the Refuges would install kiosks, and improve the availability of information at heavily used fishing sites. The anticipated result would be better informed and oriented fishing visitors who better understand and appreciate the Refuges and their resources. Other positive effects under Alternatives 1 and 2 would be improved water quality in Refuge ponds and sloughs, through carp eradication efforts and vegetation management.

Under Alternatives 1 and 2, the positive effects to fishing would not be considered significant because the proposed actions are not expected to increase the opportunities or quality of fishing by 25% or more over the existing conditions.

Alternative 3: In Alternative 3 no efforts would be made to increase access to fishing areas or to provide informational kiosks at fishing sites. Under this alternative, some access to fishing resources could be temporarily lost due to closures for shoreline habitat restoration, threatened and endangered species management, or species diversity management. Low pool management for the benefit of migrating shorebirds could result in seasonal losses of Delta shoreline currently available to fishing. Rearing habitat for salmonids could be increased by enhancing backwater slough areas. This would slightly improve fisheries production over years to come; however, fishing opportunities for these species would be unlikely to shift much.

Alternative 4: There would be no changes enacted to the current programs under Alternative 4.

E. Opportunities for Quality Environmental Education

No significant adverse effects are expected under any of the alternatives, because none of the alternatives would displace any environmental education activities. Although the environmental education program is geared to grow under Alternatives 2 and 3, these alternatives would accommodate the additional students through expanding the schedule, using teachers as facilitators, and expanding the volunteer base. Additional crowding would be unlikely to occur. Finally, none of the alternatives would result in substantial anticipated losses of wildlife or habitat supporting the environmental education experience.

Alternative 1 focuses on consumptive public uses and would not implement any measures to change the environmental education (EE) programs. Alternatives 2 and 3 both include measures to offer the existing environmental education programs to more students, up to 3,000 at McNary, and up to 500 at Umatilla.

Alternative 1 would further enhance environmental education programs by providing interpretive exhibits near the McNary Environmental Education Center that could be used by teachers. In addition, a visitor contact station added under Alternative 1 at Umatilla Refuge would enhance EE opportunities by providing a meeting place for classes, visitor orientation, interpretive panels, and access to the Refuge Manager.

Alternatives 2 and 3: Under Alternatives 2 and 3, a volunteer coordinator or park ranger would be hired. This person could recruit volunteers and work with the local schools (Umatilla, Hermiston, Boardman, Burbank, and Tri-City communities) to develop and grow the environmental education program. The volunteer coordinator or park ranger could tie Refuge environmental education programs directly into Oregon's teaching curriculum (similar to the Washington Assessment of Student Learning-WASL). This would ensure Refuge programs could assist the schools with State education requirements. Teach-the-teacher programs would be initiated, thus reducing the amount of Refuge staff and volunteer time required to facilitate classes. An additional staff member could also research and adapt time tested programs such as the Sister Shorebird Schools program. The Refuges could then use these programs to provide high quality classes without investing much time in curriculum development.

Under Alternatives 2 and 3, additional trail spurs and loops would be added and/or improved near the existing EE headquarters site at McNary Headquarters Unit. Trail improvements would also be made along the Heritage Trail site at the McCormack Unit on Umatilla Refuge. These would facilitate the Refuge's education programs because most school groups use the trails while engaged in EE. Of the seven science stations used at McNary Refuge for teaching fourth graders, three are directly on the Trail. In addition, classes for scouting groups almost always include a two-mile nature hike on the trail.

Alternatives 2 and 3 would further enhance environmental education programs by providing interpretive exhibits near the McNary Environmental Education Center that could be used by teachers

A visitor contact station at Umatilla Refuge, added under Alternative 2, would enhance EE opportunities by providing a meeting place for classes, visitor orientation, interpretive panels, and access to the Refuge Manager.

Under Alternatives 2 and 3, the positive effects would not be considered significant because the proposed actions are not expected to increase the opportunities or quality of environmental education by 25% or more over the existing conditions.

F. Opportunities for Quality Interpretation

All alternatives provide existing opportunities for visitors to encounter interpretative signs and materials. Alternative 2 would further enhance this activity by providing additional interpretive pull-outs and signs along Highway 14, additional interpretive areas along trails at The McNary and Wallula Units, establishing an interpretive station at a consolidated visitor contact facility at McCormack Unit, and providing kiosks at fishing sites. Alternative 1 also includes the consolidated McCormack facility and the kiosks at major fishing sites. Alternative 3 includes additional interpretive materials at McNary Headquarters unit but not the other improvements mentioned above. In

summary, of the action alternatives, Alternative 2 would include the greatest number of direct measures to expand interpretive opportunities for Refuge visitors; Alternative 1 would include an intermediate amount of measures, and Alternative 3 a minor amount. No changes would occur under Alternative 4.

No significant adverse effects are expected under any of the alternatives, because none of the alternatives would displace existing interpretive activities. Crowding at interpretive sites, already low, would be unlikely to occur. None of the alternatives would result in substantial anticipated losses of wildlife or habitat supporting the interpretation experience.

Under Alternatives 1, 2, and 3, the positive effects to opportunities stemming from facility enhancements would not be considered significant because the proposed actions are not expected to increase the opportunities for or quality of interpretive experiences by 25% or more over the existing conditions.

G. Opportunities for Nonwildlife-Dependent Recreation

Potential opportunities for other public uses not considered priority or deemed non-wildlife dependent under the National Wildlife Improvement Act, would be contingent on the completion of Refuge compatibility determinations for that particular use. Hiking and biking, unrelated to wildlife viewing; camping, boating/watercraft use unrelated to fishing, hunting, or wildlife viewing; beach use and swimming; and horseback riding are all currently allowed on the Refuges, even though they are considered nonwildlife-dependent forms of recreation by definition. Some of these uses are restricted under current management rules, but a limited outreach and law enforcement capability has prevented the Refuges from effectively enacting and enforcing current rules.

There would be no efforts to augment or increase these activities under any of the alternatives. For the most part, the nonwildlife-dependent uses would be allowed to continue, with some tightening of rules and law enforcement to ensure that the uses remain compatible with the Refuges' purposes.

A use that would be eliminated entirely would be camping at Madame Dorion Park. This would be eliminated under Alternatives 1, 2, and 3, with the Madame Dorion site continuing to be open for Big Six public uses, including night fishing for catfish.

A no-wake zone on Refuge managed waters, within 100 feet of islands, would be enacted under Alternative 2 to minimize noise and wake disturbance to islands and wildlife. This would diminish disturbance from pleasure boaters near sensitive island resources.

Beach use and swimming from Refuge islands would be eliminated entirely under Alternatives 2 and 3. Currently, summer beach use occurs at Strawberry Islands, and the Refuges have not effectively enforced an existing closure. Law enforcement would be increased under these alternatives, to eliminate all access from these sensitive island complexes. Beach use would also be eliminated on three designated beaches on the Umatilla Islands. These alternatives include the current closures on all other Refuge islands.

Some benefit to non-wildlife dependent uses, especially hiking, horseback riding, and boating, would occur indirectly through trail improvements and boat launch and parking improvements slated to

occur under Alternatives 1, 2, and 3. Under alternatives 2 and 3, eight miles of designated trail would be available for horse back riding and 22 miles of roads would be available for hiking/biking.

These activities would be monitored and evaluated regularly to determine their impacts. Management strategies aimed at upland habitat improvement or threatened and endangered species protection could further restrict or completely eliminate these activities in some areas. At the same time however, the quality of these activities could increase due to improvements in facilities, trail heads, signage, and information. Partnerships with user groups would be pursued and developed to help improve and maintain trail/road conditions. Improvements to upland habitats could increase the quality of the visitor experience.

In sum, no significant adverse effects are expected under any of the alternatives, because none of the activities are wildlife-dependent. Although opportunities for two non-wildlife dependent uses (camping and beach use) would be eliminated entirely, this effect is not considered significant under the criteria outlined above. In addition, there are numerous other camping areas available within 20 miles of McNary Refuge, and any persons wishing to camp near the Refuge should be able to find reasonable opportunity nearby. Beach use is also available nearby on non-refuge shorelines and non-Service administered islands.

No significant positive effects are expected under any of the alternatives due to the changes cited above; the proposed actions are not expected to increase the opportunities or quality of wildlife-dependent public uses by 25% or more over the existing conditions.

H. Amount of Illegal Use

Trespass into closed areas, off-road vehicle use, illegal drug activity (especially the dumping of methamphetamine lab materials), target shooting, dumping of household waste, and vandalism all occur on the Refuges. Some of the same reasons that attract legitimate Refuge visitors—solitude, open public spaces, quiet hidden valleys, wooded areas, and minimal human interference—also attract individuals seeking quiet places for their illegal activities

All action alternatives include more aggressive measures to curb illegal activities and create a safe environment for visitors. Alternatives 1, 2, and 3, seek to involve the town of Burbank in an outreach program to reduce dumping and off-road vehicle use on the Refuge units adjacent to the downtown area. Under these alternatives, the Service would pursue funding to survey the former Corps properties, to establish boundaries and to sign the Refuge appropriately. These alternatives would close off illegal roads and four wheel drive tracks to improve wildlife habitats and wildlife-dependent recreation on the Burbank Sloughs and Peninsula Units, and establish designated roads and improved parking areas. Law enforcement presence would be increased under these alternatives to deal with illegal use problems.

The actions outlined above would result in intermediate positive effects to opportunities for recreational public uses, but they would not be significant because they would likely not result in a substantial increase in the opportunity for quality of any wildlife-dependent public uses.

I. Environmental Justice

Since CCP implementation is expected to result in generally positive effects on the human environment, all proposed public use actions have a little risk of resulting in disproportionate adverse effects on human health, economics, or the social environment.

7.5 Economic Effects

Both McNary and Umatilla Refuges have direct economic impacts on the local economy. Both Refuges as well as the associated administering Refuge Complex office (now located in Richland, Washington) have annual budgets that support employee salaries, operations, maintenance costs, and various programs. The Refuges are sometimes allocated funding for capital improvements such as building roads or facilities. All of these activities require spending by the Service, which results in effects on the local economy.

The Refuges also provide an indirect economic impact on the local economy through the many recreational activities that they support. These activities currently include hunting, fishing, wildlife observation, photography, hiking, environmental education, interpretation, horseback riding, camping, and boating, and most of these activities would continue under each of the action alternatives (although the emphasis areas vary slightly). Individuals that visit the Refuges and participate in these activities buy goods and services in local towns and cities (e.g., food, lodging, fuel, equipment), and thus contribute to the health of the regional economy.

Farming is also supported on both Refuges through contract.

The area of economic influence is assumed to be primarily Benton, Walla Walla, Morrow, and Franklin Counties. These are the counties within which the Refuge offices or lands are situated; Refuge operation and maintenance expenditures occur primarily within these counties, and the majority of visitors to the Refuges live within these counties and are assumed to make most of their purchases near their homes or near the Refuges.

Effects are considered significant if the gain or loss in total personal income stemming from expenditures associated with the Refuges exceed 5% of the total personal incomes of the counties in the economic influence area.

Since Refuge operational expenditures would vary by alternative based on the staffing levels and programs associated with each alternative (see Appendix D), each alternative would result in a different degree of economic effect (Appendix D, Table D-8). Alternative 2, which would require the highest level of staffing and expenditure, would have a greater effect on the local economy than the other alternatives. This would translate into more jobs and more personal income within the analysis area under this alternative, compared with the other alternatives. Alternative 4 would have the least economic benefit locally as a direct result of Refuge expenditures, with fewer jobs and less personal income generated. The effects of Alternatives 1 and 3 are intermediate between Alternatives 2 and 4.

Refuge recreational programs and facilities would vary by alternative. In 2002 (similar to current conditions), Refuge visitors were estimated to spend about \$3.2 million per year to recreate at Umatilla Refuge (see table 6-5 in Chapter 6). The total economic effect of this visitor spending in the

three-county area of influence was estimated at \$2.1 million dollars (Laughland and Caudill 2003), with personal income estimated at \$838,400. Figures are not available for McNary Refuge but could be similar. The authors estimated that for each \$1 of Refuge expenditures, \$2.50 of total economic effects are generated from visitor expenditures.

In the future, the types and quantities of visitor facilities and programs are expected to influence the number of visitors. In addition, over the next 15 years, visitation is expected to be affected by demographic changes and changing cultural values that influence people's choices for recreation. Estimates of annual visitation after 15 years to each Refuge under each alternative and for different recreational categories are presented in Tables 7-3 and 7-4. As evident from these tables, visitation is estimated to change by activity, with an overall increase in visitation under each alternative. The addition is mostly due to projected increases in wildlife observation/photography activities. Overall recreational visitation is expected to be slightly higher under Alternative 2 than under the other alternatives, because of the greater emphasis in this alternative for a wide range of recreational facilities and programs. As a result, Alternative 2 would result in the highest number of local jobs and have the highest degree of local economic effect stemming from the recreational expenditures of Refuge visitors.

One aspect of the recreational activity analysis deserves explanation. The most recent *Banking on Nature* report reveals that at Umatilla Refuge, an estimated 50% of waterfowl hunters live locally, about 70% of anglers are local residents, and about 85% to 90% of nonconsumptive users are local residents (Caudill and Henderson 2003). At McNary Refuge, the staff estimates that the percentage of local users is higher than that of Umatilla for waterfowl hunting, and similar to Umatilla for other uses. Visitors from outside of the local area spend more money in the local area (motels, restaurants), while recreating on the Refuge than local residents do. Spending by non-residents due to choosing the Refuges as a recreation destination thus represents an infusion of money into the local economy that would not occur if the Refuges were not there.

If the Refuges did not exist, local residents would possibly take advantage of similar recreational opportunities nearby, such as local wildlife areas and state parks. To the extent that nearby areas could replicate the recreational experiences provided at McNary and Umatilla Refuges, the expenditures made by these visitors represent spending that may have taken place inside the county regardless of the existence of the Refuge. Hence, the analysis may overestimate somewhat the contribution of the Refuges to the local economy. However, since nearby areas are small and don't provide the spectrum of recreational activities supported by the Refuges, it is probably true that most of the recreational spending by Refuge visitors living locally represents an actual infusion of money into the local economy that would not occur if the Refuges did not exist.

In 2004, Morrow County, Oregon had a total personal income (TPI) of \$326 million dollars, Benton County, Washington had a TPI of \$4.8 billion dollars, Walla Walla County had a TPI of \$1.4 billion dollars and Franklin County had a TPI of \$1.2 billion dollars (data from Bureau of Economic Analysis, <http://www.bea.gov/beat/regional/beatfacts/countybf.cfm>).

A detailed economic analysis of the alternatives was not completed to determine multiplier effects of the alternative spending on the counties. However, based on the background information presented above and the estimated changes in Refuge spending under each alternative (see Appendix D), the

Refuges’ effect on personal income would be a maximum of 4-8 times the 2003 estimate of \$838,000 for each Refuge. Thus, comparing this amount to the TPI for the counties above, the economic effect would not be significant because the effect on the TPI of the counties in question would not exceed 5% of the total.

7.6 Effects to Cultural and Historical Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, establishes the Federal Government’s policy on historic preservation and the programs through which that policy is implemented. An impact to cultural resources would be considered significant if it adversely affects a resource listed in or eligible for listing in the NRHP. In general, an adverse effect may occur if a cultural resource would be physically damaged or altered, isolated from the context considered significant, affected by project elements that would be out of character with the significant property or its setting. Title 36 CFR Part 800 defines effects and adverse effects on historic resources.

Table 7-5 lists those activities called for in the CCP that are most likely to affect cultural/historic resources and compares their effects under the four alternative scenarios. Not all activities with possible affects are listed, nor are all potential effects listed. However, the table does address those activities most likely to have an effect on cultural or historical resources and the effects most likely to result.

The activities common to all alternatives are: upland restoration work including seeding using drills, shrub planting, soil preparation including agricultural disking, and shoreline bank stabilization for the protection of shoreline under objective 13d. To avoid adverse effects to cultural resources as a result of future upland restoration and/or shoreline protection, a cultural resource survey would be conducted prior to implementing any restoration activities. Any new cultural resources identified during the survey would be recorded and evaluated for eligibility to the NRHP. If any sites are determined to be eligible to the NRHP, the restoration plans would need to be assessed for potential effects to the historic property. If effects are possible, the proposal would be reviewed to ensure that the effects have the least impact to original materials and are in conformance with the *Secretary of the Interior’s Standards for the Treatment of Historic Properties*. Changes that comply with the Secretary’s Standards would have no adverse affect on historic properties. Once an assessment has been completed, the findings would be forwarded to SHPO for concurrence. The upland restoration enhancement and shoreline protection projects proposed under all of these alternatives would not be expected to have an adverse effect on historic resources.

Table 7-5. Comparison of activities most likely to affect cultural/historic resources.

Activity/ Objectives	Potential Effects	Alt. 1 Severity	Alt. 2 Severity	Alt. 3 Severity	Alt. 4 Severity
Upland restoration/ 7a,7d,7e	Disturbance from planting seed and shrubs; soil preparation	Potential for 10% of uplands	Potential for 30% of uplands	Potential for 45% of uplands	Potential for 10% of uplands
Reduced Fire Starts / 7c	Decreased fire related soil exposure and damage, vandalism, theft and erosion	Minor decrease in fire starts and resulting effects	Decreased fire starts and resulting effects	Decreased fire starts and resulting effects	No change

Activity/ Objectives	Potential Effects	Alt. 1 Severity	Alt. 2 Severity	Alt. 3 Severity	Alt. 4 Severity
Riparian restoration/5a, 5b	Disturbance from shrub/ tree planting and fluctuation pool levels for cottonwoods	None	Up to 62 acres per year	Up to 5 acres per year	Up to 5 acres/year
Wetland enhancement /4a	Disturbance during wetland excavation and disking	1438 acres	1000 acres	None	500 acres
Increase Island Law Enforcement/ 6a,6b	Reduced disturbance and/or vandalism	None	Decrease incidents and vandalism	Decrease incidents and vandalism	None
Eliminate Beach Use at Strawberry Island and Umatilla Islands	Eliminate potential disturbance, degradation, or vandalism/theft	None	Eliminate island access; protect resources	Eliminate island access; protect resources	None
Increase crop production/1a, 1c	Ground disturbance from disking cropland; moist soil	Increased disking on 400 additional acres and 20 new acres moist soil	10 acres new moist soil	Decrease in disking on 250 acres; 5 acres fewer moist soil.	No change
Limit public uses and access/7a, 6b	Reduced disturbance and/or vandalism with decrease in public use/access	Small decrease in access and use at Headquarters Unit	Decrease in access/use at Headquarters and Stateline Units	Decrease in access/use at Headquarters and Stateline Units	No change
Construct artificial owl burrows/1b	Disturbance from digging owl burrows	None	Minor due to localize nature of project	Minor due to localize nature of project	None
Reduce incidents of dumping /9i	Decrease in dumping that diminishes integrity of sites	Positive effects for cultural resources	Positive effects for cultural resources	Positive effects for cultural resources	No change
Construct trails and kiosk /9a-9d	Soil disturbance, construction; human disturbance at sites	None	Increase in trails and public use	Increase in trails and public use	No change
Construct visitor and office facilities/9e	Soil disturbance, construction activity, human disturbance	Localized impact	Localized impact	Localized impact	No change
Cultural resource protection and	Increase in cultural resource protection efforts will decrease likelihood of impacts and	Positive effect for maintaining	Positive effect for maintaining	Positive effect for maintaining	No change

Activity/ Objectives	Potential Effects	Alt. 1 Severity	Alt. 2 Severity	Alt. 3 Severity	Alt. 4 Severity
appreciation/13a3b,13c	negative effects to sites	cultural resources	cultural resources	cultural resources	
Increase management of NRP sites /13e	Decrease likelihood of disturbance and vandalism	Positive effect for maintaining cultural resources	Positive effect for maintaining cultural resources	Positive effect for maintaining cultural resources	No change
Increase protection of known shoreline sites /13d	Decrease likelihood of disturbance and vandalism; but would involve disturbance to shoreline	Positive effect for maintaining cultural resources	Positive effect for maintaining cultural resources	Positive effect for maintaining cultural resources	Positive effect for maintaining cultural resources

Many of the activities listed in Table 7-5 are common to Alternatives 1, 2, and 3. Specifically, activities under the Cultural Resources Goal 13 are considered to have a positive effect on cultural resources. The likelihood of disturbance, vandalism, and destruction of sites would be reduced by the strategies listed for accomplishing the goal of a program for better managing cultural resources. Another positive activity is the reduction of fire starts (7c) which would reduce risk of exposure of soils to wind erosion and exposure of artifacts to potential vandalism. Elimination of beach use and associated activities at Refuge Islands (especially Strawberry Island at McNary and Blalock at Umatilla) will decrease the likelihood of resource degradation, damage, or vandalism incidents. So the positive projects listed above that are proposed under Alternatives 1, 2, or 3, would not be expected to have an adverse effect on historic resources.

Under Alternative 1, effects could be possible from the earth moving work and surface disturbance associated with wetland restoration and enhancement work. This work often goes deeper into soil profiles than the disking and planting associated with upland plant restoration activities. After survey work prior to construction on wetland projects, activities occurring in proximity to known sites would be monitored because of the potential for buried cultural material in these areas. If any cultural materials are uncovered during excavation, the Regional Historic Preservation Officer would be contacted to review the materials and recommend a treatment that is consistent with applicable laws and policies. Implementation of the procedures described above is expected to avoid adverse effects to historic resources; however, additional analysis under NEPA may be required once specific details are known.

Prior to major excavations and as outlined in objective 13c, the Service would work with Native American groups to create a Memorandum of Understanding (MOU) to implement the inadvertent discovery clause of the Native American Graves Protection and Repatriation Act (NAGPRA). Development of this MOU would involve identifying the Native American Tribes, Groups, and direct lineal descendants that may be affiliated with these Refuge lands, initiating consultation with the affiliated Tribes, Groups, and/or direct lineal descendants, developing procedures to follow for intentional and inadvertent discoveries, and identifying the persons to contact for the purposes of NAGPRA. Completion of the MOU would reduce the potential for harm to occur from project work.

Most of the potential effects to cultural resources described under Alternative 1 would also occur under Alternative 2. Therefore, the measures for determining and addressing adverse effects

described above for activities common to all alternatives and Alternative 1, would also apply to Alternative 2. The construction of owl burrows is an additional activity involving soil disturbance; cultural resource survey and evaluation procedures above would be followed. Under Alternative 2, public access to sites with cultural resources might increase as a result of trail, kiosk, and public use facility construction, with potentially minor negative consequences. Implementation of the procedures described above is expected to avoid adverse effects to historic resources; however, additional analysis under NEPA may be required once specific details are known. The construction and public use facilities proposed under this alternative would not be expected to have an adverse effect on historic resources.

Potential effects to cultural resources under Alternative 3 are very similar to Alternative 2. Alternative 3 includes no wetland restoration work and less disking for croplands and moist soil. However, this alternative has the greatest amount of potential upland restoration and enhancement activities of the four alternatives. Expanded public access into areas that include cultural resources could also result in minor negative effects to these resources. The upland restoration and enhancement projects proposed under all of these alternatives would not be expected to have an adverse effect on historic resources.

Although the activities listed for Alternative 2 could affect the resource, they are relatively minor and would not be considered an adverse effect. Major disturbance would be avoided by the survey and consultation process as described in Section 106 of NHPA described above. Public access is currently permitted and expansion of facilities and trails under this alternative would receive the same scrutiny, to ensure they would not detract from cultural resources; therefore, no adverse effects to cultural resources as a result of human activity within the Refuges are anticipated. The minor changes that could occur under this alternative, like the others, would not alter the relationship, configuration, design, and/or function of the various known sites and would not diminish the historic character of known sites. Such changes would meet the criteria finding for a No Adverse Effect.

Based on the criteria for assessing adverse effects that are provided in the NHPA, all of the alternatives are considered to be a “No Adverse Effect” undertaking as per 36 CFR Part 800.5(3)(b), hence none of the alternatives would have a significant impact to cultural resources. The Service’s determination of no adverse effect would be submitted to State Historic Preservation Office for concurrence. No mitigation would be required.

7.7 Cumulative Effects

The term “cumulative effects” is defined in the Council of Environmental Quality’s (CEQ) regulations in 40 CFR Part 1508.7, as:

“the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

As described in Chapter 4, cumulatively, there has been a substantial modification to native upland and riverine habitats in the Interior Columbia Basin over time (Rasmussen and Wright 1990; Quigley and Arbelbide 1997). Although a number of natural areas have been designated and are maintained in the Interior Columbia Basin, modification and loss of native habitats continues at a regional scale. There is a clear trend of regionally increasing population growth, which, coupled with a growing

economy, is bringing increased development and associated habitat loss, particularly in the Tri-Cities and in Morrow County. Invasive species and altered ecosystem processes are widespread within the area. Within this context, region-wide biological integrity may be at risk. Over time, the Refuges, although relatively small and isolated from other natural lands, may become increasingly valuable for the persistence of Columbia Basin native wildlife. All of the alternatives would maintain Refuge habitats valuable to wildlife. Active improvement of shrub-steppe, riparian, and wetland habitats, particularly under Alternatives 2 and 3, would increase or maintain the value of Refuge lands and waters for a wide variety of native fish and wildlife. Alternative 1, which emphasizes habitat improvements for waterfowl, would improve the capability of the Refuges to provide wintering food for waterfowl, with less emphasis on habitat improvements for other native species. However, actions proposed under the Draft CCP/EA will not reverse or halt the regional trend toward reduced biological integrity within the Columbia Basin. Under all alternatives, biological diversity (the number of species present on the Refuge) would probably remain about the same. Invasive species could become more prevalent on surrounding lands but on the Refuges, active efforts would be made to reduce their populations, especially under Alternative 2. The Service would improve the availability and quality of wildlife-dependent recreation, especially under Alternatives 2 and 3, but within a regional context, there would be little cumulative difference in recreational opportunity.

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