
PART I - ADMINISTRATIVE

Section 1. General administrative information

Title of project

Riparian Restoration And Enhancement Planning For Multnomah Channel

BPA project number: 20128

Contract renewal date (mm/yyyy):

Multiple actions?

Business name of agency, institution or organization requesting funding

Metropolitan Service District of Oregon

Business acronym (if appropriate) Metro

Proposal contact person or principal investigator:

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NPPC Program Measure Number(s) which this project addresses

FWS/NMFS Biological Opinion Number(s) which this project addresses

Other planning document references

Short description

Re-establish native riparian vegetation on public lands on Multnomah Channel bottomlands; assess vegetation and wildlife habitat on 309 acres of estuarine wetlands; develop enhancement strategy for freshwater marsh; develop watershed protection plan.

Target species

Cutthroat trout, Western painted turtle

Section 2. Sorting and evaluation

Subbasin
Willamette

Evaluation Process Sort

CBFWA caucus	Special evaluation process	ISRP project type
Mark one or more caucus	If your project fits either of these processes, mark one or both	Mark one or more categories
<input type="checkbox"/> Anadromous fish <input type="checkbox"/> Resident fish <input checked="" type="checkbox"/> Wildlife	<input type="checkbox"/> Multi-year (milestone-based evaluation) <input type="checkbox"/> Watershed project evaluation	<input type="checkbox"/> Watershed councils/model watersheds <input type="checkbox"/> Information dissemination <input checked="" type="checkbox"/> Operation & maintenance <input type="checkbox"/> New construction <input checked="" type="checkbox"/> Research & monitoring <input checked="" type="checkbox"/> Implementation & management <input type="checkbox"/> Wildlife habitat acquisitions

Section 3. Relationships to other Bonneville projects

Umbrella / sub-proposal relationships. List umbrella project first.

Project #	Project title/description
20546	Securing Wildlife Mitigation Sites - Oregon
20116	Securing Wildlife Mitigation Sites - Oregon, Horn Butte
20114	Securing Wildlife Mitigation Sites - Oregon, Ladd Marsh WMA Addition
	Securing Wildlife Mitigation Sites - Oregon, McKensie River Islands
	Securing Wildlife Mitigation Sites - Oregon, E.E. Wilson WMA Additions
	Securing Wildlife Mitigation Sites - Oregon, Ruthton Pt. (Mitchell Pt.)
	Securing Wildlife Mitigation Sites - Oregon, Trout Creek Canyon
20115	Securing Wildlife Mitigation Sites - Oregon, Irrigon WMA Addition
20113	Securing Wildlife Mitigation Sites - Oregon, S. Fork Crooked River
	Juniper Canyon & Columbia Gorge Wildlife Mitigation Project
20140	Tualatin NWR Additions
9140	Acquisition of Pine Creek Ranch
	Securing Wildlife Mitigation Sites - Oregon, Logan Valley
	Securing Wildlife Mitigation Sites - Oregon, Middle Fork John Day

Other dependent or critically-related projects

Project #	Project title/description	Nature of relationship
9705900	Securing Wildlife Mitigation Sites - Oregon	Umbrella Project; explains intent for mitigation planning, coordination, and implementation by Oregon wildlife managers within Oregon. Identifies priority projects with specific budgets that will help meet

		mitigation objectives.
	ODFW Willamette Sunbasin Umbrella Proposal	Umbrella project; explains management intent for anadromous and resident fish and wildlife in Willamette Subbasin.
9565	Assessing Oregon Trust Agreement Using GAP Analysis	A mitigation planning tool used to analyze and rank potential mitigation projects within the basin.
9284	Oregon Trust Agreement Planning Project	A mitigation planning tool that includes methods for assembling a trust agreement and a list of potential mitigation projects.
9206800	Implementation of Willamette Basin Mitigation Program - Wildlife	A mitigation proposal focusing on land acquisition/easement, enhancement, and management of lands in the Willamette Basin. Similar in function as Coalition's umbrella project.

Section 4. Objectives, tasks and schedules

Past accomplishments

Year	Accomplishment	Met biological objectives?
1998	Planted riparian tree assemblage on 24 acres (approx. 0.7 mi. river/streambank)	Successful planting followed by low mortality
1998	Conceptual design for flow control structures	Appropriate design for wildlife habitat enhancement & fish protection

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Establish riparian forest on 24 acres	a	Cut brush in 3-ft. radius, followed by herbicide application
2	Assessment of habitat conditions	b	Topography and hydrology
		c	Survey of biological communities
3	Habitat enhancement feasibility study	d	Detail enhancement goals, determine feasibility
4	Watershed protection	e	Development of watershed protection and enhancement plan

Objective schedules and costs

Obj #	Start date mm/yyyy	End date mm/yyyy	Measureable biological objective(s)	Milestone	FY2000 Cost %
1	3/1999	06/1999	Trees are "free-to-grow"	Initial planting	35.00%
2	8/1999	10/1999	1-ft. contours		15.00%
	3/1999	9/2000	Rated staff gauges		8.00%
	3/1999	2/2000	Biological assessments		36.00%
3	11/1999	3/2000	Enhancement/Feasibility plan		2.00%
4	3/1999	12/1999	Watershed plan		4.00%
				Total	100.00%

Schedule constraints

Seasonal flooding in January/February and May/June of each year may delay biological assessments.

Completion date

2000

Section 5. Budget

FY99 project budget (BPA obligated): \$30,000

FY2000 budget by line item

Item	Note	% of total	FY2000
Personnel		%4	2,500
Fringe benefits	34%	%1	850
Supplies, materials, non- expendable property	Interplanting trees; herbicide	%5	3,000
Operations & maintenance	Metro contributes O&M	%0	0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		%0	0
NEPA costs		%0	0
Construction-related support		%0	
PIT tags	# of tags: 0	%0	
Travel	Contributed by Metro	%0	
Indirect costs		%0	
Subcontractor	Topography, hydrology, biological assessment with Metro contributing administration; tree interplant	%90	58,650

Other		%0	
TOTAL BPA FY2000 BUDGET REQUEST			\$65,000

Cost sharing

Organization	Item or service provided	% total project cost (incl. BPA)	Amount (\$)
Metro	Tree Planting	%8	34,000
Ducks Unlimited	Flow Control Structure Design	%7	30,000
USDA	Flow Control Structures	%50	200,000
Metro	Assessment and Planning	%18	72,000
Total project cost (including BPA portion)			\$401,000

Outyear costs

	FY2001	FY02	FY03	FY04
Total budget	\$25,000	\$15,000	\$15,000	\$10,000

Section 6. References

Watershed?	Reference
<input type="checkbox"/>	Beak Consultants, Inc. 1993. Audit of wildlife loss assessments for federal dams on the Columbia River and its tributaries. Prepared for NPPC, Portland, OR.
<input type="checkbox"/>	BPA. 1993. OR Trust Agreement Planning Project: Potential mitigation to impacts on OR wildlife resources associated with relevant mainstem Col. R. and Willamette R. hydroelectric projects. BPA, U.S. Dept. of Energy, Portland, OR. DOE/BP-299-1. 53pp.
<input type="checkbox"/>	BPA. 1997a. Watershed management program final environmental impact statement. DOE/EIS - 0265. BPA, Portland, OR.
<input type="checkbox"/>	BPA. 1997b. Wildlife mitigation program final environmental impact statement. DOE/EIS - 0246. BPA, Portland, OR.
<input type="checkbox"/>	BPA. 1997c. Wildlife mitigation record of decision. DOE/EIS - 0246. BPA, Portland, OR.
<input type="checkbox"/>	Northwest Power Act. 1980. Pacific NW electric power planning and conservation act, with index. BPA, U.S. Dept. of Energy. 40pp.
<input type="checkbox"/>	Northwest Power Planning Council. 1994. Columbia Basin Fish & Wildlife Program. NPPC 94-55. NPCC, Portland, OR. Jan., 1994.
<input type="checkbox"/>	ODFW 1997. Assessing OTAP Project Using GAP Analysis. In fulfillment of Project No.95-65, Contract No. DE-BI179-92BP90299. Prepared for: BPA, Project Cooperators: USFW, CTUIR, CTWSRO, SPT, Oregon Natural Heritage Program, Portland, OR.
<input type="checkbox"/>	Prose, B. Farmer A., and Olsen R. 1986. Cost-effectiveness of easement and

	fee title acquisition for mitigating wildlife habitat losses. USDI, ISFWS, NAt. Ecol. Center, Fort Collins, CO. 61pp.
<input type="checkbox"/>	Rasmussen, L. and P. Wright. 1990a. Wildlife impact assessment, Bonneville Project, Oregon and Washington. Prepared for USFW for U.S. Dept. of Energy, BPA, Portland, OR. 46pp.
<input type="checkbox"/>	Rasmussen, L. and P. Wright. 1990b. Wildlife impact assessment, McNary Project, Oregon and Washington. Prepared for USFW for U.S. Dept. of Energy, BPA, Portland, OR. 47pp.
<input type="checkbox"/>	Rasmussen, L. and P. Wright. 1990a. Wildlife impact assessment, John Day Project, Oregon and Washington. Prepared for USFW for U.S. Dept. of Energy, BPA, Portland, OR. 47pp.
<input type="checkbox"/>	Rasmussen, L. and P. Wright. 1990a. Wildlife impact assessment, The Dalles Project, Oregon and Washington. Prepared for USFW for U.S. Dept. of Energy, BPA, Portland, OR. 34pp.
<input type="checkbox"/>	

PART II - NARRATIVE

Section 7. Abstract

Abstract

This project, one of many proposed by the Oregon Wildlife Coalition, is considered an ongoing enhancement project under the *Securing Wildlife Mitigation Sites – Oregon* project (Umbrella Project 9705900) as it was recommended for FY1999 funding. This proposal explains the management objectives for wildlife habitat as they relate to the proposed project and describes the link between this project and others proposed under the Coalition’s umbrella project.

Combining the efforts of BPA and Metro, over 1100 acres of Willamette River bottomland along the Multnomah Channel is or will soon be under public ownership for wildlife habitat protection and enhancement. This complex of emergent tidal marshes, forest wetlands, sloughs, and small lakes are diverse and species-rich. On the 306 acres Metro has acquired to date, there is very high potential for wetland enhancement. Over 24 acres of degraded riparian habitat area along the Multnomah Channel and creeks on Metro’s property will be re-vegetated with native plant material in 1998. More information is needed to characterize the bottomland’s ecosystem and to develop appropriate enhancement objectives and opportunities. Topographic, hydrologic, and wildlife habitat assessment information will be acquired in 1998 and 1999. Utilizing Metro’s GIS, this data will be used to develop site plans and designs for wetland enhancement projects. A watershed management plan for streams draining the adjacent Tualatin Mountains onto Multnomah Channel bottomlands will be developed.

Section 8. Project description

a. Technical and/or scientific background

The development of the hydrosystem inundated wildlife habitats and affected many species of wildlife (NPPC 1994). The Northwest Power Act of 1980 established and charged the NPPC with the task of developing a comprehensive fish and wildlife program to protect, mitigate, and enhance fish and wildlife habitat in the Columbia Basin (Northwest Power Act, Section 4(H)(1)(A); NPPC 1994, Section 2). The Northwest Power Act also authorized and obligated BPA to fund implementation of mitigation projects consistent with the NPPC's FWP mitigation goals and objectives.

Hydrosystem impacts were assessed in the mid-1980s. These impacts have been independently audited and verified (Beak 1993) and were amended into the NPPC's FWP as unannualized construction losses (NPPC 1994, Section 11.3A.1). Wildlife impact assessments (Rasmussen and Wright 1990a, 1990b, 1990c, 1990d) estimated the loss of HUs as a result of the construction of each of the lower four Columbia River hydroelectric projects. Riparian/riverine, shrub-steppe, wetland, island, and forest habitats were lost as a result of inundation.

In 1992, the Oregon Trust Agreement Planning (OTAP) Project was initiated by the Oregon Wildlife Coalition (OWC) to create a list of potential wildlife mitigation opportunities by priority and to attempt to determine the costs of mitigating for wildlife losses in Oregon. Using Council and OWC developed criteria, this project resulted in a prioritized list of 287 potential mitigation sites and estimates for general habitats within the mitigation area (BPA 1993). For more information on the OTAP Project see the Oregon Wildlife Coalition's *Securing Wildlife Mitigation Sites – Oregon* umbrella project proposal (Project 9705900). The OTAP was later refined in 1995 using GAP Analysis techniques. The primary goal of the project was to prioritize and depict the contribution of each proposed mitigation site to target species and habitats as well as overall biodiversity in the state and/or eco-region within which it is found. From the results of this project (ODFW 1997), Oregon wildlife managers cooperatively identified and ranked a short list of higher priority sites, one of which was the Wenaha WMA area. For more information on the OWC's GAP Analysis project see the *Securing Wildlife Mitigation Sites – Oregon* umbrella project proposal.

Project Background

Based on observations at similar sites along the lower Columbia River, the river bottomlands adjacent to western bank of the Multnomah Channel were historically rich in species and diverse in wildlife habitat. These wetland complexes were influenced by the Columbia River tidal prism, the seasonal flows of the Willamette and Columbia Rivers, and the stream flows from adjacent watersheds in the Tualatin Mountains. Operation of dams on the Columbia and Willamette Rivers, farming and grazing activities on the channel bottomland, and logging and development in the adjacent small watersheds have contributed to habitat degradation in these bottomlands.

Recently, public agencies are focusing efforts on protecting and enhancing these diminishing resources. In 1991, BPA acquired 417 acres of the Multnomah Channel bottomland referred to as Burlington Bottoms. This was purchased to mitigate for loss of wildlife habitat due to construction of dams on the lower Columbia River and Willamette River Basins. In 1995, voters of the Portland metropolitan region passed a bond measure that provided funds to Metro, a regional government, to acquire land for the protection of open spaces, including the area along the Multnomah Channel. To date, Metro has acquired 309 acres toward its goal of protecting 600 contiguous acres of river bottomland along the channel for wildlife habitat. With the adjacent Burlington Bottoms, this provides wildlife habitat protection for a total of 1017 contiguous acres. Multnomah Channel bottomlands are in close proximity to the Sauvie Island Wildlife Refuge, operated by ODFW, across the channel on Sauvie Island.

A total of \$3 million has been dedicated by Metro to the acquisition of land for protection along the Multnomah Channel. In addition to bottomland acquisitions, Metro has and will continue to purchase land in the adjacent Tualatin Mountains watersheds that affect the bottomlands. No funds are available for enhancement for these properties.

The problems that will be addressed in this proposal include:

1. loss of riparian habitat;
2. paucity of information on the existing wildlife habitat quality and use;
3. identifying viable fish and wildlife enhancement and restoration opportunities;
4. developing implementation plans for specific enhancement and restoration projects;
5. long-term protection of fish and wildlife habitat in adjacent watersheds affecting Multnomah Channel bottomlands.

Analogous Model Study

The problems and the approach toward solutions are analogous to another project managed by the principal investigator and project manager: Smith and Bybee Lakes Wildlife Area. Smith and Bybee Lakes are a tidal, freshwater marsh system very similar and in close proximity to the Multnomah Channel properties. Located at the confluence of Willamette and Columbia Rivers, it is nearly 2000 acres of wetland meadows, marshes, sloughs and open water with associated riparian and upland forests. With a management plan adopted in 1990, Metro has managed the area primarily for wildlife habitat protection and enhancement, while providing passive recreational opportunities. The project manager for this grant application is also one of the authors of the management plan and manager for seven years of Smith and Bybee Lakes Wildlife Area.

With the goal to manage and restore the lakes system faithful to its former natural conditions, to the extent possible, initial management efforts focused on documenting existing conditions and investigating the functions and complexities of the former tidal marsh system. The lakes basins were cut off from their direct connection to the Willamette and Columbia Rivers in 1982 with a local dam construction, resulting in a loss in influences of the rivers' hydrology in driving the system. Essentially, the basins were converted from tidal marshes to reservoirs. Studies either conducted directly by or

under the direction of the project manager included a water quality diagnostic study (Morgan, 1996) a survey of the biota, including aquatic and terrestrial plant communities, aquatic macroinvertebrates, herpetiles, mammals, and birds (Ev, et al. 1994), a paleolimnological study (Eiler, et al. 1995), hydrologic and transport modeling (Wells, 1992), and feasibility of restoration (Morgan, 1996). With the information gathered in the above referred studies, restoration goals were established with the assistance of a technical advisory committee composed of state and federal natural resources managers and local experts. A concept design for a water control structure was developed by the project manager, accompanied by a strategy for hydrologic control, vegetation management and habitat enhancement. Funding partners were developed to assist in implementation, scheduled for 1998.

b. Rationale and significance to Regional Programs

This project is consistent with NPPC's FWP goal to achieve and sustain levels of habitat and species productivity as a means for fully mitigating wildlife losses caused by construction and operation of the federal and non-federal hydroelectric system (NPPC 1994, Section 11.1). The project is also consistent with principles outlined in Section 11.2D.1 of the FWP:

- Least costly way to achieve biological objectives;
- Has measurable objectives;
- Provides riparian and other habitat that can both benefit fish and wildlife;
- Protects high quality native habitat and/or species of concern; and
- Helps protect and enhance natural ecosystems and species diversity over the long-term.

c. Relationships to other projects

Within 1.2 miles upstream (south) along the Multnomah Channel is Burlington Bottoms, a 417-acre BPA-owned wetland complex very similar to Metro's property in habitat types, hydrology, and management objectives. Currently, Burlington Bottoms habitat types are being assessed and management strategies are being developed similar to that proposed for Metro's property. With the goal of consolidating current and future Metro acquisitions along Multnomah Channel with that of Burlington Bottoms, a future 1,100-acre wildlife refuge is envisioned.

d. Project history (for ongoing projects)

Not applicable.

e. Proposal objectives

Objectives

1. Establish riparian vegetation on Multnomah Channel, tidal creeks, and streams.
 Native riparian vegetation has been severely impacted by cutting and grazing along most of the 1.8 mile of Multnomah Channel bank and along 0.5 miles of the tidal creek and streams on Metro’s current landholdings. Native plants have been replaced by exotic pasture grasses and Himalaya blackberry. To stabilize the banks and enhance fish and wildlife habitat, a native riparian plant community will be planted and maintained (approximately 5 years) in these areas until establishment. Plant genotype appropriate for the site will be used. For example, Oregon ash seedlings developed from local parent trees will be used to insure leaf emergence will occur synchronously with the seasonal floods of the river.
Product: Approximately 24 acres of native riparian vegetation will be established.
Estimated cost: \$33,600

2. Assessment of existing habitat conditions.
 No detailed inventory or assessment of plant or animal communities exist for properties currently owned by Metro, although rudimentary field surveys have been made by Metro personnel. Although data is being acquired at Burlington Bottoms that is indicative of that expected on Metro property, detailed site-specific plant community characterization and wildlife inventory is essential to guide protection and enhancement efforts. Non-biotic factors that significantly control or influence habitat conditions will be characterized; namely, hydrology and topography.
Product: A report with maps characterizing plant communities and potential and documented wildlife use of Metro’s land acquisitions. One-foot topographic contour data will be in digital form. Staff gages and rating tables.
Estimated Costs:

\$28,000	Biological Assessment
\$14,500	Topography
\$ 7,900	Hydrology
\$ 6,250	Stream Survey for Salmonids

3. Establish detailed enhancement goals and determine feasibility.
 Recognizing that external conditions beyond our control have and will continue to change (i.e. river hydrology, introduction of pest species), realistic targets will be determined based on the assessment work, with the over-arching mission of remaining faithful to former natural conditions to the extent possible. Consideration will be given to local seed sources, native species that are either currently supported or are capable of being supported given feasible habitat modifications, migratory routes, connectivity to other ecosystems, and the role of these targeted habitat types and species in the larger ecosystems.

Once habitat type (i.e. plant assemblages) and species are targeted, the enhancement strategy will be developed with a feasibility study. For example, if expansion of the open water margins that support the existing *Scirpus lacustris* and *Carex aperta* assemblage is deemed high priority, then the data acquired in meeting Objective 1 (i.e. site hydrology and topography) will be used to

determine the feasibility of implementation and maintenance costs for optimizing growing conditions for these assemblages.

Product: Detailed maps of existing and potential habitat types. Report results may include location and design of an adjustable weir used to regulate inundation area and periodicity.

Estimated Cost: \$6,000

4. Develop watershed protection strategy for streams entering the properties from adjacent Tualatin Mountains.

Where Metro owns significant portions of the watersheds of two streams entering the Multnomah Channel bottomlands from adjacent Tualatin Mountains, most of the drainages are private-held. This requires development of watershed management strategies in cooperation of other landowners. Most land parcels are relatively large, limiting the number of landowners within these small watersheds.

Product: A watershed management strategy document will be developed by consensus with the principal landowners. Land use analysis and mapping using GIS will accompany documents.

Estimated Cost: \$4,000

f. Methods

Methods

Task A. Site Preparation, Planting, and Maintenance

This objective was derived on the (a) basis of historical data, (b) loss of critical habitat in the region, and (c) expediency in re-capturing the site.

(a) According to historical survey notes of 1853 and 1854 (Christy, 1993), these bottomlands at the base of the Tualatin Mountains were “sparsely timbered”, with ash, willow, cottonwood and oak, to “wet prairie”, with “groves of ash timber.” Vegetation in open areas were not documented. Based on remnant native plant assemblages along the channel wetlands, the prairies were likely dominated by Columbia sedge, slough sedge, soft-stemmed bulrush, meadow barley, wapato, and several other species of sedge.

(b) Much of the wetlands that historically occurred along the Multnomah Channel has been converted to agricultural uses. To re-establish the forested wetland communities, especially along the channels and streams, would restore diminished resources.

(c) Since agricultural disturbances such as cultivation and grazing recently ceased on Metro’s properties after their purchase, the window of opportunity to cost-effectively recapture these sites for native plant populations is open for a relatively-short duration. These sites are either already infested or in close

proximity to exotic pest plant species (i.e. reed canarygrass, Himalaya blackberry) that will quickly dominant the site unless management action is taken.

Early implementation of re-establishment of forested wetlands on these properties will focus on riparian areas, where soils, hydrology, and topography clearly indicate conditions are supportive of a riparian forest assemblage. The areal extent to which trees will be planted is also based on existing trees in the relatively-undisturbed portion of the property. The initial planting will cover approximately 24 acres, following the plan listed below for the 5-year “free-to-grow” period.

<u>Activity</u>	<u>Description</u>	<u>Timing</u>	<u>Cost/ac.</u>
Site preparation	Suppression of pasture grasses and bush, 2-ft dia. scalp; apply pre-emergent	Late winter	\$160
Plant Material	Purchase, handle and store the following trees using correct source: Oregon ash, Pacific willow, black willow, black cottonwood, Bigleaf maple, Western red cedar, black hawthorne, Douglas fir, crabapple	Fall Prior to planting	\$420
Planting	Plant on 7-ft. centers (890 seedlings/acre)	Late Winter	\$150
Tube Protection	Purchase and install protective tubing on hardwoods to reduce animal depredation	At planting	\$120
Year 1 Maintenance	Brush competitive growth	June, Aug.	\$300
Year 2 Maintenance	Replace trees lost; brush or spot spray competition	Feb.; June	\$250
Year 4,5 maintenance	Suppress competitive growth	As needed	N/A
		TOTAL	\$1,400/acre

As time and resources permit, additional plant material (i.e. willow, red-osier dogwood) will be gathered on-site in the form of cuttings to supplement the purchased plant material.

Timely monitoring and appropriate response to plants’ needs are essential to establishment of a native riparian forest community. With the first year being the most critical for survival, the site will be monitored at least three times during the growing season for vigor, depredation, and competition from other plants. A stock survey will be conducted in fall, 1999 to assess overall needs.

Factors that may limit successful establishment of a riparian forest community and mitigating measures are:

1. Competition from Other Plants
Adequate site preparation, including suppressing pasture grasses, brushing, and scalping for each seedling, will reduce initial plant competition.
2. Animal Depredation
Mice and beaver can cause extensive damage to young seedlings, particularly hardwoods. Polyethylene mesh tubes will be placed over the more vulnerable seedlings to deter depredation. Vegetation, particularly grasses, will be

suppressed by scalping a 2-ft. radius around each tree, with a pre-emergent herbicide applied.

Task B. Topography and Hydrology

Topography of the bottomlands along the Multnomah Channel are essentially flat, with little relief other than the natural levees along the channel. Existing topographic information for the area is limited to 40-foot contours, which is ineffective in characterizing the subtle relief of the floodplain. However, a one-foot difference in elevation between areas has a significant impact on the hydrology, soil moisture, vegetation, and habitat type. With the ability to map topography at the 1-foot contour level, detailed planning could be accurately performed for managing local hydrology and vegetation.

The areal extent of inundation throughout the bottomlands changes quickly with the elevation of the water surface in the adjacent Multnomah Channel. The ability to hold back seasonal flood waters after the drop of river levels can be a very valuable management tool. An adjustable weir constructed in the tidal creeks can allow prolonged flooding of the marshlands at targeted elevations in years where the river levels may be lower than usual. With most of the tidal creeks on the bottomlands also receiving stream flow from the adjacent Tualatin Mountains, more options exist for controlling the inundation periods and areal extent. Refinement of topographic information will allow planning and management of targeted vegetation and habitat types.

Topographic data (hypsography) will be interpreted photogrammetrically from 1998 aerial photographs which are available for this 1017-acre area. Two-foot contour lines will be generated for plotting and calculation purposes. A digital terrain model will be overlaid with GIS coverages currently in Metro's Regional Land Information System (RLIS) database, such as water features, National Wetlands Inventory, soils, and property boundaries.

Hydrology of the bottomlands is dominated by river hydrology, both in terms of seasonal flooding and year-round control of tidal creeks. During the summer and fall when river surface elevations drop, local streams entering the properties from the adjacent Tualatin Mountains become of importance to the site's hydrologic regime. Although the water quality in the Multnomah Channel is essentially that of the Willamette River, the water surface elevation is controlled by a combination of dam releases on the Columbia River, the Willamette River, and the tidal prism originating from the mouth of the Columbia River. It is the observation of the project manager that water surface elevations along the upper (southern) Multnomah Channel is closely correlated with observations at the Vancouver, WA gauge on the Columbia River. This U.S. Army Corps gauging station provides hourly water level data dating back to prior the construction of the last major dam on the Columbia river system in 1972. The use of correlated water levels will be an important restoration and management tool based on observations of the analogous basin configuration and location of Smith and Bybee Lakes Wildlife Area (Morgan, 1996).

The actual difference in daily mean high and low water surface elevations between the Vancouver gage and the mouth of the central, largest tidal creek on Metro's property on the channel will be calculated. Using a simple gauge for water-level maxima and minima (Richter, 1997), daily observations at the tidal creek mouth will be recorded and correlated with Vancouver gauge data over a range of water surface elevations. The observation period will include the seasonal highs of May/June and lows of September/October. A regression analysis will be conducted on the data for developed of an equation that can be used for predicting the site's water surface elevations on a daily basis based on Vancouver gauge data.

Characterization of local stream hydrology will be limited to one staff gauge on the largest stream entering the central portion of the property. This staff gage will be rated based on instantaneous stream flow measurements conducted by U.S. Geological Survey. Staff gage observations will be recorded at each site visit or at a minimum of once a week. Flow volume during the dry season will be important to determine the feasibility of prolonged inundation for enhancement and pest control purposes.

Task C. Assessment of Biotic Communities

Plants

Prior to disturbance to a plant community, such as manipulation of the hydrology, a thorough plant and animal assessment is necessary to guide enhancement and restoration activities and to gauge the efficacy of management efforts.

Plant community assessment will include:

1. Interpretation of 1997 aerial photographs to outline and estimate area of distinct plant assemblages. This will be digitized and entered into Metro's GIS database for mapping purposes.
2. Field verification of assemblage mapping with identification of plants present in each assemblage.
3. Establishment of permanent plant transects in representative plant assemblages and habitat types to detect long-term trends. Control sites will be selected where both little disturbance has occurred and disturbance is pronounced.

Herpetiles

The herpetiles of the project area are of considerable interest given its proximity to two populations of Western painted turtles and red-legged frogs, both listed as "Sensitive" by State of Oregon. To date, there have been no recorded survey of amphibians or reptiles on the subject properties although recent surveys conducted at Burlington Bottoms are applicable to Metro's properties. Prior to any change in managing the site's hydrology, identifying location, species, and estimate of populations of the area's herpetiles are necessary. This will be conducted by a combination of ODFW personnel, consultants and trained, experienced volunteers. A winter survey during the breeding season will be

conducted for amphibians. A survey for reptiles will be occur in spring and summer, primarily by trapping and observations of basking.

Birds

Point count stations will be selected for gathering census observations on neo-tropical migratory birds and another bird use during the breeding period. Due to the mosaic patterns of forest, shrub-scrub, prairie, and open water communities on these properties, sightings from these stations of migratory waterfowl, shorebirds, and raptors will be sufficient for recording their use of the area. Census at an estimated 10 stations will be taken during eight period between the breeding season of each year, with efforts being concentrated during June 1 through July 15. Species richness and relative abundance will be calculated. These measures are expected to be high given recent observations at Burlington Bottoms (Beilke, 1996). Bird sightings will also be recorded during all plant and herpetile field surveys by personnel with adequate training.

Fish

An electro-fishing survey will be conducted in the non-tidal reaches of the streams emanating from the Tualatin Mountains onto Multnomah Channel bottomlands. Description and mapping of reaches with potential for salmonid spawning and rearing will be included.

Task D. Habitat Enhancement Feasibility Study

The costs and benefits of hydrologic control options will be examined. With the sites hydrology driven by seasonal flooding from the rivers, daily tidal fluxes, and stream flow from the adjacent mountains, numerous options exist for controlling areal extent and timing of inundation. Control of inundation is desirable for enhancement of targeted vegetation communities and suppression of pest plants (i.e. reed canarygrass, purple loosestrife). Using information acquired from tasks listed above, location and designs of control structures will be examined. Selected options will require permits and review by resource management agencies prior to implementation.

One potential impact of water retention on site for which special attention will be warranted include the possible trapping of salmonid smolts migrating downriver which may use these backwaters as refugia. Factors such as timing in the fish species life cycle and water temperature will be considered in the feasibility study. Year-round passage of cutthroat trout must be accompanied in the design.

Task E. Watershed Protection and Enhancement Plan

The major perennial stream entering the bottomlands from adjacent Tualatin Mountains is Golf Creek. Land use in its watershed is primarily timber production, a golf course, and rural residential. With two landowners controlling most significant land uses in the watershed, Longview Fiber and the golf course owner, coordinating a watershed protection strategy is simplified. Metro had a favorable working relationship with Longview Fiber and is currently in negotiation with the golf course owner regarding his

- Principal Biologist for natural area acquisition program. Responsibilities include evaluating biological component of prospective properties, developing short-term management plans, and implementation of those plans.
- Biologist/Manager of Smith and Bybee Lakes Wildlife Area
- Principal Water Resources Planner for the regional government agency.

Expertise Biology of aquatic ecosystems, water quality analysis & modeling, limnology.

Relevant and Publications and Projects

Publication authored as Project Manager:

- Diagnostic and Feasibility Study of Smith and Bybee Lakes, Portland, Oregon
- Transport Mechanisms and Modeling in Burlington Bay, Lake Champlain, Vermont
- Diagnostic and Feasibility Study of Lake Morey, Vermont

Relevant Projects Completed by Project Manager:

- Reforestation of 270 acres
- Enhancement of 30 acres of emergent wetland
- Restoration of 20 acres of oak grassland habitat

Section 10. Information/technology transfer

(Replace this text with your response in paragraph form)

Congratulations!