INSTRUMENT
FOR
FRAZIER CREEK WETLAND MITIGATION BANK
BENTON COUNTY, OREGON

Prepared by:

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This document would not be possible without the contributions of many people. Ken Reynolds provided valuable information on site history and land-use. The vision for management potential and constraints stem from the experience of over 100 years of ownership in his family.

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Larry Devroy, Oregon Division of State Lands
Judy Linton, U.S. Army Corps of Engineers
Mary Eichler, Benton County Soil Conservation
Robert Frenkel, Oregon State University
John Marshall, U.S. Fish and Wildlife Service
Tom Melville, Oregon Department of Environmental Quality
Nancy Taylor, Oregon Department of Fish and Wildlife
Yvonne Vallette, U.S. Environmental Protection Agency

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Staff members at Terra Associates, Inc. contributing technical, drafting, and editorial support include David Teesdale, Mark von Gerichten, Tonnie Spearman, and Angela Engnes.

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EXECUTIVE SUMMARY

The Frazier Creek Wetland Mitigation Bank, sponsored by Mr. Ken Reynolds, is located approximately 3.75 miles north of downtown Corvallis, Oregon, between Highways 99W and 20 (Figure 1). It is at the north end of Benton County's Jackson-Frazier Wetland. The Frazier Creek Wetland Mitigation Bank is established to offer 13 credits for impacts to Palustrine Emergent, Palustrine Scrub-Shrub, Palustrine Forest, and Riverine (Intermittent) wetlands in the mid-Willamette Valley. Additional credits may be added for an approved buffer.

Appropriate hydrogeomorphic classifications include Slope, Flat, and Depressional. The primary service area covers portions of the Middle Willamette Drainage Basin extending from the urban growth boundaries of Monmouth and Independence, south around Albany and Tangent, south and west to the Long Tom River, southwest to Monroe, west to the base of the Coast Range (elevation 350 feet), north around Corvallis and Philomath, north to Falls City, and east back to Monmouth. Cities and towns included in the service area include Monmouth, Independence, Albany, North Albany, Tangent, Halsey, Corvallis, Philomath, Monroe, Alpine, Bellfountain, Glenbrook, Adair, Falls City, and Pedee. Figure 2 shows the boundaries of the service area.

In addition to the primary service area, as shown on Figure 2, credits may be sold within a secondary service area extending up to 20 miles from the Bank site, subject to the discretion of the Corps of Engineers and Division of State Lands permit evaluators, provided that the proposed wetland removal/fill meets the following requirements:

1. The proposed removal/fill site is located in a valley below 650 feet where the hydrogeomorphic classification is Slope, Flat, or Depression and;

2. The proposed removal/fill is either associated with a linear transportation project (such as a road, railroad, pipeline or cable line), or is located in or near a community not yet served by a mitigation bank.

Applicants should not assume that they will be allowed to use the bank if they are in the secondary area. Good justification for being allowed to access the bank will be required for removal/fill applications not in the primary service area.

Information regarding the Frazier Creek Wetland Mitigation Bank and availability of credits may be obtained from the Bank Sponsor:

Ken Reynolds
4715 NE Highway 20
Corvallis, Oregon 97330
541-753-7875 (Telephone)

INTRODUCTION

This report is a declaration of intent by Mr. Ken Reynolds, Corvallis, Oregon, to construct a wetland mitigation bank on a portion of property he owns in Benton County, Oregon. Initially, Mr. Reynolds is proposing a wetland mitigation bank encompassing approximately 26.0 acres. There is potential to expand the mitigation bank by more than 200 acres, depending on future demand. This instrument is for the first phase encompassing about 26 acres.

This document responds to the Oregon Revised Statutes (OAR) 141-085-0400 and its subsequent sections. Information presented is generally in the order listed in OAR 141-0850-0400, beginning with Section 141-085-0421.

OAR 141-085-0421

(2)(a) Site Location and Service Area

Site Location

- Portion of Tax Lot 400, T11S, R4W, NW ¼ Section 18, Benton County, OR (Figure 1).
- 44° 36.85' N, 123° 13.55' W.
- Frazier Creek Ditch, between Highways 99W and 20, approximately 3.75 miles northeast of downtown Corvallis, Oregon. The proposed site is contiguous with the Jackson-Frazier Wetland complex.

Property Owner and Mitigation Bank Sponsor

Ken Reynolds
4715 NE Highway 20
Corvallis, Oregon 97330
541-753-7875

Zoning

Exclusive Farm Use

Service Area

OAR 141-085-0421 does not provide a specific set of requirements for how a service area is to be determined. However, wetland administrative rules do specify that wetland mitigation is to provide for lost functions and values in the area(s) of impact, that credits off-set impacts to wetlands in similar hydrogeomorphic settings, and that credits meet the needs of local watersheds. We generally assume that mitigating for lost wetland functions and values can best be provided close to the area of impact and that hydrology and habitats will be similar within watersheds and within areas of similar hydrogeomorphic settings.

The proposed service area is based on the following set of requirements and assumptions:

- The service area should generally be within 20 miles of the bank.
- The service area should encompass an area with similar hydrogeomorphic settings as the wetland mitigation bank.
- Same soil series or associations are indicative of similar hydrogeomorphic settings.
- The service area should be consistent with watershed boundaries, especially the Middle Willamette Drainage Basin.
- The service should take into account the potential needs for wetland mitigation within urban growth boundaries.
- Topography and elevation data can be used to identify areas of similar geomorphic setting.

Hydric soil series in the proposed wetland mitigation bank include Bashaw, Waldo, and Dayton. These soils were formed in alluvial bottomlands and on water-deposited silts near the Willamette River. Soil surveys of the Benton, Lane, Linn County, and Polk County Soil were reviewed to locate similar soil associates. Bashaw, Waldo, and Dayton soils are found in valleys west along Route 20 to Blodgett, in a valley northeast of Blodgett, south to Reese Creek in Glenbrook (southwest of Alpine), on the west side of Junction City, and from Junction City to Albany along Hwy 99E. In the valley northeast of Blodgett, the Waldo-Bashaw association is located between about 625 and 780 feet of elevation. In the vicinity of Glenbrook, Alpine-Waldo, and Bashaw soils are found below 350 feet. On the west side of Junction City, the elevation of Bashaw soils is about 318 feet. These soils are also found on the east side of the Willamette River. Waldo soils are found along the Lukiamute River and Dayton soils are found in Monmouth and Independence.

An outline of the boundary for the wetland mitigation bank is shown on Figure 2. There was consensus within the Mitigation Bank Review Team (MBRT) to generally limit the bank to the floor of the Willamette Valley, below 350 feet elevation. There was also consensus to extend the bank from Monmouth and Independence in the north to Monroe in the south end of Benton County. A case was made for historic geologic similarity for the area between Monroe and Monmouth/Independence. After deliberation, a case was made to extend the mitigation bank to the east side of the Willamette River. On the east side of the Willamette River, 6th Field Hydrologic Units (Calapooia River and Upper Muddy Creek) were watershed guidelines. However, the primary service area will encompass Urban Growth Boundaries of Millersburg, Albany, and Tangent, and not follow strict watershed boundaries in these three urban areas.

A descriptive explanation of the service area identifies the boundary as (starting from the north) the following: Willamette River Mile (RM) 95 south to approximately Willamette River RM 116.5; around the Urban Growth Boundaries of Millersburg and Albany to the Calapooia River watershed; south around the Urban Growth Boundary of Tangent; southwest to the junction of the Calapooia and Upper Muddy Hydrologic Units; the Upper Muddy 6th Field Hydrologic Unit back to the Willamette River (about RM 142.75, Lake Creek); south to about RM 149 (mouth of Long Tom River); Long Tom River to Monroe; Monroe Urban Growth Boundary; northwest to Glenbrook; north generally following the 350 foot elevation contour to RM 17 on the Mary's River; north to RM 29 on the Lukiamute River and RM 11 on the Little Lukiamute River; north to areas below 350 feet of elevation on the South Fork of Ash Creek; and east around the urban growth boundaries of Monmouth and Independence.

To be consistent with the hydrogeomorphic setting of the mitigation bank, the following restrictions within this broad outline should apply. The mitigation bank is generally intended to service areas below 350 feet of elevation. It is intended to service the entire urban growth boundaries of Falls City, Monmouth, Independence, Corvallis, Philomath, Millersburg, Albany, Tangent, Halsey, and Monroe.

In addition to the primary service area, as shown on Figure 2, credits may be sold within a secondary service area extending up to 20 miles from the Bank site, subject to the discretion of the Corps of Engineers and Division of State Lands permit evaluators, provided that the proposed wetland fill meets the following requirements:

1. The proposed fill site is located in a valley below 650 feet where the HGM classification is Slope, Flat, or Depression and;

2. The proposed fill is either associated with a linear transportation project (such as a road, railroad, pipeline or cable line), or is located in or near a community not yet served by a mitigation bank.

Applicants should not assume that they will be allowed to use the bank if they are in the secondary area. Good justification for being allowed to access the bank will be required for removal/fill applications not in the primary service area.

(2)(b) Potential for Mitigation Banking and Needs Justification

Potential for Wetland Mitigation Banking

The potential for a successful mitigation bank are high.

- There is potential to enhance (restore) wetland hydrology with minimal grading. Breaching an existing berm along the western property boundary and redesigning swales has the potential for enhancing wetland hydrology.
- The proposed bank is in an area of historic wetlands. Hydric soils with high clay content are present in the area of the proposed mitigation bank.
- Potential for colonization by native wetland plants is high. Numerous species of native plants are present in Frazier Creek Ditch, in wetlands upstream, and wetlands adjacent to the site.
- The site is adjacent to the Jackson-Frazier wetlands. It is buffered by agricultural land with limited access and is out of sight from nearby highways. Potential for human disturbance is low.

Needs Justification

Several sources were used to justify the need for a new wetland delineation bank. They included data on population growth, removal/fill permit activity, planning maps for the City of Corvallis, the Philomath Local Wetland Inventory, and personal experience of the Consultant.

Population. Population growth provides indirect evidence of a growing need for wetland mitigation in that growth infers a need for new and improved infrastructure, residential, commercial, and industrial development. Table 1 lists population growth for major cities within the proposed service area. Significant (>15 percent between 1990 and 2000) growth has occurred within all four cities. Indeed, population growth in Albany, and Philomath was higher than the average growth rate for the entire state. During the 1990s the population growth for the four cities was about 26 percent. If this growth rate continues the total population of these four cities will double in 25 to 30 years.

Table 1. Population Change in Four Cities, Benton County, and Oregon.

Year	Corvallis	Albany	Philomath	Delete column	Benton County	Oregon
1980	40,960	26,511	2,673		68,211	2,663,156
1990	44,757	29,540	2,983		70,811	2,842,321
2000	52,215	41,000	3,995		78,153	3,421,399
Percent Change from 1990 to 2000	16.7%	38.8%	33.9%		10.4%	20.4%

Removal/Fill Permit Activity

Justifying a wetland mitigation bank on the basis of removal/fill permit activity is difficult without examining individual files. A printout of permit and violation activity for Benton County was requested from the Division of State Lands database. Over the 5 year period, April 30, 1996 to May 1, 2001, there were 121 waterway, wetland, and renewed authorizations. Area of wetland impact and details of mitigation were not available from the database; however, it does indicate a relatively high level of regulated activity.

City of Corvallis Planning

A plan for future growth and development is under preparation for the North Corvallis Area, about one-half of which is in the Jackson-Frazier watershed. Preliminary inventories suggest large areas (>100 acres) of wetland in the Crescent Valley area west of Highland Drive between Jackson and Frazier Creeks, and between Highland Drive and Highway 99W. Preliminary planning is calling for seven new road crossings (collector streets) of Jackson and Frazier Creeks. New collector streets are proposed to cross wetlands. Whether these plans come to fruition is problematic. However, the plan does indicate extensive areas of wetland within the urban growth boundary and indicates future development will be difficult without some minimal impacts to wetlands.

In south Corvallis, there are extensive areas of agricultural land that are shown as Dayton silt loam on the Benton County Soil Survey. Most of the undeveloped areas are in grass seed production. Very little of the area is shown as wetlands on the National Wetland Inventory (NWI). However, the NWI generally avoided making wetland determinations on land under cultivation. Much of this farm ground may be classified as Prior Converted Farmland (PC) by federal standards.

By State of Oregon standards this farmland with Dayton silt loam soils will likely be determined to be farmed wetland or wet PC, falling under state jurisdiction. For example, the Consultant conducted an informal wetland reconnaissance in a ryegrass field between Rivergreen Avenue and Kiger Island Drive in the spring of 2001. Hydric soils were evident, as were secondary indicators of wetland hydrology, suggesting most of the field was wet PC. The field is on the urban fringe adjacent to City services and in the next logical place development. The site does not appear on the NWI. Qualitative analysis suggests large areas of suspected wetlands in both north and south Corvallis where formal wetland delineations have yet to be conducted. These areas are within the City limits and likely to come under increasing pressure for development as the population grows.

Timberhill Corporation is currently planning to develop several hundred acres in the Dixon Creek watershed north of Walnut Boulevard. The Consultant conducted an informal wetland inventory for Timberhill Corporation several years ago. Much of the area is on moderate slopes. Recent projects have done there best to minimize impacts to wetlands. However, new roads will be needed to access interior non-wetland and development will be impossible without crossing regulated drainages. Poor quality wetland seeps are located on the north side of Walnut Boulevard that is desirable for commercial development. Slopes on Timberhill property are not conducive for on-site (creation) mitigation. Potential wetland mitigation sites have already been exhausted by projects that are in progress. New projects are forthcoming and the anticipated need for off-site mitigation is high.

An interview was conducted with Corvallis Department of Public Works. Several years ago they had two projects requiring wetland impacts and mitigation. Locating off-site mitigation was difficult. They indicated there is no City-owned land available for mitigation for any future projects and welcomed the potential for a local bank.

Philomath Local Wetland Inventory and Philomath Development

The Philomath Local Wetland Inventory indicated the presence of 40 wetland units totaling 449 acres within a study area of 2,680 acres. In other words, approximately 17 percent of the area within the City Limits of Philomath is wetland. This included 409 acres in the Newton Creek watershed and 49 acres in the Mary's River watershed. Most of the wetlands are within undeveloped portions of the City Limits. The proportion of wetland area within the undeveloped portions of the City appears to be in the neighborhood of 30 to 40 percent. Wetlands are clearly a limiting factor restricting growth within the City limits. Commercial and industrial development is particularly restricted by wetlands. It is difficult to foresee how new development can occur within the City limits of Philomath without minimal impacts to wetlands. The Consultant has experience working on several projects in Philomath and locating suitable sites for wetland mitigation has been extremely difficult.

Over 250 lots are currently approved for development in Philomath. New infrastructure and development of these sites will likely require at least minimal impacts to wetlands. Philomath is in an extremely difficult situation due to areas of ratio of wetland to non-wetland within the City limits.

Consultant's Experience

Finding available and suitable sites for wetland mitigation in the Corvallis-Philomath area has been difficult in the past five years. Off-site options have been limited and for the most part unsatisfactory. Numerous projects involving small impacts to wetlands have been mitigated by either payment in lieu of mitigation or more recently purchasing credit in the Oak Creek Wetland Mitigation Bank. For example, a project under construction on NE Conifer Blvd. purchased about 1.5 credits in the Oak Creek Wetland Mitigation Bank. J.T. Smith Corporation exhausted potential on-site mitigation options for a project in Timberhill and had to complete their mitigation requirement by purchasing credit in the Oak Creek Mitigation Bank. Another permit application is in preparation (In Harmony Community, June/July 2001) for Timberhill property. About 0.5 acres of wetland will be proposed and off-site mitigation will be needed.

Having a local off-site option for Corvallis and Philomath is desirable from a watershed perspective. A local option for wetland mitigation is also becoming a political necessity as local citizens express their concerns for enhancing, restoring, and protecting natural resources on a smaller regional scale. Citizens of Corvallis are becoming increasingly reluctant to approve wetland mitigation in Lebanon for impacts to wetlands in Corvallis.

The Consultant is currently assisting with a project under review for annexation within the City limits of Corvallis. About one-half of this 32-acre site has been delineated as wetland, and 6 to 8 acres of wetland impact may be proposed. The City's Master Plan proposes a new road crossing wetlands. Several acres of wetlands will be proposed for impact to accommodate a new road, to meet minimal density requirements, and to preserve other desirable natural resources (groves of Oregon white oak). On-site options for wetland mitigation are limited and will require an off-site option to meet mitigation requirements.

North Albany in Benton County is experiencing growth in residential development. On-site alternatives for small (<0.33 acres) impacts to wetlands were proposed in several permit applications. In one case, creating wetland hydrology has been problematic. In another case, mitigation was referred to the Oak Creek Mitigation Bank after the proposal for on-site mitigation was deemed problematic.

Needs Conclusion

The need for off-site wetland mitigation alternatives within the Urban Growth Boundary of Corvallis is sorely needed as evidenced by the number of projects that have purchased credits in the Oak Creek Wetland Mitigation Bank, small projects that have made payment to provide, and planning documents showing significant areas of wetland on lands zoned for future development. Similarly, wetlands are a severe constraint to future development in the City of Philomath. Permit activity, violations, and population growth within the vicinity of Corvallis and Philomath provide justification for a local wetland mitigation bank. Proposed changes to Oregon Administrative Rules will allow bank credits to be available for resolving violations, as well as compensatory mitigation for removal/fill permits.

Growth and development in the City of Albany was used to justify the need for the Oak Creek Wetland Mitigation Bank. The Consultant has used the Oak Creek Wetland Mitigation Bank for several projects in Albany. Use of the Oak Creek Wetland Mitigation Bank by projects in Albany is direct evidence of the need for off-site mitigation options.

Collective experience of Consultants and the Division of State Lands has repeatedly shown that installing on-site wetland mitigation for small projects (several tenths of an acre) is often problematic (Shaich and Franklin, 1995). Creating or enhancing wetland hydrology on small sites is difficult and the created habitat is frequently surrounded by development, offering little in the way of improvement to wildlife habitat, hydrologic control, or water quality. From a landscape perspective, banks, because of their large area, detailed planning, buffering from human disturbance, and management, provide more significant mitigation than small sites surrounded by development and with little to no connectivity to other undeveloped habitat.

(2)(c) List of Adjacent Property Owners

Eli Ishikawa
1143 NW 16th Street
Corvallis, Oregon 97330

Kyle Dunning
4635 NE Elliot Circle
Corvallis, Oregon 97330

Harmon Investments, LLC
3326 NE Lancaster Street, #1
Corvallis, Oregon 97330

(2)(d) Proof of Ownership

The property is under the personal ownership of Mr. Ken Reynolds and is farmed by his business, Reynolds Farms, Inc. Documentation is attached in the Appendix.

(2)(e) Grading Plan, Site Plan, and Location of Hydrogeomorphic and Cowardin Wetland Classes

Grading

The grading plan is attached as Figures 3A and 3B. Wetland hydrology (soils saturated near the surface for a significant portion of the growing season) is already present. Therefore, the goal of grading will be to enhance wetland hydrology and restore some sheet flow across the site, especially during the winter and early spring.

Features of the grading plan include cutting two water distribution swales and leveling several high spots to promote sheet flow. Two distribution swales will be cut parallel to the slope. After the distribution swales fill with water in the fall, excess water will either spill over the bank downslope and to the east or flow through narrow outlet structures at the north end. In the spring, as precipitation subsides, water in the swales will provide some groundwater recharge to soils downslope. The upper or western slope will be fed by sheet flow from the forested wetland to the west. A cut in an existing berm will be made to restore surface connectivity between the forested wetland and upper portion of the mitigation site. Frazier Creek will feed a second distribution swale. Both swales will be shallow (0.5 to 1.0 feet) and nearly level. Distribution swales will be constructed to provide continuous flow back to Frazier Creek at the north end of the site. The system, as designed, will result in no net change in flow downstream in Frazier Creek. There will be no impoundments of water.

Figure 3B presents details of simple outlet structures at the north end of the two distribution swales. The outlet will be restricted by two sets of boards that restrict water outlet through a four-inch gap. The gap is large enough to permit fish passage, but small enough to maintain water in the distribution swales. The top of the boards will be at about the same level as the bank of the swales, insuring that water will be no more than 12 inches deep in the swales at any time (except extreme flooding over the entire site).

Grading will be installed in the late summer or early fall of 2002, prior to the onset of the rainy season. There is a small risk of bank erosion prior to establishing native ground cover. Erosion control measures, such as a one- to two-inch layer of straw, matting, or bags of nut shells, should be installed if signs of erosion exist.

Adaptive management will be employed to the grading plan. Grading will be installed one year prior to planting. Grading and wetland hydrology will be monitored during the first winter and spring (2002/2003). Further modifications to the grading plan to enhance wetland hydrology or to make adjustments for fish passage may be made following the first year of monitoring and upon recommendations and approval from the MBRT.

Site Plan

The site plan describes planting zones and proposes species, spacing, and numbers for planting. Based on our knowledge and experience of the site, there is potential for natural recruitment from a latent seed bank in the soil, dispersal of native seed by wind and water from adjacent wetlands, and seed dispersal by wildlife. A number of Facultative Wet (FACW) and Obligate (OBL) species representing several genera currently grow in the Frazier Creek ditch. Spread and invasion of these species is anticipated once agricultural production ceases and the current cover of ryegrass is removed. A forested wetland dominated by Oregon ash with scattered patches of slough sedge is located west of the site. Invasion of native wetland species is anticipated from the west once agricultural management is terminated and the berm separating the ryegrass field from the Oregon ash wetland is breached.

The planting plan is presented as if there would be no natural recruitment. In reality, if the site were abandoned, plant succession would develop toward an Oregon ash forest. For the most part, the purpose of installing plants is to increase the rate of plant succession and to restore selected species to a place of dominance in the landscape.

Intentional planting will establish a diversity of native species that will likely be complemented by natural invasion. Performance standards may be satisfied by a combination of installed plantings and natural recruitment. The planting plan provides guidance for establishing each planting zone.

Site preparation will occur during the two growing seasons, 2002 and 2003, prior to plant installation. Following harvest in 2002, the field will be burned and plowed. Grading will be installed in the summer of 2002. The field will be treated with an application of herbicide in the late summer or early fall of 2002 after volunteer ryegrass has sprouted. Herbicide will be applied again in the spring of 2003. The field will be plowed again in the summer of 2003. If necessary, a third application of herbicide will be applied in the late summer of 2003, prior to fall planting.

Six planting zones are proposed, listed below with their approximate areas:

1. Shrub hedgerow wetland (0.6 acres, 2 percent of wetland)
2. Forest (Oregon ash) wetland (3.5 acres, 13 percent of wetland)
3. Transitional shrub wetland (0.2 acres, 1 percent of wetland)
4. Shrub (willow) (0.2 acres, 1 percent of wetland)
5. Seasonally Flooded Emergent wetland (3.71 acres, 14 percent of wetland)
6. Wet prairie (17.8 acres, 68 percent of wetland)

The location of each of these habitat zones is shown on Figure 4.

Shrub Hedgerow

This will be a narrow (three to ten feet, average five feet wide) hedgerow dominated by shrubs and interspersed with trees marking the northern boundary of this portion of the wetland mitigation bank. The following objectives will be associated with the hedgerow:

- Replace cultivated ryegrass with native shrubs and trees.
- Provide a buffer between wet prairie habitat to the south and cultivated ryegrass fields to the north.
- Create shrub habitat that will contribute to landscape, structural, and species diversity.
- Intersperse trees with shrubs.
- Provide a demarcation of the northern boundary of this portion of the wetland mitigation bank.
- Provide cover habitat for birds and other small vertebrates.

Table 2. Shrub Hedgerow Planting Plan

Species	Spacing	Size of Planted Material	Approximate Number
Nootka rose (*Rosa nutkana*)	Average 5 feet with other shrubs	2-gallon or transplanted cluster	225
Small-fruited rose (*Rosa pisocarpa*)	Average 5 feet with other shrubs	2-gallon or transplanted cluster	225
Douglas spiraea (*Spiraea douglasii*)	Average 5 feet with other shrubs	2-gallon or transplanted cluster	225
Scouler's willow (*Salix scouleriana*)	Ave. 6 feet with other shrubs	Slips (approximately 0.5 inch diameter and 3 to 4 feet long)	160
Western crabapple (*Pyrus fusca*)	Average one tree of any species every 30 linear feet, no more than 100 feet between individual trees or clusters	3 to 5 feet	10
Douglas hawthorn (*Crataegus douglasii*)	Average one tree of any species every 30 linear feet, no more than 100 feet between individual trees or clusters	3 to 5 feet	10
Black cottonwood (*Populus trichocarpa*)	Average one tree of any species every 30 linear feet	3 to 5 feet, or slips 4 to 6 feet long	10
Oregon ash (*Fraxinus latifolia*)	Average one tree of any species every 30 linear feet	3 to 5 feet	10
Cascara (*Rhamnus purschiana*)	Average one tree of any species every 30 linear feet	3 to 5 feet	10

Forested Wetland

The goal of this area is to establish forested wetland dominated by a canopy of Oregon ash and interspersed with Black cottonwood. Objectives associated with the forested wetland include:

- Create wetland forest habitat that will contribute to landscape, structural, and species diversity.
- Create an understory of native emergent plants to replace the monoculture of ryegrass that currently grows on the site.
- Enhance wetland hydrology by re-distributing flows from wetland to the west.

The area proposed for forested wetland is adjacent to a forested wetland dominated by Oregon ash. Patches of native wetland plants, particularly slough sedge, grow in the understory of the adjacent forested wetland. Native emergent species also grow in Frazier Creek. Natural invasion and recruitment of native trees and emergents is anticipated upon termination of farming. Redistribution of water from wetlands to the west and from Frazier Creek will facilitate seed dispersal.

Table 5. Forested Wetland Planting Plan

Species	Spacing	Size of Planted Material	Approximate Number
Oregon ash (*Fraxinus latifolia*)	12 feet	3 to 5 feet, bare root	1,050
Slough sedge (*Carex obnupta*)	4 clusters per acre 10 to 15 plants per cluster	Minimum 2 plants per cluster should be 2-gallon with flowers, others may be plugs	210
Water parsley (*Oenanthe sarmentosa*)	5 cluster per acre 10 plants per cluster	Plugs	175
Skunk cabbage (*Lysichiton americanum*)	2 cluster per acre 5 plants per cluster	Plugs	35
Camas lily *Camassia quamash*	25 per acre	Minimum 25 bulbs per acre or scatter seed	75 to 100 bulbs or seed

The understory in forested Oregon ash wetlands is often variable. It can vary from large patches of bare ground to dense cover of slough sedge or water parsley. Slough sedge and water parsley are typical in the understory in adjacent wetlands. Other acceptable understory plants include:

Mannagrass (*Glyceria elata*)

Spreading rush (*Juncus patens*)

California false hellebore (*Veratrum californicum*)

Transitional Shrub Wetland

A strip, about 20 feet wide of scrub/shrub wetland is proposed along the edge of the forested wetland. For the most part, this will be an east-facing edge. Upon maturity of the Oregon ash, the edge will receive more sunlight than beneath the forested canopy. Objectives associated with the transitional shrub wetland include:

- Create a cover of low to medium height plants that contributes to landscape, structural, and species diversity.
- Create a strip of cover as an edge effect and for wildlife.

Table 6. Transitional Shrub Planting Plan

Species	Spacing	Size of Planted Material	Approximate Number
Black hawthorn (*Crataegus douglasii*)	1 every 30 linear feet	3 to 5 feet, bare root	25
Small-fruited rose (*Rosa pisocarpa*)	Average 5-foot spacing with other shrubs Plant in clusters of 5 to 10	2-gallon	75
Nootka rose (*R. nutkana*)	Average 5-foot spacing with other shrubs Plant in clusters of 5 to 10	2-gallon	75

Table 6. Transitional Shrub Planting Plan (Continued)

Species	Spacing	Size of Planted Material	Approximate Number
Douglas spiraea (*Spiraea douglasii*)	Average 5-foot spacing with other shrubs Plant in clusters of 5 to 10	2-gallon	75
Willow (*Salix scouleriana* or *S. lasiandra*)	Average 5-foot spacing with other shrubs Plant in clusters of 5 to 10	Slips 3 to 5 feet long and 0.5 inch diameter	75
Red-osier dogwood (*Cornus sericea*)	Average 5-foot spacing with other shrubs Plant in clusters of 5 to 10	2-gallon or slips 3 to 5 feet tall and 0.5 inches in diameter	25

Shrub (Willow)

A relatively small (about 0.2 acre) and homogenous zone of shrubs dominated by willows is proposed in the southeast portion of the site. Objectives associated with this planting zone include:

- Creating a patch of shrubs that contributes to landscape and structural diversity.
- Creating cover for wildlife.

Table 7. Shrub (Willow) Planting Plan

Species	Spacing	Size of Planted Material	Approximate Number
Pacific willow (*Salix lasiandra*)	Five to six feet on centers with any other slip	Unbranched slip, 3 to 5 feet long, approximately 0.5 inch in diameter	275 total of either species
Scouler willow (*Salix scouleriana*)	Five to six feet on centers with any other slip	Unbranched slip, 3 to 5 feet long, approximately 0.5 inch in diameter	275 total of all species

Seasonally Flooded Emergent Wetland

The flooded emergent wetlands will be shallow swales that will be constructed to enhance wetland hydrology in the interior of the site. They are designed as distribution swales. Overflow from the swales will enhance sheet flow east and north towards the northeast corner of the site or back into Frazier Creek. The redistribution of water will result in no net loss of flow at the northeast corner of Frazier Creek. Inundation or saturation to the surface is anticipated through April annually, capable of sustaining FACW and OBL wetland plants.

Objectives associated with the flooded emergent wetland include:

- Creating wetland habitat that will contribute to landscape, species, and structural diversity.
- Enhance wetland hydrology in the interior of the site, restoring sheet flow to portions of the site.
- Creating emergent habitat dominated by FACW and OBL plants typically associated with prolonged inundation.

Frazier Creek currently supports a variety of native wetland plants, including American water plantain, (*Alisima plantago aquatica*), several species of rush (*Juncus spp.*), spikerush (*Eleocharis spp.*), cattail (*Typha latifolia*), mannagrass (*Glyceria sp*), and American slough grass (*Beckmannia syzigachne*). An exhaustive inventory of plants has yet to be conducted. However, a variety of species representing several genera have been documented.

Simply connecting the swales to flows from the south and west will facilitate natural distribution of seed. The distribution channels will be planted by transplanting plugs and clumps of soil containing roots and rhizomes from Frazier Creek and placing them at intervals of about 20 to 30 feet to initiate growth of emergents. The following list provides suggested species that may be installed to supplement transplanting of plugs. They may be planted as seed, bare root, or rhizomes as appropriate for the species. No more than ten percent of Frazier Creek should be harvested in any given year.

American water-plantain (*Alisima plantago-aquatica*)
Water foxtail (*Alopecurus geniculatus*)
American sloughgrass (*Beckmannia syzigachne*)
Slough sedge (*Carex obnupta*)
Wooly sedge (*Carex languinosa*)
Needle spikerush (*Eleocharis acicularis*)
Ovate spikerush (*Eleocharis ovata*)
Common spikerush (*Eleocharis palustris*)
Mannagrass (*Glyceria sp.*)
Baltic rush (*Juncus balticus*)
Swordleaf rush (*Juncus ensifolius*)
Irisleaf rush (*Juncus oxymeris*)
Plantain leaf buttercup (*Ranunculus alismaefolius*)
Bulrush (*Scirpus acutus*)
Small-fruited bulrush (*Scirpus microcarpus*)
Cattail (*Typha latifolia*)
American speedwell (*Veronica americana*)
Water parsley (*Oenanthe sarmentosa*)

Wet Prairie

The majority of the site is proposed for management as wet prairie. Wet prairie is a vanishing habitat type in the Willamette Valley. Tufted-hairgrass (*Deschampsia cespitosa*) and meadow barley (*Hordeum brachyantherum*) are two grasses that were typically found in wet prairies. Several dozen species of sedges, rushes, grasses, and forbs were common in wet prairie. In terms of species diversity, it will be impractical to replicate a historic wet prairie with the full complement of historic species through installation over a short period of time. However, it will be possible to manage this zone as wet prairie, creating the potential for restoration of this vanishing habitat type. An important management tool for maintaining wet prairie was periodic burning. This site is well-suited for this type of management because of its location. In addition, Ken Reynolds is experienced in controlled burning, as it is a management tool currently used in grass seed production.

Objectives associated with wet prairie habitat include:

- Creating native wet prairie habitat that will contribute to landscape, species, and structural diversity.
- Restore species diversity to an area that is now managed as a monoculture.
- Restore a prairie habitat dominated by tufted hairgrass, meadow barley, other grasses, sedges, and forbs.
- Maintain prairie habitat through the use of periodic controlled burns.
- Enhance wetland hydrology by increasing sheet flow across the field.

Wet prairie should be seeded to tufted hairgrass (0.75 lbs per acre, 14 lbs. total), meadow barley (3 lbs. pounds per acre, 54 lbs. total), spike bentgrass (*Agrostis exarata*) (0.5 to 0.75 lbs per acre, 10-14 lbs. total), and American slough grass (*Beckmannia syzigachne*) (2 to 4 lbs per acre, 35to 70 lbs. total). Seed of native sedges, forbs, and rushes should be added to this mix including: one-sided sedge (*Carex unilateralis*), hare sedge (*C. leporina*), dense sedge (*C. densa*), green-sheath sedge (*C. feta*), slender rush (*Juncus tenuis*), fragrant popcorn flower (*Plagiobothrys figuratus*), forget-me-not (*Myosotis laxa*), water parsley (*Oenanthe sarmentosa*), and speedwell (*Veronica scutellata*). Two to four ounces per acre of each of these seeds should be added to the grass mix. Plugs may be substituted for seed of sedges, rushes, and forbs. In such a case, plugs should be planted at the rate of 200 to 300 per acre, representing as many of the species as commercially available. Acceptable additions to the planting matrix in the wet prairies include:

Camas lily (*Camassia quamash*)
Gumweed (*Grindelia integrifolia*)
Bradshaw's lomatium (*Lomatium bradshawii*)
Popcorn flower (*Plagiobothrys scouleri*)
Common blue-eyed grass (*Sisyrinchium angustifolium*)
Oregon saxifrage (*Saxifraga oregana*)
Western buttercup (*Ranunculus occidentalis*)
Taper-tipped rush (*Juncus acuminatus*)
Hall's aster (*Aster hallii chilensis*)
Dense spike-primrose (*Boisduvalia densiflora*)
Slender cinquefoil (*Potentilla gracilis*)
Barestem desert-parsley (*Lomatium nudicaule*)
California oatgrass (*Danthonia californica*)

The list of acceptable additions may be used as guidance for substitutions to the basic matrix in the event that some species are not available. It is also intended as a list of acceptable species that may be added to enhance the site. It is not intended to be an inclusive list, nor does it imply that all of these species must be present to satisfy standards of performance.

General Planting Notes

- Species proposed in the planting plan are modeled after native species in the provisional plant inventory of the Jackson-Frazier Wetlands prepared by Halse and Chambers (no date, Oregon State University). Plant substitutions should be taken from the provisional plant inventory of the Jackson-Frazier Wetlands or an approved reference site, and approved by the bank's wetland biologist and MBRT prior to planting. Plant substitutions, additions, or deletions may be required depending on availability of recommended species.
- The best time for planting will be in the fall and winter dormant season, between October and January.
- Plants may be installed in clusters as long as average density approximates that specified on the planting plan.
- Plants should not be installed in straight rows. Plantings should be staggered to create a natural appearance to the landscape.
- Plants may be obtained by transplanting material from sources within a 40-mile radius of the site.
- Material obtained commercially should be from seed stock originating from the Willamette Valley unless otherwise approved by the MBRT.
- Trees and large shrubs may be planted as bare root in the dormant season.
- Supportive stakes should be installed for larger shrubs and trees, as needed.

Hydrogeomorphic Classification

Current and anticipated hydrogeomorphic classifications are discussed in Section **(2)(m)**.

Cowardin Classes

Currently, the entire site is disturbed palustrine emergent wetland. Fifty years ago, the site was mostly palustrine scrub-shrub habitat. Undisturbed wetlands adjacent to the site are palustrine forest. There is potential for three wetland classes (emergent, scrub-shrub, and forest) in the mitigation area.

(2)(f) Toxic Materials

Former or current land uses have not resulted in contamination by toxic materials. The site was native habitat until its conversion to agricultural production about 30 years ago. It has been in continuous agricultural production for the past 30 years. Examination of historic aerial photographs dating back to 1936 does not indicate any activity that may have resulted in contamination by toxic materials. There are no buried tanks or waste dumps in the mitigation area.

(2)(g) Ecological Goals and Objectives

One goal of the wetland mitigation bank is to enhance 26.01 acres of farmed wetland by enhancing wetland hydrology, restoring native plant communities, increasing landscape diversity, increasing structural diversity, and increasing diversity of native wetland plants. This implies creating a mosaic of wetland buffer habitat types. A second goal is to manage a majority of the site as wet prairie through the use of periodic controlled burns. Intensity of management will vary according to specific objectives of each habitat type.

A third goal is to enhance wildlife habitat. Goals and objectives are not directed toward any particular species of wildlife. Diversity and numbers of wildlife are a direct function of landscape diversity and complexity. Wildlife habitat will be a byproduct of restoring native plant communities and species diversity to the field that is now in grass seed production.

A fourth goal is to use local or regional sources of genetic stock for plant installations. As a restoration project, the mitigation bank should, whenever practical and possible, use genetic stock that was native to the Willamette Valley.

General objectives for reaching these goals include:

- Establishing six different community types or planting zones.
- Creating water distribution channels and grading to enhance wetland hydrology.
- Planting and managing the site to produce forest, shrub, and prairie habitat to increase structural diversity.
- Replacing the monoculture of ryegrass with native species of grass, sedges, rushes, forbs, shrubs, and trees to increase species diversity.
- Establish shrub and tree communities at densities recommended in the planting plan.
- Plant grasses, sedges, and rushes, and forbs in wet prairie and emergent habitat at rates to achieve 80 percent or more aerial cover.
- Maintain a wet prairie seral community through the use of fire or mowing.
- Prevent invasion of weedy invaders such as reed canarygrass (*Phalaris arundinacea*), blackberries (*Rubus discolor, R. laciniatus*), teasel (*Dipsacus sylvestris*), Queen Ann's lace (*Daucus carota*), or other species considered to be noxious as defined by the Oregon Department of Agriculture (Oregon Department of Agriculture, 2002).
- Eliminate Ryegrass (*Lolium sp.*) as a dominant species on the site. It should comprise less than 15 percent of groundcover.

Specific objectives associated with each planting zone are stated in Section **(2)(e)** above.

(2)(h) Potential to Provide Wetland Functions

Wildlife Habitat

The site is currently in a monoculture of ryegrass. Increasing species and structural diversity of plants will enhance wildlife habitat. Flooded water distribution swales have potential for creating habitat for waterfowl and amphibians. The various cover types will increase habitat for songbirds, game birds, and small mammals.

Habitat enhancement will increase the site's value as a wildlife corridor, enhancing its connectivity to the Jackson-Frazier Wetlands. Wetland forest, a plantation of trees, and agricultural land surround the site. It is well-buffered from intensive human use, a factor that enhances its value for wildlife.

Fish Habitat

Fish habitat may be enhanced, primarily downstream, by enhancing detritus to the food web. Distribution swales are designed to permit fish passage and release following high water.

Hydrologic Control

This site is low gradient and within the 100-year floodplain of the Willamette River. The 100-year floodplain capacity that is present today will remain unchanged with the installation of the mitigation bank. Management objectives will change from draining the farmed wetland to redistributing flow and slowing discharge from the site. There is good potential to use the site for hydrologic control during small (5- to 50-year event) storm surges, and; thus, make an incremental contribution to flood prevention downstream.

Water Quality

Distributing water through the swales with sheet flow across the wet prairie will increase biofiltration. Increased structural diversity will provide shading, an important factor for thermoregulation. Water moves slowly through this low-gradient system and that is good for biofiltration. Biofiltration is good now and will continue to be good after reestablishing native plants.

(2)(i) Effects of Adjacent Land Uses

Site Description and History

The proposed wetland mitigation bank is near the northern end of the historic Jackson-Frazier wetland complex. Reynolds Farm is a Century Farm, homesteaded in 1847. Their farming operation has been centered around their headquarters located on Highway 20.

Jackson and Frazier Creeks originate in the hills of McDonald Forest, north of Corvallis. The two creeks pass through the Crescent Valley area of north Corvallis, converging along Highway 99W between Corvallis and Lewisburg. Historically, there was a vast area of wetland extending several miles to the northeast from about NE Conifer Boulevard. Oldest available aerial photographs, 1936 (see Wetland Delineation Report), show braided channels, open water, forest, and scrub-shrub habitat. Unidirectional sheet flow is evident on historic aerial photographs. The federal government encouraged draining or recovering wetlands for agricultural production in the 1930s. The Jackson-Frazier wetland complex was not immune to this policy. The Frazier Creek ditch was created in the late 1930s.

Significant changes to wetland hydrology occurred within the complex over the past several decades. Emergent and scrub-shrub habitat was present until the late 1960s and early 1970s when land was cleared and drainage altered to support agricultural production. Prior to clearing, the wetland was used as winter pasture for cattle and horses. Wetlands along NE Conifer Blvd. (south of the Jackson-Frazier stream confluence) were filled and developed. Ditches were constructed to drain wetlands upstream from the Reynold's property. An east-west ditch is located along the southern property boundary. A berm was constructed along the western boundary in the southwest portion of the proposed mitigation bank. Alterations were designed to direct flows into the Frazier Creek Ditch and eliminate sheet flows across the bottomland.

Currently, approximately 26.0 acres are proposed in the mitigation bank, with potential for expansion. The current site has been in grass seed production (annual ryegrass, *Lolium sp.*) for about 30 years.

Surrounding Uses

The site is compatible with surrounding land uses. Surrounding land is zoned Exclusive Farm Use (EFU). EFU zoning protects surrounding landscape from development. A mitigation bank is compatible with forested wetland that is present to the southwest. Irrigated farming is located near the northwest corner of the site. Percolation of irrigation runoff will not have a negative impact on the mitigation bank. A managed stand of hybrid poplars (*Populus sp.*) is now growing on the east side of the area proposed for mitigation. There is potential for poplar seed to blow into the mitigation area. However, hybrid poplar are doing poorly in wet spots within the stands and are not expected to become an unwanted weedy plant in the mitigation area due to the hydrological conditions. Furthermore, periodic burns in the wet prairie will serve as a further control mechanism.

One neighbor expressed concern about the potential for flooding upstream. No impoundments are proposed that could flood property upstream or to the south. Flows will be redistributed, but there should be no net change in flow through the system. Enhancing wetland hydrology can be done without impacting flows upstream or downstream. The Bank Sponsor will have an obligation not to restrict flows in the Frazier Creek ditch. In order to maintain this obligation, the Frazier Creek ditch is not included within the formal boundary of the wetland mitigation bank.

One neighbor expressed concern that habitat restoration, particularly tall trees, could impact his approach into a private airstrip on adjacent property to the west. There are no regulations restricting plant or building height adjacent to private airstrips. However, the planting plan does take the airstrip into account. Wet prairie habitat in the approach of the air strip will not impair visibility to the runway. Planting tall trees in the approach to the runway will be avoided. Another concern was that wildlife, particularly waterfowl, could increase the risk of a bird strike to an approaching plane. This risk is currently present in the surrounding ryegrass fields and no problems have yet to be reported or known to have occurred. Restoring shrub and forest communities will result in less habitat for wintering waterfowl than is currently present on the site.

Much of the Jackson-Frazier watershed is within the Urban Growth Boundary of Corvallis. As development increases in north Corvallis, there is potential for increased runoff following storms. Increasing the amount of impervious surface upstream will likely have a greater effect on the site than the adjacent farm uses. The mitigation bank's potential for flood storage in the Jackson-Frazier basin is an asset to the watershed.

(2)(j) Types of Credits Offered

The Frazier Creek Wetland Mitigation bank will offer credits for impacts to depressional, slope, and flat hydrogeomorphic classes. Cowardin classes appropriate for mitigation include forest, scrub-shrub, emergent, and intermittent riverine.

(2)(k) Performance Standards

Performance Standards with their associated objective and monitoring method are outlined in Table 8. More detailed information on monitoring measurements and monitoring protocol is described in Section **(2)(q) Monitoring Frequency and Protocol**.

Table 8. General Performance Standards

Objective	Performance Standard	Monitoring Measurement
There should be 6 community types: a) Hedgerow scrub/shrub wetland (0.6 acres) b) Wetland Forest (3.5 acres) c) Wet Prairie (17.8 acres) d) Flooded emergent (3.71 acres) e) Shrub edge (0.2 acres) f) Shrub (willow) (0.2 acres)	Six community types should be present in the approximate locations identified on the planting plan. The area of each community type should be within five percent of the proposed area.	Planting zones will be staked in the field prior to planting by measuring distances based on the planting plan. Planting zones may be verified on an aerial photograph, surveying, or distance and bearing measurements two years after planting.
Distribution channels should be inundated through April 15. All areas of wetland should have wetland hydrology through April.	a) Surface water should be visible in the distribution channel. b) Wetland hydrology as defined in the *1987 COE Manual* must be present. c) The standard will be satisfied when the objective has been satisfied in two years with normal or below normal precipitation beginning in 2003.	Shallow (approximately 16 inches) observation tubes (capped) will be placed along a transect at approximately 6 inch changes in elevation. There should be at least two observation tubes in the wet prairie and one in the forested wetland. Monitoring frequency and protocol are described in Section (2)(q).
Increase structural diversity	a) Grass (prairie), shrub, and forest habitats must be present. b) Multi-layered canopies must be present in hedgerows and northern perimeter of wetland forest.	Photographic documentation will be provided to illustrate the presence of habitat variety and structural diversity of plant communities.

Table 8. General Performance Standards (Continued)

Objective	Performance Standard	Monitoring Measurement
Increase species diversity	a) In forested and shrub wetlands, a minimum of 3 native species of trees typically maturing at greater than 20 feet in height must be present. b) In hedgerow and transitional shrub zones, a minimum of four species of shrubs must be present. c) In emergent zones, there must be a minimum of 12 native species of groundcover, including at least three species of *Carex,* two species of *Juncus, Deschampsia cespitosa, Hordeum brachyantherum,* and four species of forbs.	Species diversity will be measured by identifying plants at designated sample plots.
Survivorship of trees and shrubs	a) Survivorship of trees and shrubs should result in planting densities within five percent recommended in the planting plan. Typically, that implies 80 to 100 percent survivorship of planted material. b) An increase in aerial coverage should be recognized in successive years. Aerial coverage of trees should be about 15 percent within three years of planting. Aerial coverage of shrubs should be 40 to 60 percent within three years of installation.	a) Survivorship and planting densities will be based on sampling. All native species of trees and shrubs, installed or naturally invading, will count toward evaluations survivorship and stem density. b) Aerial coverage of each canopy layer will be estimated at each sample point, according to protocol described in Section (2)(q).
Survivorship of ground cover	a) There should be 30 to 50 percent ground cover 1 year after installation in emergent and wet prairie zones. b) There should be 60 to 80 percent ground cover comprised of targeted native Willamette Valley species two years after installation within emergent and wet prairie zones. c) There should be 50 percent ground cover within two years of installation in shrub and forest habitat.	a) Aerial cover of ground cover will be estimated at each sample point according to protocol described in Section (2)(q). b) All installed or naturally invading native species will count toward evaluation of cover.

Table 8. General Performance Standards (Continued)

Objective	Performance Standard	Monitoring Measurement
Cover of ryegrass and non-native species such as Himalayan blackberry, thistles, purple loosestrife, Queen Ann's lace, and reed canarygrass should be minimal.	a) Ryegrass should be plowed under and removed prior to active installation of native plants. It should not exceed 10 percent of ground cover. b) There will be a zero tolerance for reed canarygrass, Himalayan blackberry, Evergreen blackberry, purple loosestrife, kudzu, Japanese knotweed, and poison hemlock the first two years after installation. c) Aerial cover of species listed in b) should be no more than 5 percent two years after plant installation, and less than 15 percent thereafter.	a) Presence of weedy invaders will be noted during all site inspections, regardless of whether they occur in a designated sample plot. b) Aerial cover of weedy invaders will be estimated at each sample point during scheduled monitoring events according to protocol described in Section (2)(q). c) *Noxious Weed Policy and Classification System* published by the Oregon Department of Agriculture Noxious Weed Control Program will be the reference for identifying unacceptable plants.
Enhance habitat for wildlife.	a) Emergent (flooded), prairie, shrub, and forest habitat types must be present. b) There should be sightings or signs of songbirds, waterfowl, shorebirds, amphibians, and mammals each year. The number of sightings should increase annually as habitats mature.	a) Presence of wildlife habitat will be assumed on the basis of the presence of native plant communities as described in the planting plan. b) A spring (May) and winter (between November and February) bird inventory will be conducted annually for three years following installation. Signs of mammals, amphibians, and reptiles will be recorded during bird inventories.

(2)(l) Reference Sites

The Jackson-Frazier Wetland complex is a general reference site for this mitigation bank. A provisional inventory of plants in the Jackson-Frazier Wetlands was used as a reference in preparing the planting plan (Halse and Chambers, no date). The plant inventory for the Jackson-Frazier Wetlands and plant inventories for forested and wet prairie wetlands in the Finley National Wildlife Refuge will be the primary references for species substitutions or contingency plantings. A quantitative assessment of reference sites will be conducted between April 15 and June 1, 2003. The quantitative assessment will follow protocol described in Section **(2)(q)**, except that sample plots will not be permanently marked. The reference sites will be monitored in 2003 and in alternate years, thereafter.

Reference sites will be provided for forested (Oregon ash) and wet prairie wetlands. The reference site for forested wetland will be in the northeast portion of the Jackson-Frazier wetland (Figure 5). A forested wetland dominated by Oregon ash grows adjacent and west of the southwestern portion of the mitigation bank. Property adjacent to the mitigation bank is under private ownership and contiguous with the publicly owned Jackson-Frazier wetlands. The canopy dominated by Oregon ash is closed and trees are four to eight inches diameter at breast height. Slough sedge grows in the understory. The close proximity of this site makes it useful for comparing and evaluating species composition, as well as wetland hydrology. Water ponds in depressions during the winter and early spring in this forested wetland. The forested wetland will also serve as a model for tree density and ground cover.

The Research Natural Area (RNA) in the northeastern portion of the Finley National Wildlife Refuge will be used as the reference site for wet prairie (Figure 6). Wet prairie (tufted hairgrass) is located in the approximate location marked by a flag in Figure 6. There are established sample plots in the vicinity of the flag. Fire history is well documented and burning is conducted as part of the management. Response of plant communities to varying intervals of burning is one of the research objectives. From Cowardin, hydogeomorphic, and management perspectives the RNA at Finley National Wildlife Refuge provides the best reference site for the goals and objectives of the Frazier Creek wet prairie. Data and management experience from Finley will be useful in guiding the development of wet prairie at the Frazier Creek Wetland Mitigation Bank.

(2)(m) Site Assessment

(A) Hydrogeomorphic and Cowardin Classes

Hydrogeomorphic classes are based on descriptions in Adamus (2001). Overall, the site historically was best described as a reach in a Riverine Flow-through (RFT) system. With the construction of drainage ditches, RFT was restricted to drainage ditches, most notably Frazier Creek. Interior portions of the current grass field were isolated from overland flow from upstream, taking on characteristics of Slope and Flat wetlands. Currently the site behaves like a Flat in that precipitation is the primary source of hydrology and behaves like a slope by having groundwater inputs. Principle sources of historic hydrology were overland flow and precipitation. Water loss was a combination of outflow during the winter and early spring with evapotranspiration, the primary source of loss later in the spring. The construction of drainage ditches facilitated greater outflow during the winter, moving evapotranspiration earlier into the spring.

Two distribution channels will restore intermittent flow through the site. Wetland hydrology will be enhanced with greater overland flow than currently exists. Precipitation will continue to be a major source of wetland hydrology. The site will have characteristics of slope and flat wetlands with flow-through channels.

Three Cowardin wetland classes will be present in the mitigation bank: Palustrine Forest, Palustrine Scrub/Shrub, and Palustrine Emergent. Distribution channels will have characteristics of an intermittent Riverine class. Distribution channels will have direct downstream channel connectivity to Frazier Creek.

(B) Ecological Baseline

Existing plant cover is a monoculture of ryegrass. Agricultural use limits wildlife habitat. In spring of 2001, northern harriers were observed hovering over the site, apparently hunting for small rodents. Sparrows were identified in grass cover in May. Tracks and scat of raccoon and coyote were observed along ditches in May 2001. The site was plowed after grass harvest in 2002. Wildlife habitat is limited each year after grass harvest and virtually non-existent after plowing and before the next crop of grass sprouts.

Frazier Creek Wetland Mitigation Bank Threatened and Endangered Species

Evaluation of potential impacts to threatened or endangered species was conducted in the context that the site proposed for the Frazier Creek Wetland Mitigation Bank has been in agricultural production since the late 1960s. Annual ryegrass has been raised continuously for over 30 years. Typical management includes plowing or disking the entire field annually. Therefore, the likelihood of threatened or endangered plants in the interior of the site is remote.

Surface flow is now directed through a main ditch. A variety of native wetland plants grow in the Frazier Creek ditch. The ditch is low gradient and maintained periodically to remove build-up of silt. The most likely place to suspect threatened or endangered species would be the Frazier Creek ditch and the western fringe of the site because these are the two areas least impacted by farming.

Obtaining a list of threatened or endangered species within a two-mile radius of the site from the Oregon Natural Heritage Database narrowed the scope of comments. Potential species of concern are listed in Table 18. State and federal status is based listings published by the Oregon Natural Heritage Program (2001).

Table 18. Threatened or Endangered Species Listing Within Two Miles of Frazier Creek Wetland Mitigation Site

SPECIES	FEDERAL STATUS*	STATE STATUS*
Animal		
Coastal Cutthroat trout – Upper Willamette River (*Oncorhynchus clarki clarki*)	SOC	No listing
Steelhead (*Oncorhynchus mykiss*)	LT	LT
Chinook salmon (*Oncorhynchus tshawytscha*)	LT	No listing
Bald Eagle (*Haliaeetus leucocephalus*)	LT	LT
Oregon chub (*Oregonichthys crameri*)	LE	SC
Pacific Western Big-Eared Bat (*Corynorhinus townsendii townsendii*)	SOC	SOC
Northwestern Pond Turtle (*Clemmys marmorata marmorata*)	SOC	SC
Fender's blue butterfly (*Icaricia icarioides fenderi*)	LE	No listing
Willamette Callippe Fritilary Butterfly (*Speyeria callippe*)	No listing	No listing
Valley Silverspot Butterfly (*Speyeria zerene bremnerii*)	No listing	No listing

Table 18. Threatened or Endangered Species Listing Within Two Miles of Frazier Creek Wetland Mitigation Site (Continued)

SPECIES	FEDERAL STATUS*	STATE STATUS*
Plants		
Shaggy Horkelia (*Horkelia congesta congesta*)	SOC	C
Thin-leaved peavine (*Lathyrus holochlorus*)	SOC	No listing
Bradshaw's lomatium (*Lomatium bradshawii*)	LE	LE
Kincaid's lupine (*Lupinus sulphureus kincaidii*)	LT	LT
Nelson's sidalcea (*Sidalcea nelsoniana*)	LT	LT

* LT- Listed threatened; LE- Listed endangered; SC-Sensitive-Critical; SOC-Species of concern; C-Candidate

Bald Eagle. Bald Eagles generally live around lakes and rivers where they can hunt for their primary food source, fish. Their diet also consists of waterfowl and carrion. In winter, some migratory birds are seen in the mid-Willamette Valley where they feed on sheep carcasses. There is a known nest site between Reynolds Farms and the City of Albany on the Willamette River.

Since the site is proposed to remain in a natural state, impacts to foraging habitat are unlikely. No impacts to water quality that may affect fish habitat downstream are projected. There are no roost or nest trees in the proposed mitigation area. Carrion from livestock is not present, as there is no domestic animal grazing. There are few if any habitat features attractive to Bald Eagles currently on the site. Installation of a wetland mitigation bank will involve restoration of natural features and will likely improve overall wildlife habitat. Habitat restoration will neither disturb the known nesting site that is on the Willamette River nor remove wildlife habitat. Neither direct nor indirect impacts on Bald Eagle habitat are likely.

Coastal Cutthroat Trout. Coastal cutthroat trout are a species of concern at the federal level. According to Gary Galovich (Oregon Department of Fish and Wildlife), both fluvial and resident cutthroat trout are in the Jackson-Frazier watershed. Both resident and fluvial populations have been identified in or above the Jackson-Frazier wetlands. Fluvial and residents are also believed to be present below the Independence Highway. The Reynold's Farm has not been sampled. Fluvial cutthroat trout may pass through the Frazier Creek ditch on the Reynold's Farm. They could also reach the Jackson-Frazier Wetlands and points beyond through Asbahr Lake and Stewart Slough.

Restoring wetlands adjacent to the Frazier Creek ditch is not likely to result in changes to fish habitat from present conditions or conditions during the early 1900s, prior to farming. Winter water flows will be maintained in the Frazier Creek ditch. Concerns were raised about the possibility of impounding fish in proposed water distribution channels. This issue has been addressed by designing the distribution channels in a manner that will permit continuous flow in and out of Frazier Creek ditch.

Water quality and quantity downstream will not be impacted by the mitigation bank. Therefore, no downstream impacts to fish habitat are anticipated.

Oregon Chub. Oregon chub are native to the Willamette Valley, found in channels, oxbows, ponds, sloughs, and flooded marshes (Sheerer 1999). Habitat disturbance and introduction of non-native fish led to their decline over the last 100 years. Historically, the Jackson-Frazier wetlands may have provided habitat for Oregon Chub.

Frazier Creek has seasonal flow and there are no other perennial or surface waters within the site proposed for wetland mitigation. Habitat for Oregon chub is not present in the interior of the area proposed for the wetland mitigation bank. Restoring wetland habitat along Frazier Creek will not enhance habitat for non-native fish that prey on or compete with Oregon chub. The wetland mitigation project will not adversely affect water quality that could impact Oregon chub or other fish populations downstream.

Western Big-Eared Bat. The Western Big-eared bat is a species of concern and not subject to the same level of regulatory scrutiny as species with threatened or endangered status. Western big-eared bats roost in caves, mines, cavities, and buildings during the day and forage at night. They are frequently associated with coniferous forests.

There are no caves or trees in the proposed mitigation area. There is no diurnal roosting habitat for bats on the site. There is potential for bats of any species to be foraging over the site at night. Installation of a wetland mitigation bank will create a more complex habitat, presumably suitable for more insects. A more robust insect population would likely be a benefit to any species of bat.

Northwestern Pond Turtle. Northwestern pond turtles are known to appear in ponds and slow moving water (back-water channels and sloughs) along the Willamette River. They nest in duff and organic litter up to 200 feet from water. Other than Frazier Creek, there is no surface water habitat for northwestern pond turtles in the area proposed for the mitigation bank. Frazier Creek is not typical habitat for the northwestern pond turtle. No significant alterations are being proposed to Frazier Creek. Impacts to northwest pond turtles or their habitat is unlikely.

Fender's Blue Butterfly. Fender's blue butterfly is listed as an endangered species at the federal level. They are found exclusively in the upland prairies of the Willamette Valley. Interdependence with native forbs, particularly Kincaid's lupine, is well documented (Wilson et al. 1997). The possibility that Fender's Blue Butterfly is present in the mitigation bank site is remote because the site was formerly under agricultural management that included herbicide treatment of broad-leaf plants. Bottomland was historically wetland and did not have soils that typically support upland species of lupines. Restoring upland prairie is not an objective of the mitigation bank. Therefore, beneficial effects are unlikely.

Willamette Callippe Fritilary Butterfly and Valley Silverspot Butterfly. Butterflies and moths feed on nectar of flowers. The site proposed for the wetland mitigation bank has been a monoculture of ryegrass for 30 years. Butterfly habitat is not present because nectar producing flowers are not present in the proposed mitigation area. Increasing species diversity in the wetland mitigation bank will likely increase potential habitat for butterflies and moths.

Plants. The field proposed for the mitigation bank has not supported native populations of forbs, shrubs, or trees for more than 30 years. Generally, searches for rare plants are conducted during the flowering season of the species in question. However, for all but one plant, Nelson's checker mallow, species search is not warranted because the field has been managed as a monoculture and is frequently plowed. Two of the five plants (Thin-leaved peavine and Kincaid's lupine) are found in uplands. Although habitat for Shaggy horkelia is described as open, sandy or rocky flats or sparsely wooded areas by Hitchcock et al. (1969), it is also found in wet prairies. The proposed mitigation bank site was unlikely to have supported any of these species.

Bradshaw's lomatium is known to be present in the nearby Jackson-Frazier wetlands. It's habitat is wet prairie and it flowers in April and May. There is no native wet prairie habitat in the proposed wetland mitigation area, and regular plowing destroyed any previous native plant communities. Seed of Bradshaw's lomatium is not known to be long-lived. Therefore, cessation of intensive agricultural management is not likely to release Bradshaw's lomatium. However, some of the mitigation bank is proposed to be managed as wet prairie and will likely support the type of plant community in which Bradshaw's lomatium formerly thrived.

Nelson's checker-mallow is not present in the interior of the proposed mitigation bank for all the reasons discussed above. Small populations and individual plants are known to occur in roadside ditches, riparian areas, and forested Oregon ash (*Fraxinus latifolia*) forests around Corvallis and Philomath. It was formerly a component of several classes of Willamette Valley wetlands. There is potential habitat for Nelson's checker-mallow along the western boundary of the wetland mitigation bank, adjacent to an Oregon ash dominated wetland. A berm was constructed along low-lying areas of the western property boundary. Plans call for breaching the berm to enhance surface runoff through the mitigation bank. Grading and site preparation will not impact native plant communities adjacent to the site.

Other Plants. There are many other wetland species that are endemic to wetlands of the Willamette Valley and are not included in the database listing rare species within a two-mile radius of the site. For example, other potential rare plants include the Willamette Valley daisy (*Erigeron decumbens*) and peacock larkspur (*Delphinium pavonaceum*). None of these plants is likely to occur in the mitigation bank area that is now managed as a monoculture. Conducting detailed plant surveys is not warranted given the recent history of agricultural production.

Conclusion

The area proposed for wetland mitigation has been under intensive agricultural production, including plowing, for over 30 years. Habitat for threatened or endangered animals and plants is not likely to be present because of the intensive agricultural use. Cessation of agriculture production, enhancing wetland hydrology, and restoring native plant communities is not likely to adversely impact any threatened or endangered species in the vicinity of the mitigation bank. Managing the habitat for native plant communities may have a positive effect on rare, threatened, or endangered plant and animal species.

(C) Wetland Delineation

A wetland determination/delineation was completed for the site in May 2001 with concurrence from the Oregon Division of State Lands on September 19, 2001 (See Appendix Determination Number 2001-0317). A wetland determination was also made by the Natural Resource Conservation Service (formerly Soil Conservation Service). For state purposes, the area below the 216-foot contour was delineated as wetland. For federal purposes, the area of the mitigation bank was determined to be prior converted farmland (SCS Form 26 dated March 14, 1994).

(2)(n) Methods to Determine Availability of Credits

The number of available credits will follow guidelines provided in OAR 141-085-0135. The number of credits will be based on a 2:1 (enhancement area:wetland credit) ratio that the Division of State Lands has approved for application to farmed wetlands.

The area proposed for wetland mitigation amounts to 26.01 acres. At the 2:1 ration, 13 credits will be available. The amount of credit may increase upon reaching performance standards and for buffer enhancement with the approval of the Oregon Division of State Lands and the Army Corps of Engineers.

The mitigation Bank Sponsor proposes a phased release of credits according to the following schedule:

- 30 percent (approximately 3.9 credits) upon approval of grading installation.
- 15 percent (approximately 1.95 credits) released upon approval of the as-built planting installation.
- 55 percent (approximately 7.15 credits) released when all performance standards have been satisfied.
- Credits may be released on a pro-rated basis whenever performance standards have been satisfied for portions of the wetland mitigation bank.

Mitigation credits may be advertised for sale upon approval of the Instrument and installation of grading. For each transaction, permitting authorities or applicant will notify (verbally or in writing) the Bank Sponsor that use of the Frazier Creek Wetland Mitigation Bank has been approved for use for a removal/fill permit application or resolution of a removal/fill violation. The applicant or permitting authorities will request a specified number of credits. The Bank Sponsor will notify the permitting authorities, in writing, within two business days of the sale of wetland mitigation bank credit(s). Facsimile transmission will be acceptable. Notification will include the number of credits sold, the name and address of the person or entity who purchased the credit(s), the project location, the date of purchase, and the state or federal identification number. Normally, notification of purchase will include the first page of a permit application and an attached form letter from the Bank Sponsor. The Bank Sponsor will maintain a record of the number of credits sold. The Bank Sponsor and permitting authorities may meet at any time to perform an audit of the number of credits available and sold. A minimum of one audit meeting per year is recommended.

(2)(o) Estimated Costs

The purpose of estimating costs is for establishing a performance bond. Major costs associated with this mitigation bank include property, grading, site preparation, plants, and labor for installation. Land is under ownership by Mr. Ken Reynolds. As there is no purchase cost, it will not be considered as an expense. The cost of plant material was estimated by getting a cost for shrubs and trees from Harold M. Miller Landscape Nursery and pricing material using catalogues from Wallace W. Hansen Nursery, Balance Restoration Nursery, and Pacific Northwest Natives. Pacific Northwest Natives was relied upon for pricing native grass seed. We also consulted with Second Growth, a landscaping firm specializing in wetland and restoration work.

The price of plant material ranged from about $23,500 to $54,700. The low-end vendor could supply mostly 1-gallon material, whereas 2-gallon is preferred. The high-end vendor guarantees regional genetic stock. The high-end vendor indicated that a volume discount would be possible. The high-end estimate does not reflect a volume discount. Doubling the cost of the plants should more than account for labor. Therefore, the cost of plant material and installation will range between $47,000 and $109,400.

The cost of grading is estimated to be $1,600, which assumes two days of work at $100 per hour. Time and material for construction of the outlet structure in the water distribution swale is estimated to be no more than $500. Other site preparation costs include plowing, disking, and chemical removal of ryegrass. Ken Reynold's estimates this cost to be $100 per acre or $2,525 for the wetland portion.

Maintenance and monitoring are estimated to cost $60,000, assuming ten years of monitoring.

Estimated total costs for plant material and installation (average of low and high), grading, site preparation, and consulting is $142,600. Adding 20 percent for contingency funding increases the total to $171,000. Based on these estimates the Oregon Division of State Lands will require a performance bond in the amount of $120,000.

(2)(p) Proof of Financial Responsibility

The Bank Sponsor will post a performance bond or irrevocable letter of credit. The performance bond may be released incrementally: 30 percent 1 year after the first pre-certification credit release, 30 percent after 2 years with acceptable satisfaction of performance standards, and 40 percent 5 years after performance standards have been satisfied.

(2)(q) Monitoring Frequency and Protocol

Hydrology will be monitored by direct observation and measurement in areas of inundation. Saturation will be observed at established points using capped observation tubes set about 16 inches deep. Hydrology will be monitored monthly between December 2002 and February 2003. From March to May 15, hydrology will be monitored at intervals of approximately two weeks. In succeeding years, hydrology will be monitored monthly between February and May 15 until all credits have been released. During the five-year monitoring period, after all credits have been released, hydrology monitoring will take place once annually between April 15 and May 15.

Plant inventory, survivorship, and aerial coverage will be monitored at three sample plots per acre in the forested wetland, seasonally flooded emergent wetland, and wet prairie. This sampling intensity will produce 10 to 12 sample plots in the forested wetland and 60 to 65 sample plots in the emergent/wet prairie zones. Sampling will occur along permanently marked transects that will be perpendicular to the northern boundary of the mitigation area. End points will be permanently marked with a metal "T" post. Spacing between transects will be approximately 125 feet. Sample plots along transects will be spaced at approximately 100 feet. In the forested wetland, a metal "T" post will locate the center of each permanent sample plot. In the emergent/wet prairie zones, the distance between sample plots may be done by pacing 90 feet and then locating the center of the sample plot by measuring 10 feet beyond the paced distance.

In the forested wetland, all shrubs and trees within a ten-foot radius of the post will be counted. Multiple stems originating from a single plant will be counted as a single plant. Dominant species in the ground cover will be listed. An estimate of aerial plant coverage for each layer (tree, shrub, and ground) will be made.

In the emergent/wet prairie zones, ground cover will be sampled within a one yard by one yard square. Installed and invading plants will be recorded. Aerial coverage will be estimated visually and recorded on a five point scale: 1=<5%, 2=5-25%; 3=25-50%; 4=50-75%; 5=>75%.

Data will be summed and averaged for each community type to characterize results for each community type. Summaries will be presented for survivorship and aerial coverage. A species inventory will be created by listing species at sample points and may include additional observations noted along each transect. Field notes will include estimates of tree and shrub height, branching patterns on young stock, and general condition of plant material. Representative photopoints will be established at perimeter and interior portions of the site. Suggested photopoints are illustrated on the planting plan, Figure 4.

Monitoring in reference sites will follow the same protocol as within the mitigation bank. Three sample plots will be established in the Jackson-Frazier Wetland as a reference for forested wetlands (Figure 5). Data will be collected at five sample plots in the Finley RNA (Figure 6). Published data or data shared by other researchers that has been collected in the vicinity of the reference sites may be used for comparative purposes.

Monitoring in minor planting zones (shrub hedgerows, shrub willow, and transitional shrub communities) will be monitored less intensively than the forested wetland, wet prairie, and seasonally flooded emergent planting zones. The qualitative assessment will include a list of dominant plant species, an estimate of plant survivorship and aerial coverage, an estimate of plant height, a qualitative rating on a 1 (poor) to 10 (excellent) scale, and a representative photograph. An example of a monitoring summary for a minor area after the third year might be:

> *Shrub Hedgerow Wetland along northern boundary (0.5 ac) Approximately 5-ft. wide strip dominated* (list species). *All ryegrass killed; Approximately 85% survivorship of Spiraea and Rosa; Aerial coverage of shrubs 25 to 50 percent; Willow approx. 4 feet tall with multiple branches in west, some nutria/beaver damage in east; Trees about 5 feet tall and averaging about 1 tree every 15 feet. Black hawthorn generally doing well, some die-back with new sprouts from roots. PHAR less than 10% coverage. OVERALL RATING* (1-10). *See Figure* X, *Photopoint* X.

The first quantitative sampling will be conducted within 60 days of planting trees and shrubs. The as-built sampling will evaluate the location and area of planting zones, and create a baseline stem count of shrubs and trees. The total number of shrubs and trees will be counted in the minor zones. Thereafter, quantitative sampling will be conducted between May 15 and July 15 annually until performance standards are satisfied and credits released.

Qualitative inspections should be made once a month the first two summers (June through September in 2003 and 2004) to inspect for signs of water stress, invasion of undesirable species, and wildlife damage. These assessments will be performed by the Bank Sponsor to determine whether to conduct contingency measures such as irrigation, removal of non-native invasives, or wildlife damage control. Formal reports will not be provided from these inspections.

Wildlife sampling (bird inventories) will be conducted by walking along three of the established transects (one east, one in the center, and one west). The biologist will stop for 3 minutes every 200 feet to listen and observe. Wildlife sampling will be done bi-annually, beginning in 2004, and will continue until all credits are released. During the five-year monitoring period and after all credits have been released, the wildlife sampling will take place either the first or second year, post-credit release, and in the fifth or final year.

Temporal and spatial sampling intensity will be reduced following satisfaction of performance standards. Annual monitoring of wetland hydrology will be suspended after the performance standard has been satisfied. Monitoring wetland hydrology will be re-instated in any year when precipitation appears to deviate more than 20 percent from normal. Spatial sampling will be reduced by 50 percent after performance standards have been satisfied and during the 5-year period of monitoring. Quantitative monitoring will be conducted in the first, third, and fifth years of the 5-year monitoring period after performance standards have been satisfied. Qualitative inspections will be made quarterly after initial performance standards are satisfied to inspect for the general condition of plant material and invasions of undesirable plants.

Changes in sampling protocol may be made upon recommendation of the wetland or wildlife biologist, with notification and approval from the MBRT.

Jay R. Lorenz, Ph.D. (Terra Associates, Inc. 12525, Suite 101, Kirkland, Washington 98034; Telephone 425-821-7777) will be responsible for conducting mitigation monitoring. He is certified as a Professional Wetland Scientist by the Society of Wetland Scientists.

(2)(r) Contingency Plans

Wetland hydrology by standards of the *1987 Corps of Engineers Manual* is already present in wetland portions of the mitigation bank. Therefore, overall success of the project will not be dependent on having to create wetland hydrology. Seasonally, flooded emergent habitat will be dependent on enhanced hydrology. Flow is present in Frazier Creek well into May each year. The new distribution swales will reflect flows in Frazier Creek.

Wetland hydrology will be evaluated for one year prior to plant installation. Surface water will be monitored in the distribution swales for one year prior to plant installation. Grading assumptions, annual precipitation, and other factors upslope will be evaluated should there be no surface flow in the distribution swales in the winter of 2002/2003 and spring of 2003. Corrective grading may be performed in the summer of 2003, prior to plant installation.

Achieving desired plant cover may be accomplished through natural recruitment or intentional installations. Results of monitoring will be critical in evaluating whether natural recruitment is leading plant succession in the desired direction or whether additional installations will be required. Reasons for poor survivorship or lack of natural recruitment will be based on comparisons with reference sites, evaluations of plant health and damage, hydrology, and planting techniques. Additional or remedial plantings will be installed in the event of poor survivorship and natural recruitment. Remedial planting will be at a rate or density to satisfy objectives and performance standards. Substitutions of plant material may be made, where justified, to reduce the likelihood of poor performance.

Sometimes mitigation installations fail due to wildlife damage. Wildlife damage occurs mainly to small shrubs and trees, and may include gnawing by rodents (mice and nutria) or browsing by deer. Wildlife damage will be evaluated to identify the species causing the damage and the extent of damage. Corrective measures may include temporary protective covering such as tubing or wire cages. Damage by mice may be corrected by clearing ground cover (generally grasses) away from the base of young woody stems. Mulching around the base of shrubs and trees is another technique to reduce grass cover and thereby rodent cover around the base of young woody stems.

Sometimes mitigation areas fail because plants are not appropriate for the hydrologic regime. The proposed plan calls for monitoring wetland hydrology for one year prior to plant installation. The planting plan or grading plan may be revised prior to plant installation to insure proposed plant communities will be appropriate for the observed hydrologic regimes.

Sometimes mitigation areas fail because plants were installed improperly or root systems were not developed well enough to survive the first dry summer. Installed plantings will be monitored for survivorship and signs of stress. Improperly installed plants may be replaced if natural recruitment does not fill in the gaps. The Reynold's Farm has irrigation capabilities. Plants may be irrigated to support survivorship the first year or two after installation.

Weedy invaders can impact restoration of native plant communities in a timely manner. Dense stands of native plants reduce the likelihood of widespread invasion of undesirable species such as reed canarygrass or Himalayan blackberry. Weed control should be intensive around the perimeter of the site in 2002 and 2003, prior to plant installation. A zero tolerance approach to weedy invaders such as reed canary grass, purple loosestrife, Japanese knotweed, and Himalayan blackberry should be taken the first two years after plant installation. Dense patches of reed canarygrass or thickets of Himalayan blackberry should not be tolerated during the first two years when ground cover may be sparse.

Wetland hydrology could change as a result of beaver activity. Naturally occurring flooding, such as from beaver activity, will be evaluated at the time it occurs. It will require adaptive management and a reevaluation of objectives, planting zones, and performance standards. If such an event occurs prior to the release of all bank credits, the Bank Sponsor will develop new objectives and performance standards that reflect the unanticipated change in wetland hydrology.

Contingency plans for a natural disaster such as fire, flood, or earthquake will be made after damage from such an event is evaluated. Flooding in the winter after plant installation could result in the need to replant. Fire will be a management tool used on a regular basis in the wet prairie. A fire should not be a catastrophic event for most of the mitigation area. Without fire or other management tools plant succession will be in the direction of shrub or forest habitat. Shrub and forest habitat will return naturally to those areas that are not actively managed as wet prairie. Flooding would only be catastrophic if it was deep and for a prolonged portion of the growing season. The mitigation bank is located within a broad and long plain. Given its geographic setting, the likelihood of prolonged flooding during the growing season is extremely low.

(2)(s) Written Approval from Benton County

See attached letter (Appendix).

(2)(t) All Items Provided in OAR 141-085-0155

This document provides all items required in OAR 141-085-0155.

(2)(u) Long-Term Protection Mechanism and Management Plans

The long-term protection mechanism shall be a recorded deed restriction. A copy of the deed restriction is attached in the Appendix. Covenants, conditions, and restrictions may be amended upon approval of the regulatory agencies.

Installation Schedule

The following schedule is proposed for enhancing wetland hydrology and restoring native plant communities at the Frazier Creek Wetland Mitigation Bank.

Table 19. Installation Schedule

Time	Activity
2002 Fall	a) Plow under and remove ryegrass b) Install grading (water distribution ditches) c) Remove north portion of berm
2002/2003 Winter	Leave field fallow
2003 Winter/Spring	Monitor wetland hydrology and flow through distribution ditches
2003 Summer	a) Plow under and remove ryegrass b) Control invasion of weeds c) Control reed canarygrass and blackberries around perimeter d) Contingency work on distribution channels, as needed
2003 Sept. 15 –Oct. 15	a) Seed grasses in wet prairie b) Seed grass cover in upland buffer c) Transplant clumps of emergents from Frazier Creek ditch to distribution channels
2003 Oct. – Dec.	Install shrubs and trees
2004 Oct. – Dec.	Install contingency and supplemental plantings, as needed
2006 or 2007	First controlled burn in wet prairie

Management Plan

Management will be intensive the first four years (2002 through 2006). Management will focus on installation, satisfying performance standards, and verifying establishment of self-perpetuating plant communities, as outlined in the goals and objectives. It will include periodic monitoring inspections to evaluate plant installation, wildlife damage, natural recruitment, plant survivorship and growth, evaluations of performance standards, maintenance to control unwanted invaders, and at least one controlled burn. Management will include inspections for vandalism and removal of trash or debris.

The Bank Sponsor is obligated to maintain flow through his property and to prevent blockages that will flood his neighbor upstream. In addition, the Bank Sponsor farms land on the east side of Frazier Creek ditch that is nearly the same elevation as the mitigation bank. The Bank Sponsor may remove or institute control measures (under state and federal rules) for beaver dams that create a flooding hazard to crops or his neighbor.

The site will generally be considered self-sustaining after all performance standards have been satisfied. At that time, management will focus on the following activities:

- Maintaining the site free of trash and debris.
- Removal of trees in the buffer that are over 30 feet tall that are within the approach of the private airstrip on adjacent property to the west (for as long as the airstrip is in operation).
- Conducting controlled burns as needed in the area designated as wet prairie and seasonally flooded emergent wetlands.
- Installing additional native wetland species deemed desirable by the Bank Sponsor with the approval of appropriate state and federal authorities.
- Periodic control of weedy plants, such as reed canarygrass and Himalayan blackberry.
- Female Oregon ash may be removed from the forested wetland, particularly along the eastern edge, as long as the desired density of trees is maintained.
- Short-term grazing by domestic livestock is permitted. Grazing by domestic livestock may be used as a management tool and must be in accordance with goals of restoring, enhancing, and conserving wetland and wildlife habitat. A plan must be approved by state and federal wetland authorities prior to grazing by domestic livestock. The plan shall be subject to review at time intervals set-forth in the plan.

(2)(v) Termination of Conditions

Reports to the Oregon Division of State Lands and the U.S. Army Corps of Engineers evaluating objectives, goals, and performance standards will terminate five years following the sale of all credits. The Bank Sponsor's contract to institute contingency measures to satisfy performance standards will terminate five years after the release of all credits. The Bank Sponsor will not be required to institute contingency measures to meet performance standards that are caused by a natural disaster, such as a 100-year flood, earthquake, or catastrophic fire, if such a natural disaster occurs within five years of terminating credit sales.

Maintaining wet prairie and emergent habitat will require active management. However, maintaining the acreage of wet prairie proposed in this Instrument may change over time. Maintaining specific habitat zones, such as wet prairie, may terminate if local, state, or federal laws prohibit management activities, such as controlled burning, that are necessary for maintenance. Managing for specific habitat types, such as wet prairie, will terminate if environmental conditions, such as significant changes in wetland hydrology (either wetter or drier), occur naturally or beyond the control of the landowner five years after the release of all credits. Under normal environmental circumstances, the contract to provide active management for the planting zones, as specified on Figure 4 of this Instrument, will terminate five years after terminating sale of credits.

Changes in hydrology that may be created naturally by beavers and that do not create a flood hazard to either farmland or neighbors will terminate management for the planting zones specified in the planting plan.

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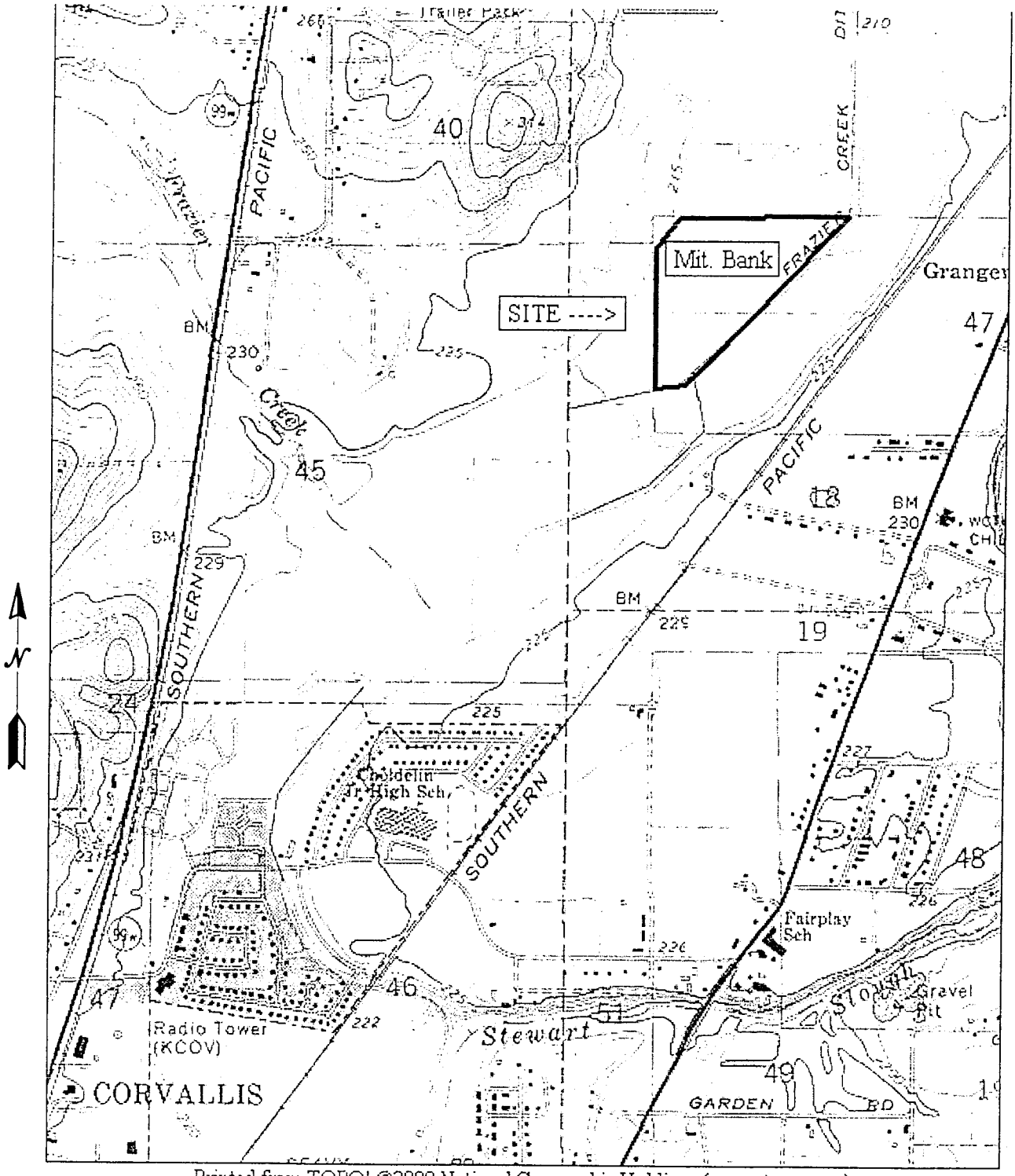

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VICINITY MAP
FRAZIER CREEK WETLAND MITIGATION
CORVALLIS, OREGON

Proj. No. T-5067	Date OCT 2002	Figure 1