Appendix E
Biological Resources of Concern

USFWS

Appendix A
Appropriate Use Findings

Appendix B
Compatibility Determinations

Appendix C
Implementation

Appendix D
Wilderness Review

Appendix E
Biological Resources of Concern

Appendix F
Statement of Compliance

Appendix G
Integrated Pest Management

Appendix H
Glossary

Appendix I
Contributors

Appendix J
Acquisition History

Appendix K
Public Involvement

Appendix L
Hydrological Modeling

Appendix M
References

Appendix N
List of Refuge Species

Appendix O
Wildland Fire Management Plan

Appendix P
Maps

Appendix E. Biological Resources of Concern

E.1 Introduction and Background

Management direction of individual refuges is driven by refuge purposes and statutory mandates, coupled with species and habitat priorities. Management on a refuge should first and foremost address the individual refuge purposes. Additionally, management should address maintenance, follow policy and, where appropriate, restore biological integrity, diversity, and environmental health (BIDEH) (Table E-1) and manage for National Wildlife Refuge System (Refuge System) Resources of Concern (ROCs). With this approach, the refuge contributes to the goals of the Refuge System and achievement of its mission.

In concert with this approach, and as an initial step in planning, the comprehensive conservation plan (CCP) planning team for the Tualatin River National Wildlife Refuge (the refuge) identified ROCs for the refuge. As defined in the policy on Habitat Management Plans (620 FW 1G) ROCs are:

> *All plant and/or animal species, species groups, or communities specifically identified in refuge purpose(s), System mission, or international, national, regional, State, or ecosystem conservation plans or acts. For example, waterfowl and shorebirds are a resource of concern on a refuge whose purpose is to protect 'migrating waterfowl and shorebirds.' Federal or State threatened and endangered species on that same refuge are also a resource of concern under terms of the respective endangered species acts.*

To provide a framework for development of goals and objectives in the CCP, the planning team identified ROCs following the process outlined in the handbook *Identifying Refuge Resources of Concern and Management Priorities: A Handbook* (U.S. Fish and Wildlife Service 2009c).

E.2 Comprehensive Resources of Concern

A comprehensive list of potential ROCs was created early in the planning process. The planning team identified species, species groups, and communities of concern, based upon a review of the refuge's establishing history and purposes, a description of the key habitat types existing at the refuge, and a review of numerous conservation plans (see Sections 1.6, 1.7, and 1.8 of the CCP), many of which highlight priority species or habitats for conservation. The comprehensive ROCs list is contained in Table E-2.

Table E-1. Summary of BIDEH for Tualatin River National Wildlife Refuge

Habitats (plant communities) that Represent Existing BIDEH	Population/Habitat Attributes (age class, structure, seral stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
Bottomland Riparian Forest	Native overstory trees include Oregon ash, grand fir, big-leaf maple, Douglas-fir, and black cottonwood. Native subcanopy trees include black hawthorn, vine maple, cascara, Pacific ninebark, hazel, red alder, and Pacific yew. Native shrub layer includes snowberry, rose, red-osier dogwood, Douglas spirea, blue and red elderberry, red-flowering currant, Carex, and sword fern. Generally within the 100-year floodplain. *Potential Conservation Species: beaver, mink, downy woodpecker, northern red-legged frog, pileated woodpecker, Swainson's thrush, western wood peewee, wood duck, and yellow warbler.*	Functioning floodplain: infrequent major flood events (flood heavily once every 3-5 years), scouring of trees/herbaceous layers, deposition of silts. Frequent short-term flooding (may flood for a few days two to three times per year). Deposition of large woody debris in both the forest floor and river/stream channel. Flooding is the primary natural disturbance regime in Tualatin River Basin bottomland riparian forest.	Non-functioning floodplain and altered hydrology in refuge watershed. Floodplain alterations including ditching and tile drains associated with agricultural practices, urban and rural development leading to increased runoff, and summer water withdrawals for agriculture, industrial, and urban uses. Climate change may cause further changes in weather and/or flooding patterns. Invasive species such as reed canary grass, Himalayan blackberry, English hawthorn, English ivy, and holly.
Mixed Coniferous/deciduous Upland Forest	Native overstory trees include Douglas-fir, western red-cedar, big-leaf maple, western hemlock, Garry oak, Pacific Madrone, and some grand fir. Native subcanopy trees include black hawthorn, vine maple, cascara, hazel,	Relatively undisturbed forest with openings caused by wind storms. Infrequent fires. Cool, wet winters and mild summers.	Habitat fragmentation from agricultural and urban development. Invasive species such as Himalayan blackberry, English hawthorn, English ivy, and holly. Species composition

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Habitats (plant communities) that Represent Existing BIDEH	Population/Habitat Attributes (age class, structure, seral stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	serviceberry, Pacific dogwood, and red alder. Native shrub layer includes snowberry, Oregon grape, Indian plum, Mock orange, red-flowering currant, and sword fern. Generally occurs above the 100-year floodplain. *Potential Conservation Species: brown creeper, chestnut-backed chickadee, Pacific slope flycatcher, black-tailed deer, olive-sided flycatcher, Swainson's thrush, and pileated woodpecker.*		may change with changes in precipitation or temperature due to climate change. Forest diseases such as Swiss needle cast may also increase due to climate change.
Wet Prairie	Few to no woody shrubs and trees. Native herbaceous species include sedges, rushes, tufted hairgrass, popcorn flower, Nelson's checker-mallow, and other forbs. *Potential Conservation Species: American kestrel, northern harrier, common yellowthroat, Nelson's checker-mallow, western meadowlark, Wilson's snipe, and sora.*	Periodic fire, poorly drained soils, and seasonal flooding. Typically a transition area between upland and wetland. Periodic grazing by large ungulates.	Invasive species especially reed canary grass and Himalayan blackberry. Fire suppression facilitates encroachment of woody species especially Oregon ash. With elk being removed from Willamette Valley habitats, no grazing by large ungulates. Draining and conversion to agriculture and urban development.
Oak Habitats	Widely scattered Garry oaks and/or Willamette	Frequent (approximately every	Agricultural and urban developments.

Table E-1. Summary of BIDEH for Tualatin River National Wildlife Refuge

Habitats (plant communities) that Represent Existing BIDEH	Population/Habitat Attributes (age class, structure, seral stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	Valley ponderosa pine. Very few shrubs. Dominated by native grasses and forbs including Roemer's fescue, California oatgrass, California brome, blue wildrye, and meadow barley. *Potential Conservation Species: downy woodpecker, white-breasted nuthatch, western bluebird, western gray squirrel, and coyote.*	5 years) low-intensity fire; absence of ground disturbance; presence of acorn-dispersing animals (squirrels, jays, acorn woodpeckers); light grazing/browsing by native ungulates. Oak habitats were formerly maintained by Native Americans with fires of various frequencies.	Fire suppression causing conifer encroachment and competition by native trees and shrubs. Invasive species such as Himalayan blackberry and non-native grasses.
Herbaceous Wetland	Seasonal, semipermanent, and permanent wetlands characterized by annual vegetation and perennial emergent and submerged aquatic wetland plants. Few trees and shrubs. *Potential Conservation Species: waterfowl, canvasback, dusky and cackling Canada geese, tundra swans, shorebirds, sora, northern pintail, northwestern pond turtle, American bittern, and pied-billed grebe.*	Hydric soils flooded at least part of the year from rainfall accumulation or overflow from rivers and streams in the floodplain. Fluctuating water levels and deposition of sediments from flood waters. Infrequent fire. Consumption of vegetation by large concentrations of waterfowl. Functioning floodplain: infrequent major flood events (flood heavily once every 3-5 years), scouring of woody species, deposition of silts, and reduction of emergents.	Non-functioning floodplain and altered hydrology in the refuge watershed. Floodplain alterations including ditching and tile drains associated with agricultural practices, urban and rural development leading to increased runoff, and summer water withdrawals for agriculture, industrial, and urban uses. Encroachment of woody species. Invasive species including reed canary grass, velvetleaf, knotgrass (Bermuda grass), common

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Habitats (plant communities) that Represent Existing BIDEH	Population/Habitat Attributes (age class, structure, seral stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
			cocklebur, and nutria. Urban development with draining and filling of wetlands.
Scrub-shrub Wetland	Dominated by willow species, red-osier dogwood, rose, and spirea generally less than 20 ft. tall. Herbaceous plants include common cattail, sedges, and rushes. Typically characterized by deep organic peat soils. *Potential Conservation Species: willow flycatcher, common yellowthroat, American bittern, northern red-legged frog, and sora.*	Hydric soils flooded for a large part of the year from rainfall accumulation or functional floodplain causing overflow from rivers and streams.	Urban development with draining and filling of wetlands. Many of these habitat types were drained and converted to agriculture through draining, ditching, and tiling. Invasive species such as reed canary grass outcompete native plants.
Rivers, Streams, and Backwater Sloughs	Lower Tualatin River mainstem is characterized as low-gradient (about 1 foot/mile drop) and slow-flowing with riparian vegetation along the banks. Tributary streams may be low- to high-gradient. Sloughs may be inundated year-round or seasonally. Vegetation may include native riparian plant species such as Oregon ash, red-osier dogwood, willows, snowberry, twinberry, and Pacific ninebark.	Periodic flooding, scouring and movement of river/stream channel, inputs of coarse woody debris and leafy detritus, and occasional catastrophic flooding.	Dams; water removal for agricultural, industrial, urban, and rural uses; and ditching, tiling, and draining of adjacent lands. Changes in frequency, duration, and intensity of flood events. Poor water quality, such as water with low dissolved oxygen, high phosphorus, and high temperature. Climate change may exacerbate flooding frequency and/or water quality issues.

Table E-1. Summary of BIDEH for Tualatin River National Wildlife Refuge

Habitats (plant communities) that Represent Existing BIDEH	Population/Habitat Attributes (age class, structure, seral stage, species composition)	Natural Processes Responsible for These Conditions	Limiting Factors
	Potential Conservation Species: anadromous fish, beaver, mink, northwestern pond turtle, and wood duck.		Tualatin River channel is deeply incised and some tributary streams are highly modified into channelized sections with steep banks. Artificial fish passage barriers such as culverts and water diversion structures. Invasive species such as reed canary grass outcompete native plants.

Table E-2. Potential Resources of Concern for Tualatin River National Wildlife Refuge

Species	Refuge Purpose Species	BIDEH	Federal Threatened and Endangered	State Threatened and Endangered	Bird Conservation Region 5 (2008)	Partners in Flight (PIF) Watch List	Birds of Management Concern (BMC) Region 1 Status 2005	Oregon Chub Recovery Plan	Oregon Conservation Strategy	PIF—Oregon/BCR 5, 2004	PIF: Conservation Strategy—Landbirds 1999, 2000	Pacific Flyway Management Plan: Western Canada Geese	Pacific Flyway Management Plan: Western Population Tundra Swans	Pacific Flyway Mgt. Plan: Cacklers	Shorebird Plan [1]	Waterbird Plan [2]	Waterfowl Plan [3]	Flyway Depredation [4]	Three Rivers Conservation Plan 2006	Nature Conservancy—WVPTGSEA	Pacific Coast Joint Venture (PCJV) Willamette Valley Implementation	Recovery Plan for Prairie Species
Acorn Woodpecker			FS						X		X									X		
Aleutian Canada Goose																				X		
Allen's Hummingbird					X	X																
American Acetropis Grass Bug			FS																			
American Bittern	X															X						
American Coot	X																					
American Kestrel	X	X									X										X	
American Wigeon	X						GBBDC															
Anadromous Fish	X																					
Backwater Streams and Sloughs	X																					

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Bald Eagle	X	X		ST	X				X											X		
Band-tailed Pigeon			FS			X	GBBDC			X	X											
Barn Owl	X																					
Beaver	X	X																				
Belted Kingfisher	X																					
Bewick's Wren											X											
Black-capped Chickadee	X																					
Black-headed Grosbeak	X																					
Black-tailed Deer	X	X																				
Black-throated Gray Warbler										X												
Bottomland Riparian Forest	X	X							X		X										X	
Bradshaw's			FE	SE					X													X

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Species	Refuge Purpose Species	BIDEH	Federal Threatened and Endangered	State Threatened and Endangered	Bird Conservation Region 5 (2008)	Partners in Flight (PIF) Watch List	Birds of Management Concern (BMC) Region 1 Status 2005	Oregon Chub Recovery Plan	Oregon Conservation Strategy	PIF—Oregon/BCR 5, 2004	PIF: Conservation Strategy—Landbirds 1999, 2000	Pacific Flyway Management Plan: Western Canada Geese	Pacific Flyway Management Plan: Western Population Tundra Swans	Pacific Flyway Mgt. Plan: Cacklers	Shorebird Plan [1]	Waterbird Plan [2]	Waterfowl Plan [3]	Flyway Depredation [4]	Three Rivers Conservation Plan 2006	Nature Conservancy—WVPTGSEA	Pacific Coast Joint Venture (PCJV) Willamette Valley Implementation	Recovery Plan for Prairie Species
Lomatium																						
Brown Creeper	X	X									X											
Bullock's Oriole											X											
Bushtit										X	X											
Cackling Canada Goose	X						GBBDC							X								
California Myotis									X													
Canvasback	X						GBBDC															
Chestnut-backed Chickadee		X							X													
Chinook Salmon (Upper Willamette Evolutionarily Significant Unit	X		FT						X												X	

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[ESU])																							
Chipping Sparrow									X		X												
Chorus Frog	X	X																					
Coho Salmon	X																						
Common Garter Snake	X																						
Common Yellowthroat	X																						
Cooper's Hawk		X								X	X												
Coyote		X																					
Cropland/Pasture	X																						
Cutthroat Trout (coastal)	X		FS																				

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Downy Woodpecker	X										X											
Dry Prairie	X																					
Dunlin	X														X							
Dusky Canada Goose	X	X					GBBDC		X								X			X		
Fender's Blue Butterfly		X	FE	SE					X											X		X
Fringed Myotis			FS																			
Forested Wetland	X	X																			X	
Garry Oak	X	X																			X	
Golden Paintbrush			FT	SE					X													X
Grasshopper Sparrow									X		X									X		

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Great Blue Heron	X	X							X														
Great Egret	X																						
Greater Scaup							GBBDC										X						
Greater Yellowlegs	X														X								
Green-winged Teal	X																						
Herbaceous Wetland	X	X																					
Hermit Warbler						X																	
Hooded Merganser	X																						
Horned Lark (*strigata* ssp. only)		X	FC		X		BCC/BCR		X		X									X	X		

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House Wren											X											
Hutton's Vireo										X												
Killdeer	X			ST											X						X	
Kincaid's Lupine	X		FT	ST					X													X
Least Sandpiper															X							
Lesser Goldfinch										X												
Lesser Scaup	X						GBBDC										X					
Lesser Yellowlegs					X										X							
Lewis's Woodpecker		X	FS		X	X	BCC/N			X	X									X	X	
Long-billed Curlew					X		BCC/N								X							
Long-billed															X							

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Dowitcher																							
Long-legged Myotis			FS																				
Mallard	X						GBBDC																
Mink	X	X																					
Mixed Coniferous/Deciduous Upland Forest	X	X																					
Mourning Dove							GBBDC																
Nelson's Checker-mallow	X	X	FT	ST					X														X
Neotropical Landbirds—Breeding	X																						

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Northern Flicker	X																					
Northern Harrier	X	X					BCC/N				X										X	
Northern Pintail	X	X					GBBDC										X					
Northern Pygmy Owl										X												
Northern Red-legged Frog	X	X	FS						X											X	X	
Northern Saw-whet Owl										X												
Northern Spotted Owl			FT	ST			FT			X										X		
Northwestern Pond Turtle	X	X	FS						X										X	X		
Northwestern Salamander	X																					

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Oak/Pine Savanna	X	X							X		X										X	X
Olive-sided Flycatcher	X	X	FS		X	X				X	X									X		
Orange-crowned Warbler											X											
Oregon Ash	X	X																				
Oregon Chub			FE	SE				X	X											X		
Pacific Lamprey	X		FS						X											X		
Pacific-slope Flycatcher		X								X	X											
Pale Larkspur (*Delphinium leucophaeum*)			FS	SE																		X
Peacock Larkspur	X		FS	SE					X													X

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(*Delphinium pavonaceum*)																							
Peregrine Falcon	X	X			X		BCC/N		X											X			
Pied-billed Grebe	X															X							
Pileated Woodpecker	X	X																					
Ponderosa Pine (Willamette)	X																						
Purple Finch					X					X													
Purple Martin		X	FS						X		X									X			
Red Crossbill										X													
Red-breasted Sapsucker										X													
Red-eyed Vireo	X										X												

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Red-naped Sapsucker							BCC/N			X												
Red-shouldered Hawk											X											
Red-tailed Hawk	X	X																				
Red-winged Blackbird	X																					
Ring-necked Duck	X						GBBDC															
Ring-necked Pheasant	X																					
River Otter	X	X																				
Rufous Hummingbird					X	X	BCC/N				X											
Sandhill Crane																				X		

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Scrub-shrub Wetland	X	X																		X		
Sharp-shinned Hawk		X																				
Shorebirds—Migrating	X																			X	X	
Short-billed Dowitcher					X		BCC/N															
Short-eared Owl						X			X											X		
Silver-haired Bat			FS																			
Solitary Sandpiper					X																	
Song Sparrow	X																					
Sora	X	X														X						
Spotted	X																					

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Sandpiper																						
Steelhead (Upper Willamette ESU)	X	X	FT						X										X		X	
Steller's Jay										X												
Swainson's Thrush	X	X									X											
Taylor's Checkerspot Butterfly			FC						X													X
Thin-leaved Peavine (*Lathyrus holochlorus*)			FS																			
Townsend's Western Big-eared Bat			FS						X											X		

Table E-2. Potential Resources of Concern for Tualatin River National Wildlife Refuge

Species	Refuge Purpose Species	BIDEH	Federal Threatened and Endangered	State Threatened and Endangered	Bird Conservation Region 5 (2008)	Partners in Flight (PIF) Watch List	Birds of Management Concern (BMC) Region 1 Status 2005	Oregon Chub Recovery Plan	Oregon Conservation Strategy	PIF—Oregon/BCR 5, 2004	PIF: Conservation Strategy—Landbirds 1999, 2000	Pacific Flyway Management Plan: Western Canada Geese	Pacific Flyway Management Plan: Western Population Tundra Swans	Pacific Flyway Mgt. Plan: Cacklers	Shorebird Plan [1]	Waterbird Plan [2]	Waterfowl Plan [3]	Flyway Depredation [4]	Three Rivers Conservation Plan 2006	Nature Conservancy—WVPTGSEA	Pacific Coast Joint Venture (PCJV) Willamette Valley Implementation	Recovery Plan for Prairie Species
Tree Swallow											X											
Tricolored Blackbird			FS			X														X		
Trumpeter Swan							GBBDC													X		
Tundra Swan	X	X											X								X	
Varied Thrush	X	X								X	X											
Vaux's Swift	X									X	X											
Vesper Sparrow (*affinis* ssp. only)			FS		X		BCC/BCR		X		X									X	X	
Virginia Rail	X															X						
Wapato	X	X																				
Warbling Vireo	X																					
Water Howellia			FT																			
Waterfowl—	X																					

Table E-2. Potential Resources of Concern for Tualatin River National Wildlife Refuge

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Cavity Nesting																						
Waterfowl—Migrating	X																					
Waterfowl—Wintering	X	X							X												X	
Wayside Aster (*Eucephalus vialis*)			FS						X													
Western Bluebird	X	X							X											X		
Western Brook Lamprey									X													
Western Canada Goose												X										
Western Gray Squirrel		X							X													

Table E-2. Potential Resources of Concern for Tualatin River National Wildlife Refuge

Species	Refuge Purpose Species	BIDEH	Federal Threatened and Endangered	State Threatened and Endangered	Bird Conservation Region 5 (2008)	Partners in Flight (PIF) Watch List	Birds of Management Concern (BMC) Region 1 Status 2005	Oregon Chub Recovery Plan	Oregon Conservation Strategy	PIF—Oregon/BCR 5, 2004	PIF: Conservation Strategy—Landbirds 1999, 2000	Pacific Flyway Management Plan: Western Canada Geese	Pacific Flyway Management Plan: Western Population Tundra Swans	Pacific Flyway Mgt. Plan: Cacklers	Shorebird Plan [1]	Waterbird Plan [2]	Waterfowl Plan [3]	Flyway Depredation [4]	Three Rivers Conservation Plan 2006	Nature Conservancy—WVPTGSEA	Pacific Coast Joint Venture (PCJV) Willamette Valley Implementation	Recovery Plan for Prairie Species
Western Meadowlark	X	X							X		X									X		
Western Painted Turtle									X											X		
Western Screech Owl	X									X	X											
Western Toad																				X		
Western Wood Pewee	X										X											
Wetland	X								X				X	X	X	X	X	X		X	X	
Wet Prairie	X	X							X												X	X
White Rock Larkspur	X			SE					X													
White-breasted Nuthatch		X							X		X											

Table E-2. Potential Resources of Concern for Tualatin River National Wildlife Refuge

Species	Refuge Purpose Species	BIDEH	Federal Threatened and Endangered	State Threatened and Endangered	Bird Conservation Region 5 (2008)	Partners in Flight (PIF) Watch List	Birds of Management Concern (BMC) Region 1 Status 2005	Oregon Chub Recovery Plan	Oregon Conservation Strategy	PIF—Oregon/BCR 5, 2004	PIF: Conservation Strategy—Landbirds 1999, 2000	Pacific Flyway Management Plan: Western Canada Geese	Pacific Flyway Management Plan: Western Population Tundra Swans	Pacific Flyway Mgt. Plan: Cacklers	Shorebird Plan [1]	Waterbird Plan [2]	Waterfowl Plan [3]	Flyway Depredation [4]	Three Rivers Conservation Plan 2006	Nature Conservancy—WVPTGSEA	Willamette Valley Implementation	Pacific Coast Joint Venture (PCJV)	Recovery Plan for Prairie Species
White-fronted Goose	X						GBBDC																
White-topped Aster				ST					X														X
Willamette Daisy			FE	SE					X														X
Willamette Floater (*Anodonta wahlametensis*)									X											X			
Willamette Valley Larkspur (*Delphinium oreganum*)			FS	SC																			X
Willow Flycatcher	X	X	FS		X	X			X		X												
Wilson's Snipe	X	X													X								

Table E-2. Potential Resources of Concern for Tualatin River National Wildlife Refuge

Species	Refuge Purpose Species	BIDEH	Federal Threatened and Endangered	State Threatened and Endangered	Bird Conservation Region 5 (2008)	Partners in Flight (PIF) Watch List	Birds of Management Concern (BMC) Region 1 Status 2005	Oregon Chub Recovery Plan	Oregon Conservation Strategy	PIF—Oregon/BCR 5, 2004	PIF: Conservation Strategy—Landbirds 1999, 2000	Pacific Flyway Management Plan: Western Canada Geese	Pacific Flyway Management Plan: Western Population Tundra Swans	Pacific Flyway Mgt. Plan: Cacklers	Shorebird Plan [1]	Waterbird Plan [2]	Waterfowl Plan [3]	Flyway Depredation [4]	Three Rivers Conservation Plan 2006	Nature Conservancy—WVPTGSEA	Willamette Valley Implementation	Pacific Coast Joint Venture (PCJV)	Recovery Plan for Prairie Species
Wood Duck—Breeding	X	X					GBBDC																
Yellow Warbler	X										X												
Yellow-billed Cuckoo			FC		X		BCC/R				X									X	X		
Yellow-breasted Chat	X		FS						X		X												
Yellow-rumped Warbler	X																						
Yuma Myotis			FS																				

Possible Focal Species

Key:

Federal Threatened and Endangered Species

FE = Federal Endangered
FT = Federal Threatened

State Threatened and Endangered Species

SE = State Endangered
ST = State Threatened

FC = Federal Candidate
FS = Federal Species of Concern
SC = State Candidate
SS = State Sensitive

BMC Region 1 Designation Codes:

BCC/N = Birds of Conservation Concern/National
BCC/R = Birds of Conservation Concern/Regional
BCC/BCR = Birds of Conservation Concern/Bird Conservation Region
GBBDC = Gamebirds Below Desired Condition
GBADC = Game Birds Above Desired Condition
T/E = Threatened or Endangered under the Endangered Species Act

[1] U.S. Shorebird Conservation Plan (Brown et al. 2001)

[2] Waterbird Conservation for the Americas: the North American Waterbird Conservation Plan (Kushlan et al. 2002)

[3] North American Waterfowl Management Plan (North American Waterfowl Management Plan Committee 2004)

[4] Pacific Flyway Management Plan (Pacific Flyway Council 1998)

E.3 Priority Resources of Concern

The Comprehensive Resources of Concern list was further culled in developing a more targeted assemblage of Priority Resources of Concern (Table E-3). The Priority Resources of Concern table is comprised of 14 focal species, including birds and fish that were selected as representatives or indicators for the overall condition of important refuge habitats. Most of the biological emphasis of the CCP is focused on maintaining and restoring these priority resources.

Several different conservation focal species may be listed for specific habitats to cover the variety of habitat structures and plant associations. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Other species utilizing the habitat will generally be expected to benefit as a result of management for the focal species.

Definitions for the column headings in Table E-3 are as follows:

- **Focal Species**: Species selected as representatives or indicators for the overall condition of the conservation target. In situations where the conservation target may include a broad variety of habitat structures and plant associations, several different conservation focal species may be listed. In addition, species with specific "niche" ecological requirements may be listed as a focal species. Management will be focused on attaining conditions required by the focal species. Other species utilizing the conservation target will generally be expected to benefit as a result of management for the focal species.
- **Habitat Type:** The general habitat description utilized by the focal species.
- **Habitat Structure:** The specific and measurable habitat attributes considered necessary to support the focal species.
- **Life History Requirement:** The general season of use for the focal species.
- **Other Benefiting Species:** Other species that are expected to benefit from management for the selected focal species. The list is not comprehensive; see the *Table of Potential Resources of Concern for the Refuges* for a more complete list.

Table E-3. Priority Resources of Concern for Tualatin River National Wildlife Refuge

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Pacific slope flycatcher	Bottomland riparian forest	Early to mid-successional forest with shrub understory (Sakai and Noon 1991) associated with deciduous trees (Pearson and Manuwal 2001). Canopy trees >12 ft. tall with <20% tree canopy cover, where canopy is Oregon ash-dominated, with willow, red-osier dogwood, bigleaf maple, and hazel (Altman 2000). Shrub cover 30-80%.	Breeding	Yellow warbler, song sparrow, willow flycatcher, and rufous hummingbird
Swainson's thrush		Mid- to late-successional forest with shrub understory. Oregon ash, Douglas-fir, bigleaf maple, cascara as overstory species with >50% canopy closure. Swamp rose, snowberry, elderberry, and salmonberry; >50% shrub cover with >60% native species (Altman 2000).	Breeding, year-round for benefitting species	Beaver, northern red-legged frog, anadromous fish (coho and steelhead), yellow-breasted chat, and black-capped chickadee
Brown creeper		Old-growth and mature forest types (Anthony et al. 1996). Oregon ash, bigleaf maple, Douglas-fir with canopy height >33 ft. and canopy closure >50%. Subcanopy cover >10% by snowberry, Pacific yew, cascara, some grand fir. Habitat patches >50 meter wide (PIF 2000).	Breeding and year-round	Chestnut-backed chickadee, anadromous fish, western wood pewee, downy woodpecker, and pileated woodpecker
Orange-crowned warbler	Mixed coniferous/ deciduous forest	Douglas-fir-dominated canopy with mixtures of grand fir, western red-cedar, western hemlock, bigleaf maple, Garry oak, Pacific dogwood, Pacific yew, and red alder. Understory consists of snowberry, hazel, sword fern, and other shrubs. Understory trees <15 ft. and >30% cover (Altman 1999).	Breeding and year-round for benefitting species	Bewick's wren, spotted towhee, downy woodpecker, olive-sided flycatcher, and pileated woodpecker
Wilson's snipe	Wet prairie	Dominated by sedges and native grasses with very few shrubs or trees (NatureServe 2010). Grasses may be >3 ft. tall (e.g., *Deschampsia* sp.). A wide variety	Breeding, wintering for waterfowl species	American bittern, savanna sparrow, western meadowlark, northern harrier,

Table E-3. Priority Resources of Concern for Tualatin River National Wildlife Refuge

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
		of sedges and rushes should be represented. May retain water at the soil surface more than 6 months during the year.		dusky Canada goose, migrating and wintering waterfowl, and Nelson's checker-mallow
Western bluebird	Oak Habitats	Early successional stages (restoration areas) dominated by native grasses and forbs with scattered sapling Garry oak trees. Trees may range from <3 ft. tall to >15 ft.	Breeding, year-round	Chipping sparrow, coyote, grasshopper sparrow, mourning dove, and rufous hummingbird
White-breasted nuthatch		Trees dominated by widely spaced (Vesely and Tucker 2004) mature Garry oak >25 inches diameter at breast height (DBH) with cavities. Some areas with scattered ponderosa pine large enough (>25 inches) to provide nest cavities, and <1 snags/acre >1 ft. DBH. Native grass and forb understory <30 inches with few to no shrubs. Tree and shrub cover <10% with variable grass heights. Patch size >200 acres (PIF 2000).	Breeding, year-round	Western gray squirrel, acorn woodpecker, western bluebird, black-tailed deer, and lesser goldfinch
Northern pintail	Herbaceous wetland	Shallow water depths averaging 4-18 inches over 75% of wetland basins. Dominated by seed-producing annual plants (e.g., smartweeds, plantain), and native emergent plant species (e.g., sedges, rushes), with few encroaching trees.	Wintering, migrating	Tundra swan, cackling Canada goose, wintering waterfowl, river otter, mink, northwestern pond turtle; bald eagle and peregrine falcon (foraging)
Greater yellowlegs		Declining water depths producing saturated mud flats to mostly drained during summer.	Migrating and year-round or breeding for benefitting species	Least sandpiper, dunlin, killdeer, lesser yellowlegs, long-billed dowitcher, spotted sandpiper, tree swallow, and great blue heron
Virginia rail		Water depths averaging 12-30 inches over 25-75%. Dominated	Breeding and year-round for	Wintering waterfowl,

Table E-3. Priority Resources of Concern for Tualatin River National Wildlife Refuge

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
		by emergent plant species such as spike rush, wapato, softstem bulrush, and common cattail.	benefitting species	American bittern, sora, common yellowthroat, common garter snake, and chorus frog
Pied-billed grebe		Water depths averaging 24-48 inches over 50-75%. Open water >50%. Plant species dominated by submergent plants such as *Potamogeton* sp., *Callitriche* sp., and emergent plants such as *Scirpus* sp., softstem bulrush, and common cattail.	Breeding and year-round for benefitting species	Diving ducks, red-winged blackbird, wood duck, Vaux's swift, mink, purple martin, northwestern pond turtle, and northwestern salamander
Willow flycatcher	Scrub-shrub wetland	Water depths typically 3-10 ft. with some water remaining during most of the year. Vegetation dominated by willow, rose, and Douglas spirea with some Oregon ash, redosier dogwood, and black cottonwood.	Breeding and year-round	American bittern, sora, Virginia rail, red-winged blackbird, common yellowthroat, northern red-legged frog, and northwestern salamander
Coastal cutthroat trout, winter steelhead	Rivers, streams, and backwater sloughs	Barrier-free river, stream channels, and sloughs. Shaded along the banks, and with coarse woody debris for in-stream structure.	Migration corridor for migrating fish, off-channel winter refuge for juvenile fish	Northwestern pond turtle, mink, beaver, belted kingfisher, spring Chinook, coho, and Pacific lamprey
Cackling Canada goose	Cropland	Cultivated cereal grains including corn, barley, wheat, oats, etc. Green browse pastures with annual/perennial ryegrass, fescue, legumes, etc. Mowed to <4 inches before October 1.	Migrating and wintering waterfowl, year-round for benefitting species	Tundra swan, dusky Canada goose, northern pintail, American wigeon, northern harrier, and western meadowlark