OAK CREEK MITIGATION BANK

Lebanon, Linn County, Oregon

MEMORANDUM OF AGREEMENT

TO

ESTABLISH A WETLAND MITIGATION BANK

BETWEEN

OAK CREEK MITIGATION BANK LLC, SPONSOR

AND

U.S. ARMY CORPS OF ENGINEERS, PORTLAND DISTRICT
OREGON DIVISION OF STATE LANDS
U.S. ENVIRONMENTAL PROTECTION AGENCY
U.S. FISH AND WILDLIFE SERVICE
OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY
OREGON DEPARTMENT OF FISH AND WILDLIFE

OAK CREEK MITIGATION BANK
Lebanon, Linn County, Oregon

Memorandum of Agreement

INTRODUCTION

The parties to this Memorandum of Agreement (the "Agreement") have participated in the development of the Mitigation Banking Instrument (the "Instrument") for the Oak Creek Mitigation Bank. The Instrument, dated July 14, 1999 contains the details of the mitigation site plan, goals, objectives, performance standards, monitoring and contingency plans, and reference site. By signing this Agreement, the parties approve the Instrument and the mitigation site plan described within it. This Agreement relies upon and supplements the commitments expressed by the bank sponsors in the Instrument.

1. PURPOSE OF THE BANK

The purpose of the bank is to provide compensatory wetland mitigation for anticipated losses to wetland functions and values resulting from activities authorized by permit from the U.S. Army Corps of Engineers ("the Corps") under Section 404 of the Clean Water Act and/or from Oregon Division of State Lands (DSL) under the State Removal-Fill Law. The bank will provide compensatory mitigation for impacts to riparian, depression and sloped wetland classes (emergent, scrub-shrub, and forested wetland habitats) within the service area.

2. GOALS

The goals of the bank are to enhance or restore approximately 61.7 acres of degraded wetland and create approximately 6.2 acres of buffer. This wetland will be contiguous with nearby wetland habitats and will extend wildlife corridors associated with Oak Creek. The site will provide enhanced connectivity between upstream and downstream of the river bank.

3. MITIGATION BANK SITE

The mitigation bank site is located on the southern outskirts of Lebanon, in Linn County, Oregon (Section 26, Township 12 South, Range 2 West, parcel 800). Rock Hill Drive establishes the southern boundary of the parcel; the City of Lebanon's Urban Growth Boundary establishes the northern boundary. The parcel contains approximately 88.2 acres; 35.8 acres to the north and 52.4 acres to the south of the Oak Creek channel. Oak Creek enters the property from near its southeast corner, flowing to the northwest, then west before crossing the western property boundary.

4. SERVICE AREA

The bank's service area includes that portion of the Mid-Willamette River watershed (USGS, HUC #17090003) below the confluence of the Santiam and Luckiamute Rivers on the north and above the confluence of the Long Tom River on the south (see Instrument, Figure 2).

5. PERFORMANCE STANDARDS

The performance standards for the mitigation plan are stated in the Instrument in Section 5.0, Success Criteria, under the heading "Performance Standards" (pages 21 to 23).

6. MONITORING AND CONTINGENCY PLANS

Monitoring and contingency plans are stated in the Instrument in Section 5.0, Success Criteria, under the headings "Monitoring Frequency, Protocols, Expertise" and "Reporting Frequency and Protocols" (pages 22 and 23).

The bank sponsors acknowledge their responsibility for completing the necessary actions to ensure success of any required remediation to correct failures to meet mitigation performance standards. The sponsors will provide the necessary financial assurances in the form of a surety bond in the amount of $30,000 to allow the Corps and DSL to undertake any such measures which the sponsors fail or unable to implement. The surety bond will be maintained for the life of this agreement, or until the credits are certified and appropriate success criteria have been met and the success of the site has been confirmed.

7. CREDITS

Mitigation work at this site will be accomplished in phases as described in the Instrument. Completion of the mitigation site work for Phase 1 will result in the establishment of 29.12 credits. Completion of Phase 2 may result in 2.06 credits. These credits will become available for sale by the bank once they are certified in writing by the Corps and DSL. Certification of these credits is dependent upon evidence to be provided by the bank sponsors that the completed work meets the performance standards stated in the Instrument.

Subject to written approval by the Corps and DSL, up to 30 percent of the total credits in each phase may be sold in advance of certification provided that any construction associated with that phase has been completed. Approval of advance sale of credits will be dependent on evidence provided by the bank sponsors that these requirements have been met. The Corps and DSL will determine the percentage of total credits which may be sold in advance of certification.

In the event of catastrophic acts of nature, such as but not limited to earthquakes, drought, and volcanic activity, which interfere with the sponsors' ability to fulfill the terms of this Agreement and the Instrument, no further credits will be sold unless remediation of the mitigation site is accomplished. Proposed remediation measures are subject to prior approval by the Corps and DSL with the advice of other parties to this Agreement.

8. REPORTS

Monitoring reports will be prepared annually until five years after the sale of the last remaining whole or partial mitigation bank credit. The annual monitoring reports will be submitted to the Corps and DSL in January of each year. These reports will address progress toward meeting the performance standards and any remedies taken to correct deficiencies that occurred in meeting the standards.

Reports of credits earned, sold and remaining will be prepared annually and submitted to the Corps and DSL along with the monitoring reports. In addition, the Corps and DSL will be notified of each individual credit sale at the time that it occurs, including a copy of the transaction document.

9. EFFECTIVE DATE AND MODIFICATION

This Agreement will become effective when all of the following conditions are met:

1. This Agreement is signed by the bank sponsors, the Corps and DSL;
2. A surety bond in the amount of $30,000 is established by the bank sponsors with terms mutually agreeable to the sponsors, the Corps and DSL;
3. A deed restriction with terms mutually agreeable to the sponsors, the Corps and DSL is signed by the owners of the mitigation bank site and is recorded with the Linn County Clerk.

This Agreement will terminate five years after the date the last remaining whole or partial credit is sold by the bank. This Agreement may be terminated earlier only by written agreement signed by the sponsors, the Corps and DSL, after having sought the advice of the Mitigation Bank Review Team.

This Agreement may be amended only by a written amendment signed by the sponsors, the Corps and DSL after having sought the advice of other parties to this agreement.

10. OBLIGATIONS OF THE PARTIES

Sponsors: The bank sponsors are responsible for implementation, maintenance and remediation of the mitigation site plan as detailed in the Instrument, including but not limited to, ensuring the success of the wetland restoration and creation work; reporting the results of annual monitoring of the mitigation site; managing and reporting credit sales and balances; complying with the requirements of local zoning ordinances and land use plans; obtaining any required water rights; and all other requirements of the Instrument.

Authorizing Agencies: The Corps and DSL are responsible for determining when and if credits can be certified and made available for sale; review of all reports submitted by the bank sponsor as required by this Agreement; determining the adequacy of the mitigation site work, the need for remedial measures, and the adequacy of completed remedial measures; undertaking remedial measures when and if the bank sponsors fail to implement the required measures using funds made available by the sponsor through the surety bond; and for determining when and if mitigation bank credits can be used by permit applicants to satisfy the compensatory mitigation

requirements of individual permits. The Corps and DSL will seek the advice of the members of the Mitigation Bank Review Team, composed of the other parties to this agreement, before making the decisions required by this Agreement.

Other Parties: All other parties, by signing this Agreement, accept the terms of this Agreement and the Instrument. These parties constitute the Mitigation Bank Review Team, with the Corps and DSL as co-chairs, and will review all annual reports submitted by the bank sponsor, will participate in meetings and site visits to review the success and operation of the bank, and will advise the Corps and DSL in making decisions required by this Agreement.

11. SIGNATURES

Bank Sponsors:

Richard P. Novitzki — 7-15-99
Richard P. Novitzki — Date

Duane C. Smith — 7-15-99
Duane C. Smith — Date

Authorizing Agencies:

for — 9/26/99
Randall J. Butler — Date
Colonel, Corps of Engineers
District Engineer
Portland District

Paul R. Cleary — 7/16/99
Paul R. Cleary — Date
Director
Oregon Division of State Lands

Oak Creek Mitigation Bank Review Team Member

Elbert Moore

Elbert Moore, Director
Office of Ecosystems and Communities
EPA-Region 10

8/26/99
Date

Wetland Mitigation Banking Instrument for the Oak Creek Mitigation Bank Lebanon, Oregon

Submitted to
Oregon Division of State Lands
U.S. Army Corps of Engineers

Submitted by
Oak Creek Mitigation Bank, LLC
39170 Lacomb Drive
Lebanon, OR 97353
(541) 258-7059

July 14, 1999

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

TABLES:

FIGURES:

Wetland Mitigation Banking Instrument for the Oak Creek Mitigation Bank in Lebanon, Oregon

1.0 EXECUTIVE SUMMARY

This Banking Instrument constitutes a contract between the Oak Creek Mitigation Bank LLC (the Sponsor) and the Oregon Division of State Lands (DSL) and the U.S. Army Corps of Engineers (Corps) to allow the Sponsor to conduct a private mitigation bank. The Sponsor will restore, create, and enhance wetland resources and reconnect Oak Creek with its historic flood plain at a site of approximately 88.2 acres (parcel 800, T12S, R2W, Sec. 26) at the south side of Lebanon, OR that has been actively farmed for more than 50 years (Figure 1). The Sponsor will be allowed to sell credits in the Bank to those holding a valid permit from DSL and the Corps allowing off-site mitigation for unavoidable wetland impacts within the Bank's service area. The Banking concept has no impact on the Oregon wetland removal and fill permit process, except that it provides an option to off-site mitigation. This option must be approved by the DSL Resource Coordinator and the Corps Project Manager before the credits may be purchased.

The service area (Figure 2) within which credits may be used to offset impacts includes the Middle Willamette River watershed (USGS, HUC #17090003) below the confluence of the Santiam and Luciamute Rivers on the north and above the confluence of the Long Tom River on the south (essentially that portion of the watershed within Linn and Benton Counties). It includes Oak Creek and the Calapooia River up to the community of Holly but excludes that portion of the Caloopia River watershed upstream from Holly and excludes the wooded foothills above the valley bottom (e.g., west of Philomath). It includes the communities of Lebanon, Sweethome, Albany, Philomath, and Corvallis.

The Bank credits may be used to offset impacts to functions and values of Palustrine emergent, scrub-shrub, and forested wetlands (Cowardin classes) in the Mid-Willamette valley in riparian, flood plain, shallow depression, and slope settings (HGM classes). The credits will typically be used to offset smaller wetland losses (e.g., less than 5 acres) because restoration, enhancement, or creation of small wetland resources is difficult and rarely successful from an ecological perspective.

2.0 SITE DESCRIPTION

This Banking Instrument establishes an agreement between the Oak Creek Mitigation Bank LLC, the Oregon Division of State Lands (DSL), and the U.S. Army Corps of Engineers (Corps) to develop a wetland mitigation bank site immediately south of, and adjacent to the urban growth boundary of, Lebanon, Oregon within the Oak Creek watershed (Figure 1).

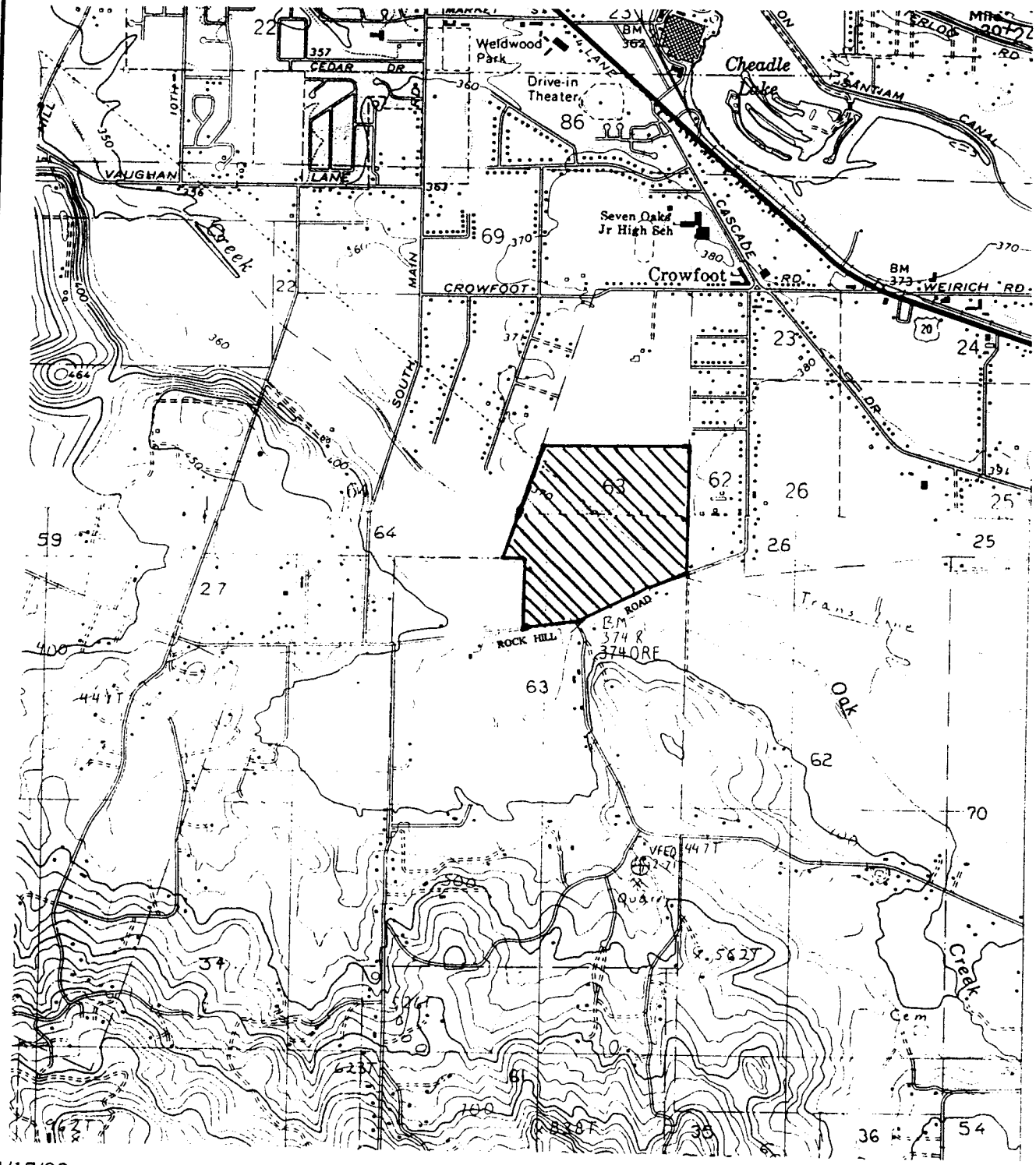


Figure 1. General location and topography of the proposed Oak Creek Mitigation Bank in Linn County, Oregon (U.S.G.S. Brownsville, 1988 and Lebanon 1969, photorevised 1986, 7.5 minute quadrangles)

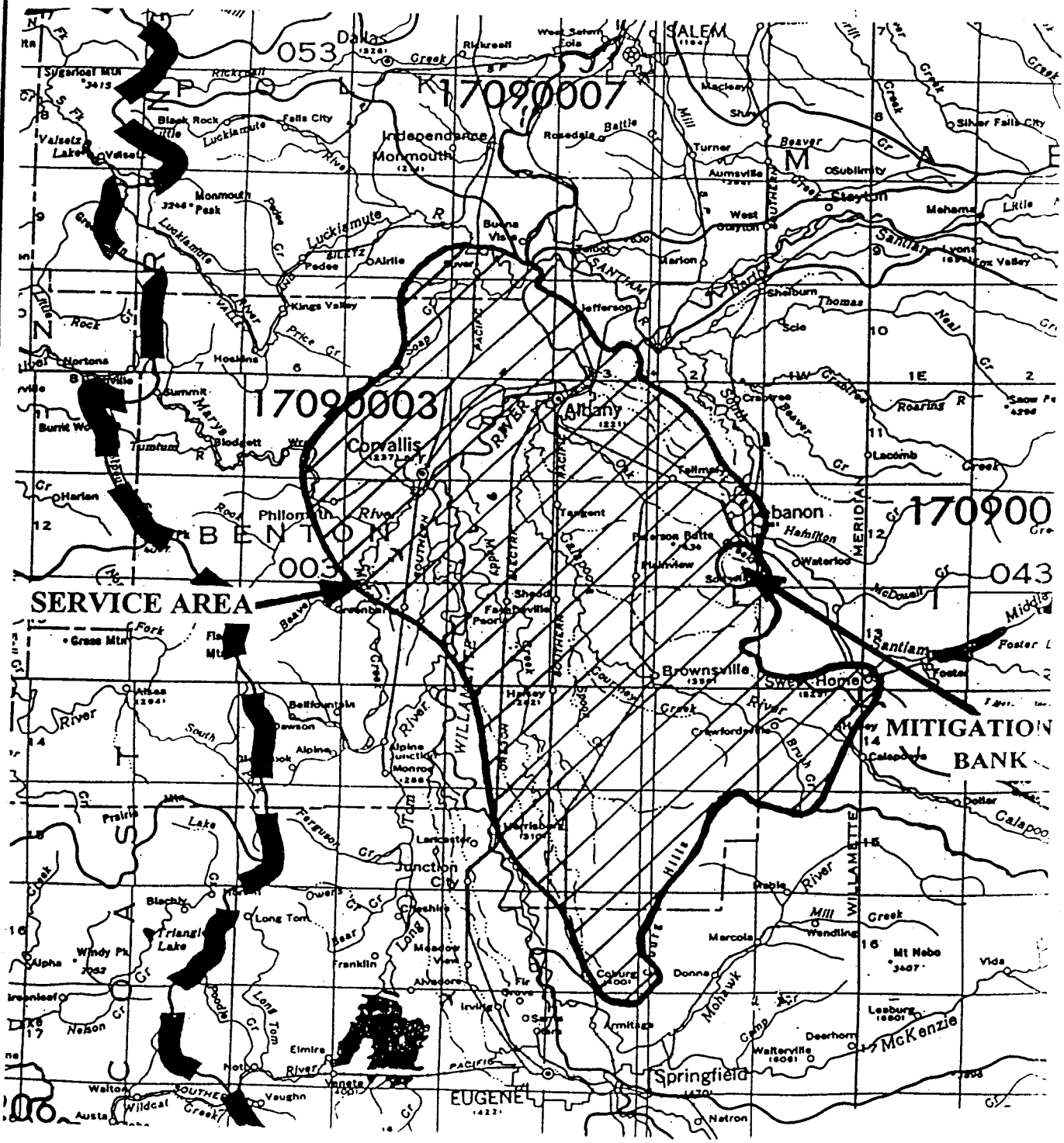


Figure 2. Service area (hydrologic unit #17090003, U.S. Geological Survey Hydrologic Map, 1974) for the Oak Creek Mitigation Bank in Linn County, Oregon.

The project will restore a wetland that has been farmed for more than 50 years and will provide an ecologically desirable natural resource to benefit the City of Lebanon, Linn County, and the state of Oregon. The project design will restore an entire wetland complex comprised of several wetland habitat types that will include seasonally flooded palustrine emergent, scrub-shrub, and forested habitats. The project design complements all city and county programs intended to enhance flood water storage and improve riparian habitats, preserve open space, and develop public trail systems.

The mitigation bank site is in the upper Oak Creek watershed, at a transition between slightly to moderately impacted landscape upstream and highly degraded landscape downstream. This location enhances opportunity for restored wetland and riparian habitat functions to integrate into and complement existing watershed function and extend the continuum of upstream habitats and functions, thereby enhancing the value of the upstream ecosystem function to downstream resources. Flood storage, water quality improvement, and habitat function accomplished at this site will benefit downstream users and provide improved opportunity for resource improvement programs downstream to connect to and complement the more natural upstream ecosystem.

This site, as well as much of the Willamette Valley, has been affected by land conversion to agriculture, logging, and urban development as well as by stream damming, ditching, and channelization. These changes in land use and watershed function have seriously degraded wetland and riparian habitats throughout the valley. Agricultural development of this and surrounding lands over the past 100 years or more have removed and replaced the native plant communities with commodity crops and pasture grasses.

Both wetland and upland habitat features on the site have been degraded by historic land uses. Approximately 80 acres of the total 88.2 acres have been cultivated or otherwise altered to raise grass seed. Shallow ditches both south and north of Oak Creek drain surface water quickly to the stream, minimizing the area, depth, and duration of ponding. Deeper ditches along the north, south, and west property boundaries drain both surface water and groundwater from the site and have helped lower groundwater levels. The channel of Oak Creek has been deepened, straightened, and confined by berms (comprised of spoils from channel deepening) and like the smaller ditches, drains groundwater from the site. Oak Creek is now dry during late summer but likely flowed year-round historically.

Water levels in observation wells (Figure 3), monitored since June 1997, are low in late summer but typically rise to the surface over much of the site during the winter recharge period (Table 1). These observations confirm that the groundwater supply to the site is not significantly reduced but that groundwater levels are lowered seasonally by the ditches and deepened stream channel.

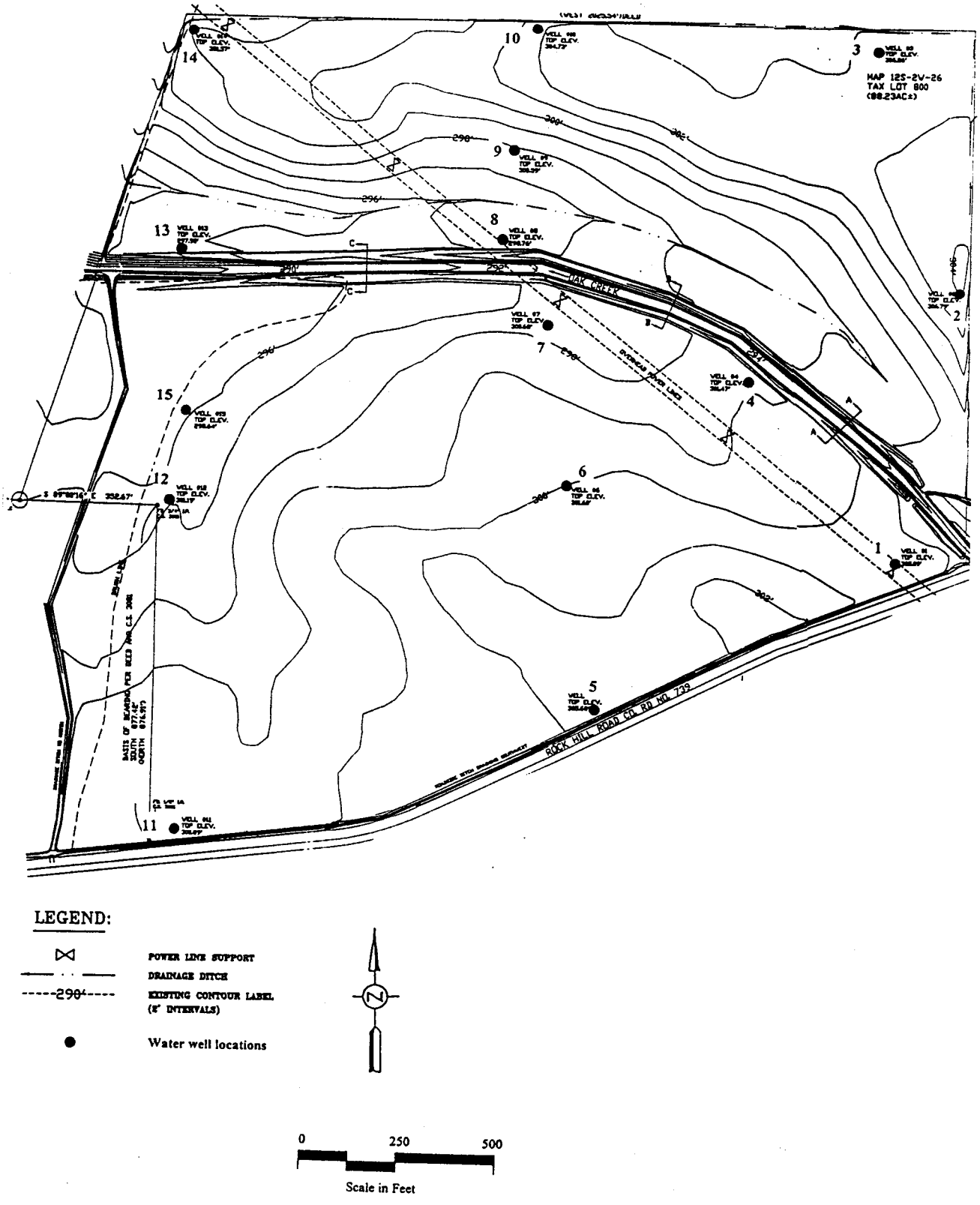


Figure 3. Location of groundwater monitoring wells at the Oak Creek Mitigation Bank (Base map provided by Udell Engineering, 1998)

Table 1. Depth to water (in inches) below land surface in observation wells (see Figure 3)

DATE	Observation Well Number														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
June 6, 1997									20						
July 16, 1997									24						
August 8, 1997	75					69									50
October 1, 1997	42	>106	>94.5	38	74	62	34	48	62	>116	>64	62	53	>105	[illegible]1
October 26, 1997	23	80	60	16	48	16	10	26	23	76	18	22	34	103	17
November 19, 1997	+4.6	26	9	+0.5	29	+1.0	+0.5	18	7	37	2	7	3	36	0
January 5, 1998	6	10	0.5	+0.1	28	1	+0.5	18	7	21	3	2	5	10	0
January 31, 1998	7	8	+1	+1	21	+1	+1	9	5	19	3	1	4	8	+1
March 13, 1998	8	11	0	+1	22	1	1	11	7	25	0	0	6	9	5
April 18, 1998	9	18	0	9	26	9	3	13	9	29	15	2	18	16	[illegible]
May 31, 1998	12	14	1	4	19	6	4	11	10	24	9	2	13	12	10
July 3, 1998	27	50	36	21	48	39	32	27	28	69	30	18	37	23	17
July 24, 1998	38	55	66	42	67	52	41	35	40	91	46	34	49	80	31
August 23, 198	50	91	75	47	73	54	52	47	63	94	46	54	61	89	35
October 9, 1998	115	>138	>142	>97	121	87	102	91	128	>145	>78	113	110	>138	>103

"+" indicates that the water level is <u>above</u> the land surface

As a result of discussions with the MBRT, DSL, and the Corps leading to a credit ratio of 2:1 for enhancement of formerly cropped disturbed wetland, our enhancement strategy will be to: 1) gradually eliminate undesirable plants (i.e. weedy, non-native grasses, forbs, and woody species) and replace with native, desirable wetland and upland species, 2) remove the majority of the berms that have separated Oak Creek from its historic flood plain, and 3) plug the surface ditches and compact or scrape them to enhance depth and duration of ponding..

The following materials are provided to address each item listed in DSL's Administrative Rules for Compensatory Wetland Mitigation Banking, OAR 141-85-421 Requirements (2).

Location

The proposed mitigation bank is located on the southern outskirts of Lebanon, Oregon (Section 26, Township 12 South, Range 2 West, parcel 800) (Figure 1). Rock Hill Drive establishes the southern boundary of the parcel; the City of Lebanon's Urban Growth Boundary (UGB) establishes the northern boundary. The parcel contains approximately 88.2 acres; 35.8 acres to the north and 52.4 acres to the south of the Oak Creek channel. Oak Creek enters the property from near its southeast corner, flowing to the northwest then west before crossing the western property boundary.

Former or Current Land Use of Proposed Site

The site has been farmed for more than fifty years, and has been subject only to those activities (e.g., cultivating, fertilizing, seeding, and applying herbicides) appropriate to this land use. There is no reason to believe any toxic materials would exist on the site. The principal crop has been seed grass.

However, historically the site may have been utilized by the Calapooia Tribes for the harvest of common camas, an important food crop. The site has been surveyed for cultural materials, and although no evidence of cultural usage of the site was identified (Appendix A), upon completion of the terms of this Banking Instrument and sale of the total amount of mitigation credits, the property may be offered for sale to the Confederated Tribes of the Grand Ronde.

Water Quality Issues

Surface Water Quality

Oak Creek is in the Calapooia sub-basin of the Willamette River watershed which is listed on DEQ's 303d list. There is a Health Division advisory for this sub-basin related to mercury accumulation in fish tissue. However, these problems occur downstream in the vicinity of industrial areas along the I-5 corridor and do not affect the quality of water at the site. The enhancement and restoration designs reconnect Oak Creek to its historic flood plain, thereby enhancing the opportunity for flood water to enter the site and the opportunity for the wetland to perform floodwater storage and water quality improvement functions. The designs do not store water on site so there are no water rights issues involved. There are no activities associated with surrounding adjacent properties that would raise concern for contamination of runoff from these areas. The temporary detention of runoff from adjacent properties during flood events further enhances the opportunity for on-site water quality improvement of runoff water passing through the wetland complex.

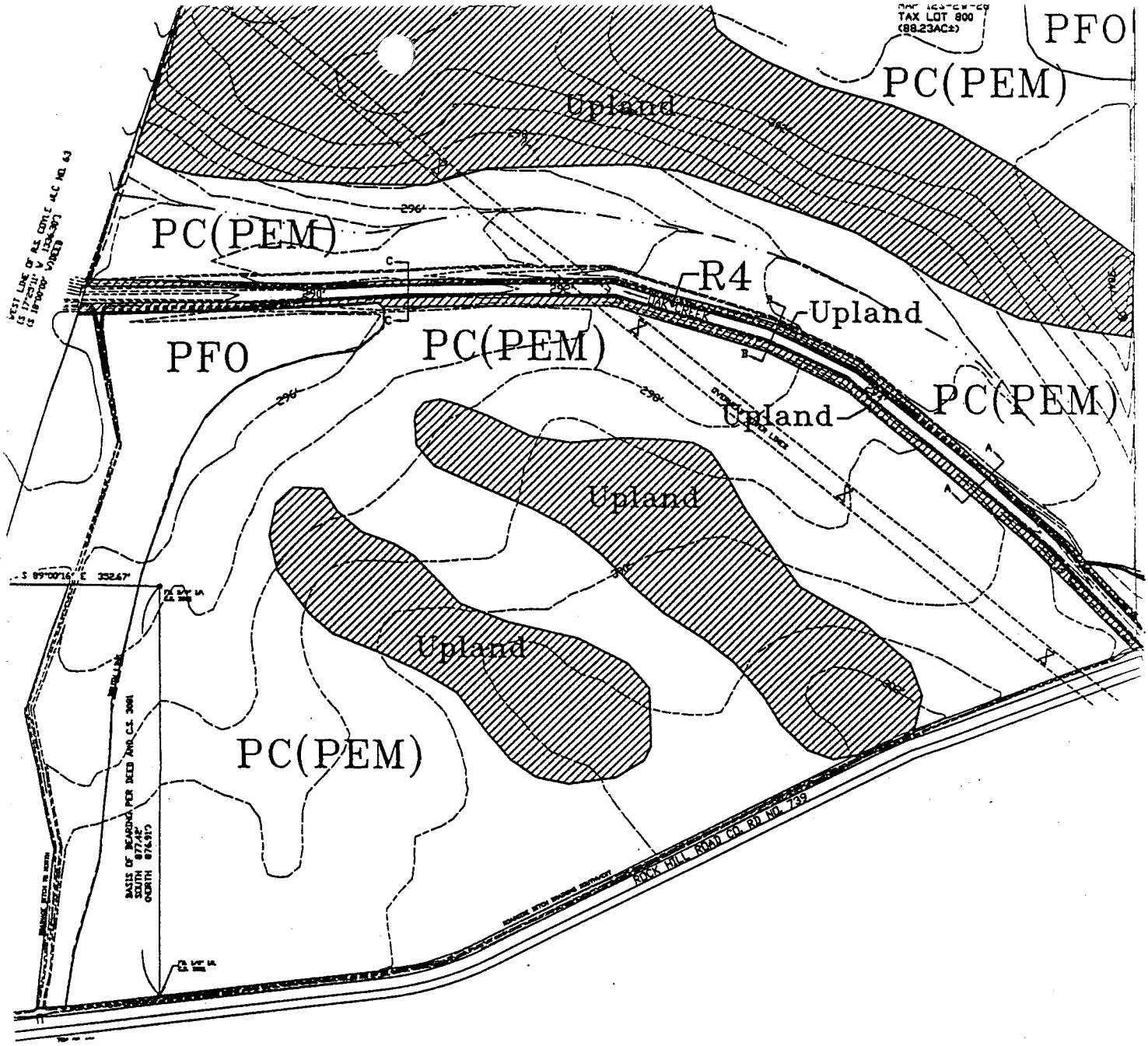
Groundwater Quality

At the recommendation of Barbara Priest (DEQ) we contacted Rodney Weick to discuss the mitigation strategy in the context of groundwater management for the area. The design elements that provide floodwater storage and enhance opportunity for ground water recharge is consistent with and complements the groundwater management plan for the area. Further, the continued monitoring of ground water levels in observation wells at the mitigation site will contribute valuable data to the ongoing groundwater management program.

There are no known injection wells on the site or on any of the adjacent properties and no underground or above-ground storage tanks were identified. There were no drainage tile found on the site or on any of the adjoining properties.

Assessment of Bank Site

A wetland determination was conducted in March 1998 with Allen Makinson of the NRCS, the lead federal agency for regulatory review of wetlands on agricultural lands. Figure 4 depicts the Cowardin classes present on the site. Figure 5 shows the soils mapped on the site by NRCS (formerly Soil Conservation Service), which include Clackamas variant silt loam, Courtney gravelly silty clay loam, Dayton silt loam, and Holcomb silt loam (SCS 1982). Both the Courtney and Dayton soils are considered hydric, while the remaining two soils may contain hydric inclusions. Soils sampled south of the creek often revealed a clay pan at less than 15 inches below grade, conforming to the Dayton profile. Soils north of the creek were typically more gravelly, and usually without the near-surface clay pan. Nevertheless, the hydric soils criterion was satisfied over much of the site (primarily within flat to shallowly depressional areas subject to seasonal ponding and high water tables) by the presence of low chroma soils (chroma 1 or 2) with redoximorphic features.



LEGEND:

⋈	POWER LINE SUPPORT
— · —	DRAINAGE DITCH
-----290'-----	EXISTING CONTOUR LABEL (2' INTERVALS)
Upland	UPLAND
PC	PRIOR CONVERTED CROPLAND
PEM	PALUSTRINE EMERGENT
PFO	PALUSTRINE FORESTED
R4	RIVERINE INTERMITTENT

0 250 500

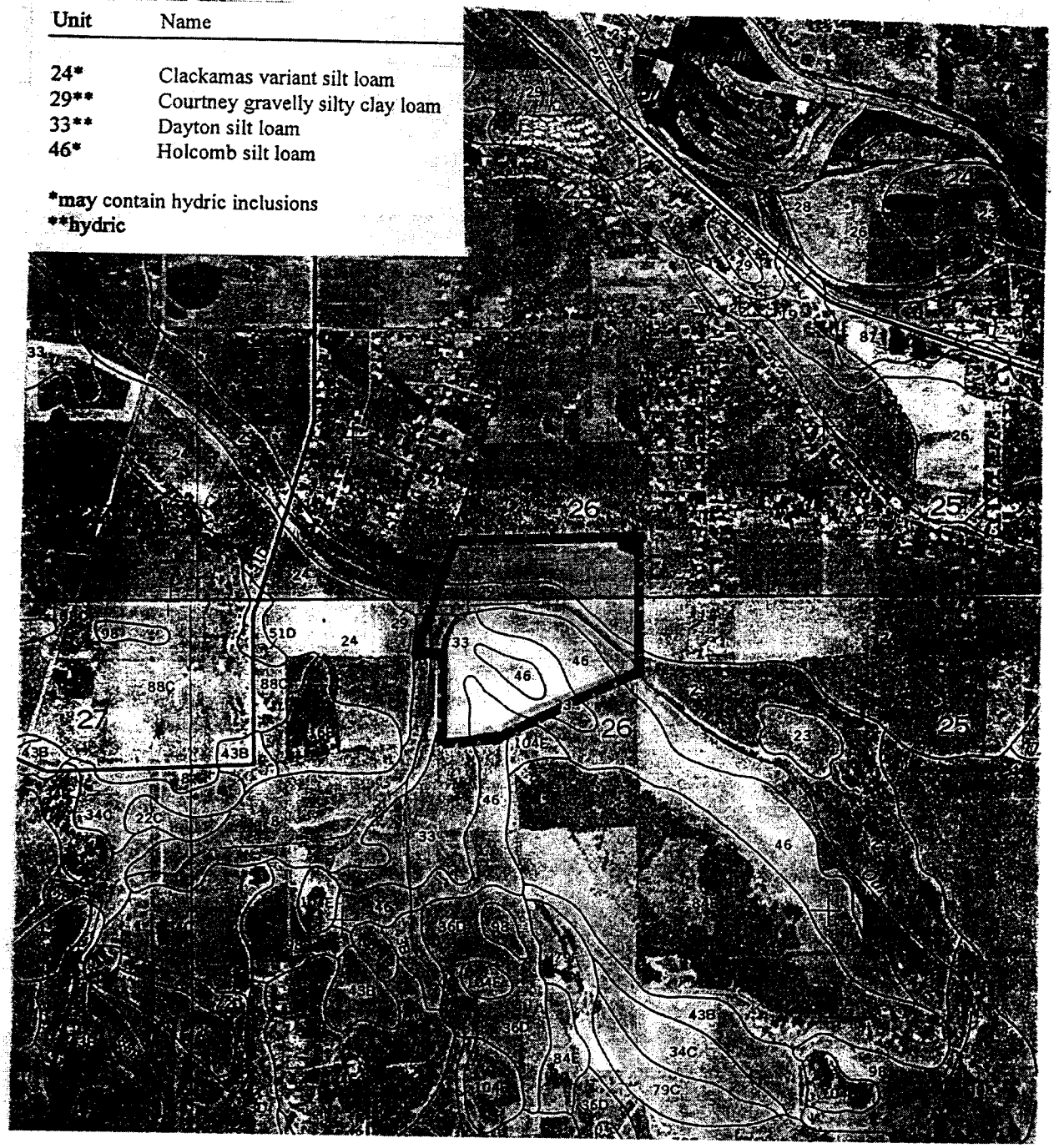
Scale in Feet

24/98

Figure 4. Existing Cowardin wetland classes at the proposed Oak Creek Mitigation Bank (Base map provided Udell Engineering, 1998).

Unit	Name
24*	Clackamas variant silt loam
29**	Courtney gravelly silty clay loam
33**	Dayton silt loam
46*	Holcomb silt loam

*may contain hydric inclusions
**hydric



11/24/98

7-1512

Figure 5. Mapped soil series for the proposed Oak Creek Mitigation Bank in Linn County, Oregon (USDA, SCS, Linn County, 1982)

Due to the long-term and extensive farming and ditching activities throughout the site, essentially all former palustrine emergent wetlands were determined to be prior converted cropland. Figure 4 depicts areas of non-wetland, prior converted cropland, and wetland. The summary of Allen Makinson's review of the site is included in Appendix B, along with wetland determination data sheets. (NOTE: DSL [Janet Morlan, pers. comm.] determined that the PC areas are still jurisdictional wetland and consequently are eligible for enhancement credit at the ratio of 2:1 but not for restoration credit at 1:1.)

Approximately 6.2 acres of palustrine forested wetland are present on the site as well. The forested wetland has been dewatered by past ditch excavation and is being invaded by upland species; as a consequence it exhibits impaired condition and reduced function. Except for the forested area and the berms immediately adjacent to Oak Creek, the remaining acreage is primarily farmed palustrine emergent wetlands, as mentioned above. Before channeling of Oak Creek and excavation of the smaller tributary ditches lowered ground-water levels and reduced the frequency of flooding, riparian (riverine), depression, and slope wetlands occupied most of the site. (Although there are presently approximately 31 acres of non-wetland, it is likely that less than 15 acres of upland originally occupied the site; the additional acreage resulted from relocating the channel of Oak Creek, agricultural tilling, and regrading to enhance access to the site). Regional activities have had irreversible impacts on site hydrology, making it unlikely that all of the original wetland acreage can be restored.

The stream sediments are predominantly composed of fines and the water is turbid at the Freeway Lakes downstream. No known spawning sites occur in the downstream vicinity of the proposed project, nor are any steelhead known to have historically used Oak Creek for spawning or rearing (Tom Murtaugh, ODFW; pers. comm.). Presently, the site is disconnected from both upper and lower permanent sections of the stream which empties into the Calapooia River after going through the Freeway lakes in Albany. Only during winter flows can fish migrate up the creek or down from the headwaters to the proposed wetland mitigation bank site.

OFWAM Assessment

The mitigation bank site was assessed in its current (pre-restoration) condition using the Oregon Freshwater Wetland Assessment Methodology, or OFWAM (Roth et. al. 1996). The OFWAM assessment confirms the site's value as habitat for some wildlife species, its degraded habitat for fish populations, and its degraded water quality and hydrologic functions. The assessment also confirmed the site's potential sensitivity to future impacts, its moderate potential for enhancement, and its currently low suitability as an educational, recreational, or aesthetic resource. The OFWAM assessment is included as Appendix C.

WET Assessment

The mitigation bank site was also assessed using the Wetland Evaluation Technique, or WET (Adamus et al 1987). The WET assessment confirms that because the site presently has almost no wetland characteristics its functions and values are mostly low. The exceptions are the functions "Floodflow Alteration, Sediment/Toxicant Stabilization and Retention, and Nutrient Removal/Transformation". This is because of the site's position near the stream and the fact that it is showing no evidence of erosion. However, the WET analysis cannot account for the deepened channels of Oak Creek that prevent the expected level of performance. The removal of the berms and restoration of the riparian zone will allow these functions to be performed at expected (high) levels. The tabulated results are included as Appendix D.

Summary Assessment

In summary, this site is highly degraded but has great restoration potential. Proper execution of the proposed site restoration will result in a substantial net gain in wildlife and fish habitat, recreational opportunities, and educational and aesthetic values. Flood storage, groundwater recharge and discharge modification, and water quality improvement functions will exhibit a substantial net gain, benefiting a major portion of the downstream watershed.

3.0 PURPOSE OF BANK

Demonstration of Need

Extensive development in Lebanon, Albany, and Corvallis and the improvement to Highway 34, are impacting wetlands within the service area. Many of these impacts are small (fractions of acres) and on-site mitigation is often impractical, or fails to provide ecologically significant wetland habitat. Further, on-site mitigation within the UGB is a short-term solution, whereas off-site mitigation outside the UGB provides a long-term solution.

Three sites in Lebanon need 3.0, 0.7, and 0.3 acres, three sites in Albany need 2.78, 2.0, and 1.78 acres, and a large industrial site in Philomath needs 11.0 acres. The Oregon Department of Transportation needs 10+ acres for the improvement of Highway 34 between I-5 and Lebanon. Doug Parker, City of Lebanon Planner, suggests that there is significant growth occurring in Lebanon at this time and that there is considerable need anticipated for wetland mitigation resulting from this development. He estimates that the number of building permits filed during 1997 represent an increase of nearly 20% in the size of the Lebanon housing base. Further, he expects this rate will be sustained, or even increase, in response to the Highway 34 improvements scheduled for 1998.

The Albany area is experiencing significant growth, and the recently completed wetland inventory suggests that there are approximately 150 acres of wetland within the city's UGB, representing as much as 25% of the developable land (Rich Catlin, City of Albany Planning Department). Mitigation for at least a portion of those acres unavoidably impacted (where on-site mitigation is not possible) would likely be appropriately served by the Oak Creek Mitigation Bank.

Service Area

The service area for the bank (Figure 2) will include that portion of the Mid-Willamette River watershed (USGS, HUC #17090003) below the confluence of the Santiam and Luckiamute Rivers on the north and above the confluence of the Long Tom River on the south. The northern boundary coincides with the extension of the ecoregion boundary of the "Willamette River and Tributaries Gallery Forest" from the Willamette River to the east and west (3b--Theile et al, 1995). The southern boundary separates the lower part of the Willamette watershed affected by the major urban area of Eugene and Springfield and by the influence of the Fern Ridge Reservoir from the more natural areas above. In practical application, this includes the portion of the Mid-Willamette River watershed within Linn and Benton Counties. The service area will also extend up the Calapooia River only to Holly. This excludes the higher gradient upstream portion of the basin from the lower gradient downstream portion of the basin that is similar to the rest of the service area. The service area will also exclude the forested foothills (3d Valley Foothills--Theile et al, 1995) above Sweethome, Holly, and west of Philomath. This assures that the wetlands likely to be impacted and eligible for mitigation credit will be similar in characteristic, class, and function to those established via restoration, creation, or enhancement at the bank site. Use of the mitigation bank to offset impacts within the service area will be determined on a case by case basis in negotiation with the DSL Resource Coordinator and Corps Project Manager. Because of the ecological similarity between this watershed and the adjoining part of the Santiam River (Omernick et al 1987; Theile et al 1995), the service area will also include Sweethome and the remainder of the city of Lebanon.

Note: James M. Omernick, in his "Map Supplement" to Ecoregions of the Conterminous United States explains that the ecoregions were defined to better understand differences and similarities between regions, especially as they relate to water quality in aquatic resources. He explains that "the ecoregions are based on perceived patterns of a combination of causal and integrative factors, including land use, land surface form, potential natural vegetation, and soils". Hence, using the Omernick ecoregion boundaries as well as the fourth-order watershed boundaries appears to be consistent with the desire to establish the service area of mitigation banks on an ecologically sound basis

Bank's Potential to Provide Function

There is significant potential to restore function at the bank site, especially flood storage and wildlife habitat, as well as water quality improvement, groundwater recharge and discharge modification, fish habitat, resilience against future impacts, education, recreation, and aesthetics. At present, the site is farmed and except for the forested wetland, the remainder of the site exhibits little wetland characteristic and significantly reduced function. The natural riparian habitat has been covered by berms (sidecast spoils from channel deepening) and presently supports an undesirable blackberry community, suggesting impaired condition and reduced function. The existing palustrine forested wetland is impaired by lowered groundwater levels and reduced frequency of flooding and is being invaded by upland plants such as blackberry, suggesting impaired condition and reduced function.

The project design will restore the former riparian wetland and enhance the slope and depression wetland classes (emergent, scrub-shrub, and forested wetland habitats), thereby restoring wetland characteristics and functions to the site.

Oak Creek and the drainage ditches from the north and south have been deepened and channelized, as is evident in historic aerial photos (Appendix E). Between 1936 and 1952 Oak Creek was altered from a previously meandering course. The original channel lay somewhat north of the present location, and crossed Rock Hill Road several hundred feet to the east of the present bridge. Due to the deepening and straightening of the stream channel, berms created by the sidecast channel spoils, and construction of the bridge, Oak Creek now only overflows its banks during extreme flood events (greater than 25-year recurrence). Overbank flooding probably occurred more frequently before the channel modifications.

Under current conditions, the flood storage function is severely impaired. This in turn severely restricts performance of the water quality improvement function on the site. Removing most of the berm and recontouring the riparian area will reconnect the stream to its historic floodplain and allow Oak Creek to overflow its banks periodically, thereby restoring the flood storage, water quality, and recharge functions. The increased flood storage function will help reduce the negative impacts of increased runoff from upstream forestry activities (clear-cutting) as well as the rapid drainage of this site and adjoining properties by ditches. The restored flooding regime will enhance water quality functions such as: sediment trapping, nutrient and pollutant filtration and retention, and primary productivity and export of organic materials. These in turn will enhance the site's ability to provide fisheries habitat functions appropriate for riparian habitats in this hydrogeomorphic setting. In combination, the improved habitat characteristics will better support fisheries, resident flora and fauna, and migratory wildlife populations. Care will be taken to assure that drainage of off-site properties will be maintained; however, the excess water will be captured on the mitigation bank site in the plugged and deepened shallow ditches and depressions to slow the rate of surface water runoff, further enhancing the site's flood storage and recharge functions.

The re-establishment of wetlands along Oak Creek offers many potential fisheries benefits including a potential refuge during winter storm events for resident cutthroat trout residing upstream in the headwaters of the creek. The habitat created may provide a refuge for cutthroat trout washed down from upper Oak Creek during winter freshets. Cutthroat trout would be able to utilize the off channel areas where the stream meanders across the floodplain while flows are elevated. As the stream reestablishes itself and its flood plain and associated riparian vegetation, the increased habitat complexity will provide increased opportunity for fish to find and utilize preferred habitat.

Additionally, any wetland habitat that is created along the stream will attract amphibians. Species such as *Abystoma macrodactylum*, the long toed salamander, often utilize temporary ponded water in the spring for rearing.

Groundwater levels have also been significantly lowered by the deepening of the stream channel and ditching. Groundwater levels presently drop from 3 feet to more than 10 feet below land surface (Table 1). This is not normal in wet meadow wetlands, which are typically saturated to the surface for most of the year. It is also likely that Oak Creek historically flowed year around (Richard Kaczmarek, personal communication). The deepened stream channel and the ditches hasten surface water runoff and drainage of the local groundwater system, increasing springtime runoff and reducing summer and fall baseflow, causing the stream to go dry. Hence, the groundwater function (recharge and discharge modification) is significantly impaired.

However, despite the fact that groundwater levels are unnaturally lowered during the growing season, they recovered over much of the site to near land surface during the wet winter weather of 1997. This suggests that the upgradient source of groundwater has not been significantly diminished, so that a restoration design that reduces drainage from the site will help to restore site hydrology nearer to historic conditions.

The proximity of the mitigation bank site to the city of Lebanon and the ease of access from Rock Hill Road greatly enhance the site's appeal to outdoor enthusiasts (recreation, aesthetics) and its utility for educational purposes. Once it is established as a long term wetland monitoring site, it will undoubtedly gain in educational value.

Hydrogeomorphic (HGM) and Cowardin Classes Served by the Bank

The Bank will provide riverine (riparian) and slope and depression (within and above the flood plain) wetland (HGM classes) and will include emergent, scrub-shrub, and forested wetland (Cowardin classes). These are the most common wetland classes being impacted by development in the Lebanon, Sweet Home, Corvallis/Philomath, and Albany areas. It appears that approximately 8 to10 times as much emergent wetland acreage is impacted as forested wetland acreage. This is approximately the ratio of emergent to forested wetland habitats that will be developed at the Bank site (55.49 acres vs. 6.18 acres).

3.0 MITIGATION STRATEGY

Ecological Goals and Objectives of the Bank

The goals of the bank are to restore and enhance approximately 62 acres of degraded wetland and create approximately 6 acres of buffer and upland inclusion. This wetland will be contiguous with nearby wetland habitats and will extend wildlife corridors associated with Oak Creek. The site will provide enhanced connectivity between wildlife habitats upstream and downstream of the bank site.

Historically, the Willamette River valley was very wet and low gradient streams occurred in braided channels over much of the valley bottom. These streams did not drain the groundwater system effectively, and much of the lower areas were likely saturated to the surface well into the growing season. Wet meadow habitats, so wet as to inhibit invasion of shrubs and trees, were likely very common during that period. Confining and channelizing the Willamette and its tributaries have fostered down-cutting of stream channels. Ditching and tiling to dry the rich soils for agricultural purposes has lowered the groundwater level regionally and dramatically changed the vegetation in the valley.

Prior to Euroamerican settlement, vegetation communities on the site probably consisted of riparian gallery forest dominated by Oregon ash and black cottonwood and wet prairie dominated by tufted hairgrass (*Deschampsia cespitosa)* and other herbaceous species (including camas). Intermediate communities that reflected the limits of human-set fires, saturated areas, or deeper ponding may have included scrub-shrub communities at the edge of the forest, sedge communities where saturation persisted, and marsh communities where ponding persisted throughout the growing season. Though some topographic features may have been eliminated by agricultural activities, the site probably supported a mosaic of wet and mesic prairie, primarily along Oak Creek, and a riparian overstory along the creek, which occupied multiple channels within a wider floodplain than at present.

Under these historic conditions, Oak Creek periodically flooded out over the very shallow river valley. The rest of the site was seasonally ponded and saturated to the surface well into the growing season, reflecting near-surface groundwater levels.

Stream flow in Oak Creek and the drainage ditches is seasonal, being greatest in winter and spring and diminishing to zero flow (presently) during later summer and early fall. Groundwater levels also vary seasonally, being highest after the dormant season begins and fall and winter rains recharge groundwater reservoirs, and being lowest in the summer when ditches have drained the local system and evapotranspiration is highest.

Deepening and channelizing Oak Creek prevents flooding except in extreme events (more than 25-year recurrence) and lowers the local groundwater level. Ditches along the north, south, and west property boundaries also drain the local groundwater system. This drainage

of the system early in the growing season is confirmed by groundwater level data collected during this project (Table 1). However, those data also confirm that the groundwater levels recover rapidly when fall and winter rains recharge the groundwater reservoir. This suggests that the groundwater supply is still adequate to maintain wet meadow habitats at this site if the early spring/summer drainage can be reduced.

We will restore vegetation communities that are similar to those that occupied the site prior to Euroamerican settlement (as characterized by those observed at selected reference sites). We will remove the berms that confine Oak Creek and reconnect the stream to its associated riparian habitat and flood plain to restore the riparian and flood plain function. We will plug and deepen surface ditches presently crossing the fields to retain surface waters, to provide micro habitats, and to increase habitat diversity. In so doing, hydrology will be restored to the site and the wetland habitats supported will be nearer to those existing at the reference sites. Further, by working with existing site hydrology, little or no subsequent hydrologic maintenance will be required.

The restoration design incorporates wetland habitats that include emergent, scrub-shrub, and forested habitats and that include temporary, seasonally flooded, and intermittently exposed hydrologic regimes. The habitats will include the riparian zone adjacent to Oak Creek; shallow depressions next to the riparian zone within the flooded area; shallow depressions outside the flooded area; slope areas outside the flooded area; the forested area next to Oak Creek and the south ditch within the flooded area; and the forested area in the northeast corner that is outside the flooded area.

We have surveyed the plant communities in similar habitats at the reference sites and developed plant lists from the representative plant communities. In the annual reports we will describe the plants found in the individual habitats at the Bank site and compare them (species, frequency, percent cover) to those in similar habitats at the reference sites. We have also surveyed wildlife observed in similar habitats at the reference sites and developed wildlife lists for the representative habitat types. In the annual reports we will describe the wildlife observed in the individual habitats at the Bank site and compare them (species, numbers) to those in similar habitats at the reference sites.

Finally, the planting strategies are designed to most rapidly re-establish the desired plant communities in each habitat. Native trees and shrubs appropriate to a riparian forest community will be planted along both sides of Oak Creek. The shallow depressions will be planted or seeded with wetland and woody species to provide structural diversity for wildlife use. The wet meadow communities will be enhanced by allowing natural recruitment and providing weed management. Since both desirable and undesirable species are likely to be present in the seedbank, hydrologic conditions and soil disturbance will determine what initially colonizes the disturbed areas. However, recognizing that volunteer recruitment of native species is highly desirable, and that volunteers are most likely to persist, planting strategies will capitalize on natural recruitment to the extent possible.

Effects of Adjacent Land Uses

The property to the south across Rock Hill Drive is presently forested, brushy hillside, and degraded wetland, affected by drainage ditches. The wetland is pastured, but does retain some (albeit degraded) wetland characteristics. Therefore, this property and the improved wetland habitat provided by the mitigation bank will complement each other by enlarging the size of, and improving connectivity among, natural resource areas. The property to the west is degraded palustrine forested wetland; this existing wetland will integrate into and complement the larger wetland complex developed on the bank site and again enlarge the size of, and connectivity among, natural resource areas.[1] The property to the north is presently farmed, but because it lies within the urban growth boundary, it may be developed. Hence, a buffer will be left between the wetland edge and the property boundary to minimize impacts of subsequent development on the habitat function provided on the bank site. The property to the east is presently pastured, and that land use and the existing fences will provide sufficient protection to the bank site, although some buffer will be maintained. Although degraded, the riparian corridor of Oak Creek provides connectivity to upstream habitat resources, in particular a U.S. Fish and Wildlife Service property located approximately ½ mile upstream. That site is currently being managed for its native population of Bradshaw's lomatium, a state- and federally- listed endangered plant.

Reference Site

We have identified three reference sites (Figure 6). Two are along Oak Creek, one approximately one mile downstream (no longer available/accessible) and one approximately ½ mile upstream of the bank site (accessible with permission of USFWS). The sites are described in Appendices F and G. Both of these reference sites contain the mix of both Cowardin and HGM wetland habitat classes that will be supported at the mitigation bank site. The third site is just south of the bank site, along Ty Valley Road. That site was identified by Allen Makinson, NRCS, as appropriate for monitoring re-establishment of camas *(Camassia quamash)* on the mitigation bank site. Permission to access or monitor this site has not been obtained.

Site Mitigation Plan

The mitigation bank site has been hydrologically manipulated for many decades, with Oak Creek and tributary branches excavated to enhance drainage across the site. In agricultural

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[1]The adjoining property owner has been approached by the Oak Creek Mitigation Bank LLC to restore hydrology and wetland characteristics and functions to this parcel. The credits generated through this restoration will be identified in an amendment to this Instrument.

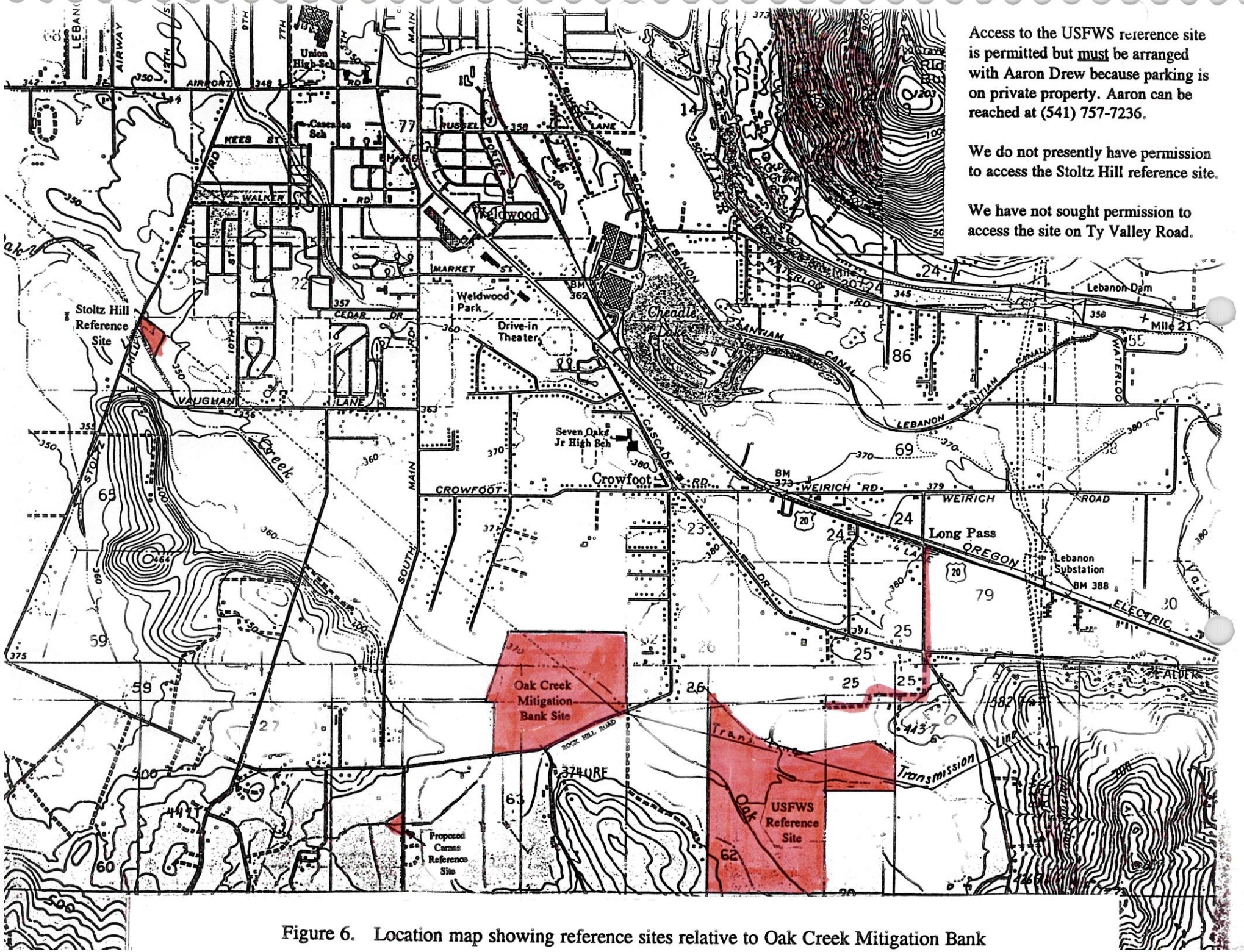

Figure 6. Location map showing reference sites relative to Oak Creek Mitigation Bank

production since early this century, the site has been subject to periodic vegetation clearing as well as site drainage activities. High berms along Oak Creek restricted the frequency of overbank flooding into the adjacent fields, which in recent years have primarily been seeded to a non-native grass seed crop, Italian ryegrass (*Lolium multiflorum*). Most other species found in the fields tend to be weedy (i.e. are tolerant of disturbance or are poor competitors, preferring bare ground). The regulatory status and extent of existing wetland on the site is based on the NRCS wetland determination (PC) conducted in March 1998 (see Figure 4 and Appendix B) and the subsequent DSL determination that the PC areas meet jurisdictional criteria and are eligible for enhancement credit at the ratio of 2:1.

Mitigation activities will cease agricultural activities, reintroduce wetland vegetation communities (Cowardin classes) likely to have prevailed on the site prior to agricultural clearing and production, and reconnect Oak Creek to its historic flood plain. The mitigation design will include two phases: Phase I will restore and enhance wetland habitat by removing most of the berms along Oak Creek; by plugging shallow ditches in the fields; and by eliminating agricultural land uses, controlling nuisance plant species, and planting native trees and shrubs in the PC areas and in a 25-foot buffer between the PC and upland areas or property boundaries. A 50-foot buffer will be maintained along the north boundary abutting the urban growth boundary. The western upland south of Oak Creek will be planted and maintained as an upland inclusion within the enhanced wetland area. Phase II will enhance wetland habitat in the forested areas by controlling nuisance plant species, supplemental planting, and plugging a shallow ditch within the forested area.

Phase I

We will enhance 52.74 acres of formerly cropped disturbed wetland (PC) and remove the berms to restore approximately 2.75 acres of wetland beneath the berms.

Cowardin Wetland Classes Restored

The enhanced wetland will include seasonally flooded palustrine emergent (PEM--) and palustrine scrub-shrub (PSS--) (Cowardin classes). These will include riverine, depression, and slope classes (Hydrogeomorphic--HGM) (Figure 7).

Phase I Credits

52.74 acres enhanced wetland @ 2:1	26.37 acres credit
2.75 acres restored wetland @ 1:1	2.75 acres credit
6.16 acres buffer and upland restoration @ 10:1	0.62 acres credit

(NOTE: Credit for buffer areas will be available only after success criteria are met and at least 5 years after construction. The ratio of 10:1 is the maximum and it may be less, depending upon the level of success in achieving success criteria.)

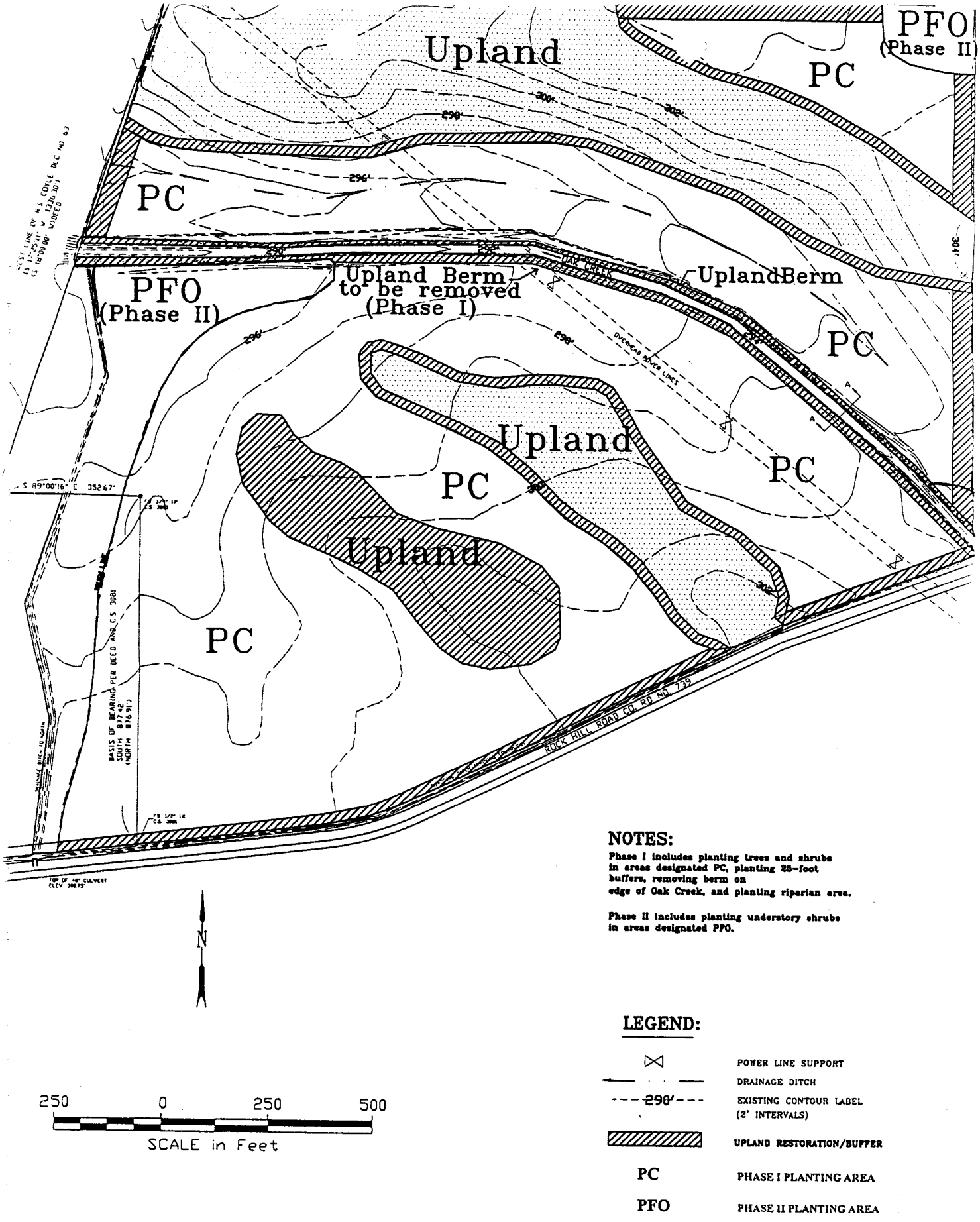

Figure 7. Wetland, buffer, and upland restoration areas at the Oak Creek Mitigation Bank

Restoration Strategy

Removing portions of the berms and recontouring the riparian areas will reconnect Oak Creek to its historic floodplain and riparian habitats and restore the flood storage, water quality improvement, and habitat functions to the ecosystem. Immediately below the Rock Hill Bridge and down to the present ford the berm on the right (east) bank will be retained to alleviate concern for flooding the residence to the east immediately across Oak Creek on the north side of Rock Hill Road. Below the ford approximately 75 to 95% of the remaining berms will be removed and recontoured to approximate the historic land surface. Some of the material from the berms will be used to plug surface ditches on the fields and the rest will be placed on the upland areas. On those berms left intact, the vegetation will be managed to inhibit undesirable plants and to re-introduce appropriate plants to the system.

Any trees, logs, or root wads resulting from construction activities in Phases I or II will be placed within wetland habitats to contribute to habitat function and diversity. They will also be used to protect and disguise monitoring wells.

Planting Strategy

Ceasing Farming Activity

The cessation of farming on the site has allowed a variety of grasses and forbs to grow in areas once dominated by annual commodity crops. Many of these species are adapted to quickly colonizing bare ground and will likely not be the climax herbaceous community within the property. As yet, few trees or shrubs have established themselves in the open fields. During the period when the property was farmed, herbicides were used to control these volunteer species. Part of the restoration strategy in Phase I is to cease agricultural production and field spraying, allowing species adapted to the soil and hydrologic conditions of the property to flourish.

The hydrologic regime of the undisturbed field will determine the dominant species. If wetland conditions exist during the early growing season, hydrophytes adapted to growing in saturated soils should dominate the field. During mid-summer, when the water table has dropped, species composition will shift to upland species. The hydrologic regimes that develop in the different micro habitats will determine the dominant species within the mitigation bank.

Noxious weed control

As yet, noxious weeds capable of forming monotypic communities, such as reed canarygrass and purple loosestrife, are not common within the property. We will implement an active weed control program during Phase I, to control these noxious species. The weed control program will also target other species capable of dominating the drier riparian areas and buffer areas within the property. These include Himalayan blackberry and Scots broom. To effectively

control these species, we recommend, where appropriate, the mechanical removal of some individuals and the judicious use of herbicides approved for use in aquatic areas. Examples of how four specific weeds will be controlled is discussed below.

Reed canarygrass (Phalaris arundinacea)

Phalaris does not currently extend over much of the mitigation bank perhaps as a result of the former agricultural practice. Changes in the soil and hydrologic regime may favor the establishment of *Phalaris* seedlings. These seedlings may grow into clumps of tall grass which can effectively compete with other vegetation. Local control of these newly established clumps of the grass will keep it from spreading by rhizomes and prevent the distribution of seed. Clumps will be sprayed with 0.75% isopropylamine glyphosate in late June. A nonionic surfactant will be added (0.5%) to the spray mixture assuring complete wetting of the foliage. When the foliage has died and dried at the end of summer, the standing dead grass will be burned to kill the seeds.

Purple loosestrife (Lythrum salicaria)

Purple loosestrife is an escaped ornamental which may become a noxious wetland weed. It will be controlled by local application of glyphosate. A solution of 1% isopropylamine glyphosate will be sprayed on the plants when they are in full purple bloom. A nonionic surfactant will be added (0.5%) to the spray mixture to assure complete wetting of the foliage. The plants will be left standing until they are completely dead.

Himalayan blackberry (Rubus discolor) and evergreen blackberry (R. laciniatus)

Himalayan blackberry and evergreen blackberry may invade some of disturbed drier portions of the riparian area and buffer areas. These two species can be controlled by spot spraying the foliage in September after the brambles have fruited. A solution of 1.25% isopropylamine glyphosate will be sprayed on the blackberry vines. A nonionic surfactant will be added (0.5%) to the spray mixture to assure complete wetting of the foliage. The brambles will die slowly over the winter and will be broken down, if needed, during the following growing season.

Scots broom (Cytisus scoparius)

As with the blackberries, Scots broom is likely to sprout on the drier portions of the mitigation bank. It can be controlled by cutting the stems in mid summer at the time of flowering and immediately painting the cut stump with a full-strength solution of glyphosate.

Planting in the PC areas

The only grading to occur during Phase I will be to remove portions of the berms along Oak Creek. The removal of the berms will allow the creek to overflow its banks during high flood

events. Based on the topography of the field, it is likely this area will only be inundated for short periods following high water. The intermittent nature of this flooding regime was not a major factor in selecting appropriate species to plant in areas designated by the NRCS as prior converted cropland (PC).

The goal of planting within the PC areas is to increase structural and species diversity within the Oak Creek floodplain. Prior to Euroamerican settlement, vegetation communities on the site probably consisted of forested communities dominated by Oregon ash and black cottonwood and wet prairie dominated by tufted hairgrass (*Deschampsia cespitosa*) and other herbaceous species (including camas). Intermediate communities that reflected the limits of human-set fires, saturated areas, or deeper ponding may have included scrub-shrub communities at the edge of the forest; sedge communities where saturation persisted; and marsh communities where ponding persisted throughout the growing season. Though some topographic features may have been eliminated by agricultural activities, the site probably supported a mosaic of wet and mesic prairie and a riparian overstory along the creek, which occupied multiple channels within a wider floodplain than at present.

As no grading will occur in the fields, we have not proposed planting herbaceous species. The variety of grasses and forbs currently growing in the field, including manna grass (*Glyceria occidentalis*) and tufted hairgrass, should continue to thrive if the hydrology of the PC areas is sufficient to maintain a population of hydrophytes. Instead, we propose to plant trees and shrubs suited to growing in the floodplain of Oak Creek. The species to be installed were chosen for 1) their suitability to the soils and hydrology of the site, 2) their natural occurrence within the reference wetlands, 3) their wildlife habitat enhancement value, and 4) their commercial and local availability.

The species selected to be planted within the PC portions of the bank include those listed in Table 2, below.

Table 2. Suggested Woody Plantings in the Prior Converted Cropland areas of the Oak Creek Mitigation Bank

Botanical Name	Common Name	Size	Quantity
Trees and Shrubs		**(1 gal. Cont.)**	
Fraxinus latifolia	Oregon ash	24-36"	1,271
Crataegus douglasii	Douglas hawthorn	24-36"	706
Populus trichocarpa	Black cottonwood	24-36"	1,094
Rhamnus purshiana	Cascara	24-36"	459
Rosa nutkana	Nootka rose	18-24"	2,648
Rosa pisocarpa	Clustered rose	18-24"	2,824
Spiraea douglasii	hardhack spiraea	18-24"	3,354
Total Plantings (1 gallon containers or bare root)			**12,355**

These plants will be installed in late winter to early spring while plants are dormant or are otherwise less likely to be stressed by low soil moisture or other factors. In addition, each plant will be installed in the center of a polypropylene-mesh weed barrier to minimize competition from weedy species. The approximate locations of planting areas are within areas shown as PC, as shown on Figure 7. The trees and shrubs will be installed in clusters, leaving room between the clusters for continued growth of the herbaceous community. Plant placement will be finalized in the field to insure proper moisture and soil conditions.

Planting in the riparian areas

When the berms are removed, the riparian area will be restored to its original elevation. The goal of the riparian plantings will be to restore the original plant community along the creek. Riparian plantings will provide additional shading and bank stability to maintain cooler water temperatures and to minimize erosion. Over time the plantings will also increase structural and species diversity and increase organic debris and biotic inputs to the aquatic system.

To achieve this goal, the newly exposed areas will be seeded with native grasses and planted with a variety of woody riparian species. The species selected for installation along the creek include those listed in Table 3 below.

Table 3. Suggested Woody Plantings in the riparian areas of the Oak Creek Mitigation Bank

Botanical Name	Common Name	Size (1 gal. Cont.)	Quantity
Trees and Shrubs			
Fraxinus latifolia	Oregon ash	24-36"	167
Alnus rubra	Red alder	24-36"	61
Populus trichocarpa	Black cottonwood	24-36"	50
Rosa pisocarpa	Clustered rose	18-24"	70
Cornus stolinifera	Red osier dogwood	18-24"	209
Salix piperi	Pipers willow	18-24"	420
Total Plantings (1 gallon containers or bare root)			**978**

As with the plants for the PC areas, the riparian plantings will be installed in late winter to early spring while plants are dormant and are less likely to be stressed by low soil moisture or other factors. Each plant will also be installed in the center of a polypropylene-mesh weed barrier to minimize competition from weedy species. The approximate locations of planting areas is along the banks of Oak Creek, as shown on Figure 7.

Planting in the buffer areas and upland restoration area

To provide a visual and spatial buffer between adjoining properties and along upland areas, a 25-foot buffer (50 feet along the urban growth boundary) will be established, as shown in Figure 7. This buffer encompasses areas designated as PC by the NRCS and non-wetland areas. In addition, an isolated upland area will also be restored with native tree and shrub plantings.

The buffers and upland restoration areas will be planted with woody trees and shrubs, suitable for growing in the buffer's varying hydrologic regime. The species selected for installation along the creek include those listed in Table 4 below.

Table 4. Suggested Woody Plantings in the buffer and upland restoration areas of the Oak Creek Mitigation Bank

Botanical Name	Common Name	Size(1 gal. Cont.)	Quantity
Trees and Shrubs			
Fraxinus latifolia	Oregon ash	24-36"	276
Crataegus douglasii	Douglas hawthorn	24-36"	153
Populus trichocarpa	Black cottonwood	24-36"	238
Rhamnus purshiana	Cascara	24-36"	100
Rosa nutkana	Nootka rose	18-24"	506
Rosa pisocarpa	Clustered rose	18-24"	583
Amelanchier alnifolia	western serviceberry	18-24"	215
Spiraea douglasii	Hardhack spiraea	18-24"	230
Total Plantings (1 gallon containers or bare root)			**2,300**

Phase II

In Phase II we will enhance or restore additional wetland habitat in the forested areas (5.39 acres along Oak Creek and the ditch from the south and 0.79 acres in the northeastern corner of the property). Phase II will be completed by summer of 1999. It is expected that credit at up to 3:1 will be allowed for the enhancement of these areas (improve hydrology; decrease invasive species; increase desirable species).

Cowardin Wetland Classes Restored

In Phase II palustrine forested (PFO--) wetlands (Cowardin classes) (Figure 7) will be enhanced. These will include riverine, slope, and depression (HGM) classes.

Phase II Credit

Enhancement @ 3:1

5.39 acres enhanced wetland @ 3:1	**1.80 acres credit**
0.79 acres enhanced wetland @ 3:1	**0.26 acres credit**

Enhancement Strategy

Enhancement will include some berm removal and some ditch filling to restore hydrology and will require controlling nuisance plant species (especially Himalayan blackberry) and supplemental planting. Construction will be completed in summer 1999. Planting will be done in winter and early spring and selective spraying or mechanical eradication will be in spring and summer. Topography and plant community will be documented before and after construction and plant control is undertaken to document enhancement accomplished. This documentation will be provided before, or as part of, a request for certification of credits.

Planting Strategy

The restoration of the forested plant communities includes controlling weedy species, such as Himalayan and evergreen blackberry, and planting shrubs and herbaceous species typically found within the Oregon ash-dominated wetland forests of the Willamette Valley. The degraded hydrology of the forested areas has allowed species such as the blackberries to dominate portions of the plant community within the mitigation bank. Although the predominantly Oregon ash overstory is intact, many of the understory species expected in this community are not present or are not well represented.

The control of nuisance species will follow the same protocol discussed in the *Noxious Weed Control* section above. Species selected for planting in the forested communities includes those listed in Table 5.

Table 5. Plants to be installed in the forested areas at the Oak Creek Mitigation Bank site during Phase II

Botanical Name	Common Name	Size (1 gal. Cont.)	# of plugs
Trees and Shrubs			
Fraxinus latifolia	Oregon ash	24-36"	165
Crataegus douglasii	Douglas hawthorn	24-36"	70
Populus trichocarpa	Black cottonwood	24-36"	250
Rosa nutkana	Nootka rose	18-24"	408
Rosa pisocarpa	Clustered rose	18-24"	408
Physocarpus capitatus	Pacic ninebark	18-24"	340
Spiraea douglasii	Hardhack spiraea	18-24"	204

Herbaceous		
Camassia quamash	Common camas	829
Carex obnupta	Slough sedge	285
Juncus patens	Spreading rush	245

The woody understory plantings will be installed in late winter to early spring while plants are dormant. As no dominant herbaceous plant community exists within the forested areas, polypropylene-mesh weed barriers are not required. The herbaceous species will be installed during the early spring to minimize stress. The planting areas includes all of the forested areas shown on Figure 7.

Contingency Plan

The bank site will be visited monthly after construction and through the first growing season. For the rest of the time until the end of the Mitigation Banking Instrument (until five years after the last credit is sold) the site will be visited at least quarterly. During these visits, any problems will be noted and a plan to correct deficiencies developed and either implemented immediately or presented to the MBRT for approval (whichever is appropriate).

Success of plantings will be noted each year and additional seeding or cuttings placed to replace unwarranted loss. However, if other desirable natural plants are out-competing the planted species, and the volunteer species are consistent with plant community targets developed from the reference sites, the voluntary natural communities will be left undisturbed.

Site hydrology will be observed seasonally. If minor deficiencies in hydrology occur in limited areas, additional water may be diverted from the drainage ditches on the north or south as required, or minor berms (less than 1 to 2 feet high) may be created to detain some water in ponded areas for somewhat longer periods.

RPNA and PHS will be involved with site operation and maintenance throughout the life of the Banking Instrument. Both of these companies have been successful in designing and developing wetland mitigation sites throughout Oregon and in other parts of the United States, and are well qualified to correct any deficiencies that might occur at this site. A performance bond of $30,000 has been established as a source of funding to cover any corrective measures required for Phases I and II during the period of the Banking Instrument.

5.0 SUCCESS CRITERIA

Performance Standards

HGM has not been formally adopted in Oregon, but we are using an HGM-like approach for characterizing the bank site and the reference wetland site, and subsequently to document success of the mitigation bank site (i.e. compare plant communities at the Bank site to those at the reference site). We have also completed both OFWAM and WET assessments for the site, and will conduct these assessments again following site restoration.

Vegetation

Phase I

Phase I will be considered successful and certified when the PC, buffer, and riparian areas are:

1) dominated (more than 50% cover or more than 50% frequency of occurrence) by desirable native plant species and plant associations after the first growing season, (or by 60% after the second growing season, or by 70% at any later time)
2) has more than 80% survival among the planted native trees and shrubs; and
3) has no more than 15% cover of invasive, undesirable herbaceous species. The criteria for undesirable species may include the following:
    a) designated a 'noxious weed' requiring control by the Oregon Department of Agriculture Weed Control Program
    b) invasive non-native woody or herbaceous species that constitute a competitive threat to desirable native plant community establishment.

Certification for sale of all remaining Phase I restoration credits will be requested by the Sponsor as soon as success can be demonstrated (e.g., after the first growing season).

Phase II

The enhancement of forested wetland areas will be considered successful and credits certified when they are:

1) dominated (more than 50% cover or more than 50% frequency of occurrence) by desirable native plant species after the first growing season, (or by 60% after the second growing season, or by 70% at any later time),
2) have more than 80% survival among the planted native shrubs; and
3) have no more than 15% cover of invasive, undesirable herbaceous species. The criteria for undesirable species may include the following:
    a) designated a 'noxious weed' requiring control by the Oregon Department of Agriculture Weed Control Program

b) invasive non-native woody or herbaceous species that constitute a competitive threat to desirable native plant community establishment.

Certification for sale of all remaining Phase II enhancement credits will be requested by the Sponsor as soon as success can be demonstrated (e.g., after the first growing season).

Monitoring Frequency, Protocols, Expertise (q)

A topographic survey will be completed after the construction associated with Phases I and II to document physical changes to the site. The topographic survey, representative photos, and a discussion of the species planted, buffers created, and any other actions pertinent to the restoration, enhancement, or creation of wetland on the site (e.g., variations from original plan) will be documented and presented in a report to DSL, the Corps, and the MBRT within 60 days of completion of Phase II activities. This documentation will be provided before, or as part of, any requests for certification of Bank credits.

Hydrology

The hydrologic monitoring of groundwater levels in 17 observation wells, stream stage in Oak Creek and in the southern tributary ditch, and observations of depth of ponding in shallow depressions and riparian areas will be conducted bi-monthly and continued through the duration of this Banking Instrument. These data will be used to document the flooding regime of the site after berm removal and other hydrologic responses to site restoration.

Sediment Deposition

A series of 10 monitoring locations have been selected randomly within the restored riparian zone to monitor sediment deposition characteristics. Measurement points have been established, consisting of re-bar driven into the riparian area. Measurements were made in June 1999 and will be obtained each June (after the spring flooding period is over) during the duration of this Banking Instrument. These data will be used to document the sediment trapping function of the site after restoration and reconnecting Oak Creek to its historic flood plain.

Vegetation

Plant communities will be characterized once annually (late summer/early fall) using the protocols presented in the 1997 vegetation survey (Appendix F). Photos will be taken from the points established in that survey. Wildlife surveys will be conducted twice annually, in spring (between May 15 and June 15) and winter (between January 1 and February 1). Water level monitoring will be conducted bi-monthly to define the water regime for distinct wetland plant communities.

The plant community characteristics for each habitat restored will be compared annually to the plant lists determined from surveys of similar habitats at selected nearby reference sites--see Appendix F. The survey protocol involves a stratified random sampling strategy. We have established transects parallel to the long axis of each habitat type. We will add transects as distinct habitat types develop. All species observed along the transect are recorded. Ten 1 meter x 1 meter quadrats are evenly spaced along the transect and herbaceous species occurrence and percent cover are recorded for each quadrat. Sampling is stopped when the species-area curve flattens out (more than ten quadrats may be required). Where shrub or tree strata exist, they are sampled in a ten-meter radius around the quadrat. Percent cover by shrubs/saplings is estimated and diameter breast height (DBH) is measured for trees. Stem counts are taken for saplings and trees. Permanent locations have been identified for taking panoramic photographs of each habitat type. These protocols are presented in the report "Vegetation Monitoring: Lebanon, Oregon Mitigation Bank Site" by Steven and Angela Niswander (see Appendix F).

Wildlife

Wildlife use of the mitigation bank site will be suggested by a wildlife survey conducted twice each year (spring: between May 15 and June 15; winter: between January 1 and February 1) during the life of this Instrument. Four census stations were selected and identified to characterize baseline conditions at the present site. Additional census stations will be added to represent additional habitat types as they develop over time. All individual birds, mammals, amphibians, and reptiles observed within 50 meters of the station during a 15 minute period from sunrise to four hours after sunrise are recorded. Birds flying over the census station and any wildlife observed (direct observations or evidence such as scat, tracks, etc.) while walking between census stations are recorded as observations, but separately from observations at the census stations. These protocols are presented in "Wildlife Monitoring: Lebanon, Oregon Mitigation Bank Site" by Steven and Angela Niswander, that provides base line wildlife observation from Summer 1997 (Appendix G). A subsequent survey in Winter 1998, by David Wilborn, is also included in this Appendix.

Reporting Frequency and Protocols

The results of the hydrologic monitoring, vegetation sampling, and wildlife surveys will be summarized and provided with the summary of credit activity to DSL and the Corps annually (in January). Vegetation and wildlife data will be those collected from January through December. Hydrologic data will be those collected from October 1 through September 30 (the USGS water year). Hydrologic data will be provided in both tabular and graphic format to facilitate analysis of trends, comparisons among years, and comparison to reference sites. The data sheets for the annual vegetation sampling will be provided. In addition, for each habitat type a graphic will be provided to assist in comparing plant community composition in habitat types at the Bank site to those in similar habitat types at the reference sites. The data sheets and summary tables of wildlife observations for both the

winter and spring surveys will be provided. In addition, for each habitat type a graphic will be provided to assist in comparing wildlife usage at the Bank site to that in similar habitat types at the reference sites.

Monitoring, wetland delineation, and site assessment will be conducted by R.P. Novitzki and Associates, Inc. (RPNA), Pacific Habitat Services, Inc. (PHS), and Patrick Thompson Consulting (Statement of Qualifications provided in Appendix H).

6.0 REGULATORY REQUIREMENTS

Consistency of Mitigation Banking with Local Plans and Land Use Regulations

The Mitigation Plan has been discussed with Doug Parker, City of Lebanon Planner, and has been determined to complement all appropriate City plans, requirements, and zoning overlays. Lebanon's long-term plans include a trail system which may cross the Bank site. Access for this trail would be allowed on the upland north of Oak Creek, or may be allowed through the restored wetland area so long as the trail's design and use did not change the character or function of the restored wetland. The Mitigation Plan also has been discussed with Steven Michael, Linn County, and has been determined to be consistent with all zoning restrictions, watershed plans (especially riparian enhancement programs), and other land use concerns. (These letters are in Appendix I). The property is zoned EFU and wetland restoration is an allowed use. The Mitigation Plan has also been discussed with Rich Gebhart, Corps and with Ken Franklin, DSL, and appears to be consistent with policies of both agencies. Both Rich and Ken have visited the site and consider it suitable replacement for wetland impacts in the Service Area. The site will also provide a potential site for research conducted by the NRCS Plant Materials Center in Corvallis and for DSL to demonstrate application of the HGM approach in Oregon.

There is an existing transmission line easement crossing the property, held by the Bonneville Power Administration and dated August 17, 1949. The perpetual easement grants to the UNITED STATES OF AMERICA access along a strip of land 100 feet wide along the alignment of the transmission lines. They are granted the "right to enter and erect, operate, maintain, repair, rebuild, and patrol one or more electric power transmission lines and appurtenant signal lines, poles, towers, wires, cables, and appliances necessary in connection therewith, in, upon...(description of land)". Such infrequent patrolling or maintenance activity does not impair the function of the restored wetland areas.

The Oak Creek Mitigation Bank LLC has coordinated with Susan Adams (USDOE, BPA, Eugene, OR, (541) 465-6555) regarding the effects of the BPA easement on the wetland mitigation bank and the effects of the mitigation bank on the activities protected by the BPA easement. Within the 100-foot easement we will not plant trees or shrubs and will maintain any recruited vegetation to a height of 10 feet or less. BPA understands that the only Bank construction activities within the easement involve berm removal adjacent to Oak Creek.

It is expected that access to the transmission towers during normal maintenance periods (e.g., July and August) will cause no harm to the wetland. In the event that access to the towers is necessary on an emergency basis during wet periods, the following process will be followed.

(Note: Oak Creek Mitigation Bank, LLC [Sponsor] is responsible for site management until 5 years after the last credit is sold. During this period (at least until the year 2005) BPA agrees to notify the Sponsor if emergency access is (or was) required. After the Sponsor is released from this Instrument and site management responsibilities, a Conservation Easement holder will be identified and accepted by Corps and DSL. When this occurs, we will notify BPA and provide them phone numbers, mailing address, and other means for notifying the Conservation Easement holder that emergency access is required.)

If possible, BPA will notify the Sponsor or Conservation Easement holder before access is required, or they will notify them as soon as possible after access and emergency work is complete. Within 2 weeks of notification of work completion, the Sponsor or Conservation Easement holder will assess the bank site to determine if any restoration of the access or work areas is needed. Restoration may include regrading, replanting, seeding, etc. as necessary to return the wetland to pre-disturbance conditions. If restoration is required, the Sponsor or Conservation Easement holder will present a plan to DSL and the Corps for approval. Upon approval they will arrange for the restoration. The Sponsor or Conservation Easement holder will submit a completion report to DSL and the Corps. They will then submit a request to BPA for reimbursement of costs associated with the necessary remediation.

(Each and all such activities in the BPA easement shall be documented by Oak Creek Mitigation Bank LLC and included in the Annual Monitoring Report to the DSL and the Corps during the life of this Instrument.)

The site is approximately two miles from the Lebanon airport and is outside the UGB.

Compensatory Mitigation Plans for Non-Minor Projects

This Banking Instrument incorporates and addresses all specific items included in the DSL/Corps Mitigation Rules and Guidelines.

Proof of Ownership

Oak Creek Mitigation Bank LLC is the equitable owner of the 88.2-acre mitigation bank site, located on Rock Hill Road south of Lebanon, Oregon (T12S, R2W, Sec. 26, parcel 800, Linn County). A copy of the purchase contract is provided in Appendix J.

List of Adjacent Property Owners

BJORNSON, LINDA
DODRILL, DONNA
LENGACHER,ELLEN
HERGERT, EDWARD
31950 MOSS ST
LEBANON RO 97355

KACZMAREK, RICHARD & DONNA
37595 ROCKHILL DR
LEBANON OR 97355

SCHMITT, PETER & LAREINA
910 CENTRAL AVE
LEBANON OR 97355

RIVERA, SANTOS
525 OREGON ST
LEBANON OR 97355

MILLER, WILLIAM & DONNA
455 OREGON ST
LEBANON OR 97355

MADDOX, MARGARET
560 CENTRAL AVE
LEBANON OR 97355

GARLAND, JERALD
WILSON, BARBARA
PO BOX 1194
LEBANON OR 97355

SMITH, CHESTER & MABLE
975 HILLVIEW DR
LEBANON OR 97355

BAY, RICHARD & CAROLEE
437 78TH AVE NE
SALEM OR 97301

SANDERLIN, C
MATIACO, STEVEN
PO BOX 367
FOREST GROVE OR 97116

SANDERLIN, C
MATIACO, STEVEN
PO BOX 367
FOREST GROVE OR 97116

BAKER, JOYCE
685 HILLVIEW DR
LEBANON OR 97355

HERMAN, ELEANORA
575 CROWFOOT RD
LEBANON OR 97355

MERRILL, ANTHONY & MARION
610 CENTRAL AVE
LEBANON OR 97355

CAGLE, FAY
662 CENTRAL AVE
LEBANON OR 97355

DAVENPORT, ALBERT & SYLVIA
690 CENTRAL AVE
LEBANON OR 97355

DAVENPORT, ALBERT & SYLVIA
690 CENTRAL AVE
LEBANON OR 97355

FITZJOHN, JAMES
780 CENTRAL AVE
LEBANON OR 97355

CRENSHAW, JOSEPH & NINA
37570 ROCKHILL DR
LEBANON OR 97355

OAKESON, ARNE & EDITH
1029 W VALERIO ST
SANTA BARBARA CA 93101

DUELL, ARTHUR
GORDON, WAYNE
4352 E 200 N
ANDERSON IN 46012

ANGLIN, JAMES & CHERYLL
37405 SODAVILLE CUTOFF DR
LEBANON OR 97355

ANDERSON, LAUNA
1451 NE SEWARD AVE
BEND OR 97701

JOHNSON, PHILLIP & ROSEMARIE
37394 SODAVILLE CUTOFF DR
LEBANON OR 97355

BURNETT PETRIFIED WOOD
PO BOX 293
PORTSMOUTH OH 45662

Estimated Cost

Land Acquisition	$165,000
Site Survey (initial; as-built)	$10,000
Consulting Fees	$50,000
Legal Fees	$15,000
Construction	$25,000
Wetland Design/Planting	$50,000
Total	**$315.000**
Monitoring (Annual Cost)	$10,000

Proof of Financial Resources

Oak Creek Mitigation Bank LLC has acquired ownership of the property. The Company has established a line of credit in the amount of $100,000. The Company has obtained a performance bond in the amount of $30,000. The performance bond will be maintained for the life of this Banking Instrument or until the credits are certified and appropriate success criteria have been met and the success of the site has been confirmed.

Method of Credit Accounting

Credits available for sale will be certified by determining the number of acres of wetland that have been successfully restored at the bank site using the Corps of Engineers 1987 delineation protocols; the ratios for restoration, enhancement, and creation described above; and the success criteria described above.

Recognizing that ecosystem function and health is dependent on the interaction between wetland and associated uplands, and the need to buffer wetlands from adjoining incompatible land uses, additional credits for upland buffers will be at a ratio up to 10:1. These credits will be authorized for sale after 5 years and after success criteria are met.

The frequency and duration of flooding, the amount of sediment deposition, plant community composition, and wildlife usage will be recorded for selected habitats. These data will be used to document increased function and increased value of wetland areas. If improved function and value can be demonstrated, the Sponsor may petition DSL, the Corps, and the MBRT to provide additional credit for the improved quality (e.g., increase credit for the improved wetland acres to a ratio between 1:2 and 1:1).

The number of wetland mitigation acres certified using the above criteria, the total number of credits sold, the number of credits remaining available for sale, the individual permittees to whom credits have been sold, and the number of credits each permittee purchased will be reported annually.

The reports presenting results of monitoring and credit accounting will be submitted to DSL, the Corps, and to MBRT members by January 31 each year and will cover the period from January 1 to December 31 of the preceding year (except hydrologic data which will be for the USGS water year, from October 1 to September 30).

Time Periods Associated with Elements of the Banking Instrument

The terms of this Banking Instrument will continue until 5-years after the last credit is sold. However, if the site achieves equilibrium, meets success criteria, and demonstrates self-sustainability sooner, the sponsors may petition DSL and the Corps to release them from further responsibility to actively manage the site.

The performance bond will be maintained for the life of the Instrument. However, when the success of the site and achievement of success criteria are confirmed, the Sponsor may petition DSL and the Corps to release them from this requirement earlier.

Phase I construction and planting is complete. Phase II construction and management activities will be undertaken as soon as possible and planting completed as soon as possible.

The terms of this Instrument may be changed during the life of the Instrument. Either the Sponsor, DSL, or the Corps may initiate a proposed change at any time. However, the change will only take effect if all three signatory parties agree to that change. It is understood that the MBRT serves as an advisory body to the DSL and Corps and may participate in any discussions that may result in changes to this Instrument. It is also understood that DSL and the Corps may request periodic meetings, either at DSL or at the mitigation site or reference site to discuss relevant issues.

Long Term Protection Measures

A deed restriction has been drafted and will be recorded in Linn County as soon as this Instrument is accepted. A Conservation Easement is being developed with the U.S. Fish and Wildlife Service. It is our intent to provide restoration that is self-sustaining and requires little or no subsequent hydrologic or physical management. However, management of the plant community (e.g., fire, weed control/spraying, cultural harvest of camas) may be required, which is consistent with the management responsibility of USFWS. After the completion of the terms of the Banking Instrument (or sooner with the agreement of DSL and the Corps) the land may be sold or otherwise transferred to an entity (e.g., USFWS, State of Oregon, City of Lebanon, or a private party) with the desire to maintain the wetland resource.

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U.S. Geological Survey. 7.5-minute topographic maps. Lebanon (1969, photorevised 1986) and Brownsville (Prov. Ed. 1988), Oregon quadrangles.

U.S. Geological Survey. 1974. State of Oregon Hydrologic Unit (HUC) map.

Appendix A
Cultural Resources Inventory

Appendix B
NRCS Wetland Determination
and
PHS Data Sheets

USDA United States Department of Agriculture
N ral Resources Conservation Service
Benton-Lincoln-Linn ld Office
33630 McFarland Rd.
Tangent, OR 97389
(541) 967-5925

RECEIVED 4-28-98

April 27, 1998

Mr. Richard Novitzki
4853 NW Bruno Place
Corvallis, OR 97330

Dear Mr. Novitzki:

This is to notify you that as of the date of this letter preliminary, technical wetland determinations were completed for the following tract(s): 1283 that are a part of the farm you either own and/or operate.

Enclosed is a Form CPA-026E and an aerial photo that includes the preliminary technical wetland determinations for your tract along with several fact sheets and information brochures. Any areas shown in "NI" on the map have not been completed. This supersedes any previous USDA wetlands determinations.

In order to maintain your USDA program eligibility and comply with the Clean Water Act, contact us prior to performing the following activities:

land clearing
drainage (title or open ditching)
drainage maintenance
filling, leveling, or dredging
land use changes
any activity involving "other waters of the United States" as defined above.

If you do not agree with this preliminary technical determination, you may request a field visit or mediation within thirty (30) days of this letter. Your request should be made in writing to the above office address and should state the reason for the request of the field visit or mediation. For further information on the appeal or mediation process, please see the enclosed information sheet. If no field visit or mediation is requested within thirty (30) days, this preliminary technical determination will become the final technical determination.

If you are the owner of this tract of land and have a tenant, I urge you to discuss this letter and enclosed NRCS-CPA-026E with your tenant. Likewise, if you are the tenant of this tract of land, I urge you to discuss this letter with your landlord.

Sincerely,

Allen Makinson

Allen Makinson
RESOURCE SOIL SCIENTIST

Enclosures:
Appeals Information
NRCS-CPA-026E
Farm Service Agency Maps

Mr. Richard Novitzki April 27, 1998

APPEALS INFORMATION

As of January 16, 1996, the U.S. Department of Agriculture has initiated a major revision to the appeal process within the Department. The revised process implements statutory changes in agency appeal authorities that were set forth in the Federal Crop Insurance Reform and Department of Agriculture Reorganization Act of 1994.

As a result of these statutory and regulatory changes, the Natural Resources Conservation Service appeal processs has been changed. Under the new appeals and mediation process, your preliminary technical determination will become final within 30 days unless you request either of the following options:

(1) A field visit be made by our office to review with you the basis for our preliminary technical determination, answer any questions you have concerning the determination, and to gather additional information from you concerning the preliminary technical determination.

(2) That mediation be used in an attempt to settle your concerns with the preliminary technical determination. If you choose mediation, you must contact the mediator directly and make arrangements for the mediation process by contacting:

Jack Sainsbury, State Executive Director
Oregon State Farm Services Agency Offic
Tualatin, OR 97062
Phone: (503) 692-6830
Fax: (503) 692-8139

Please inform our office that you have chosen mediation so that we can make appropriate arrangements for participating in your mediation session.

Mediation is a process in which a trained, impartial person (a neutral mediator) helps look at mutual problems, identify and consider options, and determine if we can agree on a solution. Unlike an appeal, mediation is private, confidential and informal. The mediator will help us work together to evaluate the information in your case and to identify alternatives that will assist us in resolving the dispute. The mediator has no decision making authority. Unlike the appeal process, a mediator cannot decide what is "right" or "make" anyone do anything. If the mediation is successful, the mediator may help us reach an agreement and document that solution in writing.

If you choose to use mediation, you can request that the NRCS pay any appropriate and reasonable costs associated with securing the services of a trained mediator when the services are provided on other than a voluntary basis. NRCS will have final discretion over what is considered appropriate and reasonable.

A final technical determination will be issued within 30 days after the field visit, if one is requested, and/or within 30 days following the completion of mediation. The final technical determination, whether it is a result of the expiration of the 30 day period or from a field visit or mediation of a preliminary technical determination, may be appealed to the Farm Service Agency Linn-Benton-Lincoln County Committee at the following address:

Farm Service Agency
33630 McFarland Rd
Tangent, OR 97389-9627
(541) 967-5925 ext. 201

If you decide to appeal to the county committee, we will forward a copy of our administrative record to the county committee for their use in deciding your appeal.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NRCS-CPA-026E
8-95

HIGHLY ERODIBLE LAND AND WETLAND CONSERVATION DETERMINATION

Name: Novitzki, Richard Tract: 1283 Farm:
County: Linn Request Date: FSA Farm No.: 655

Section I - Highly Erodible Land

Fields in this section have undergone a determination of whether they were highly erodible land (HEL) or not; fields for which an HEL Determination has not been completed are not listed. In order to be eligible for USDA benefits, a person must be using an approved conservation system on all HEL.

Field	HEL(Y/N)	Sodbusted(Y/N)	Acres	Determination Date

Section II - Wetlands

Fields in this section have had wetland determinations completed. See the Wetlands Explanation section for additional information regarding allowable activities under the wetland conservation provisions of the Farm Bill and Section 404 of the Clean Water Act.

Field	Wetland Label	Acres	Determination Date	Certification Date
1	NW	15.5	04/09/98	04/09/98
1	PC	17.5	04/09/98	04/09/98
2	NW	9.7	04/09/98	04/09/98
2	PC	32.7	04/09/98	04/09/98
UN-1	W	6.5	03/10/98	03/10/98
UN-1	NW	5.4	04/09/98	04/09/98
UN-2	W	0.9	03/10/98	03/10/98

Wetlands Explanation

Wetland Label	Explanatory Comments

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NRCS-CPA-026E
8-95

HIGHLY ERODIBLE LAND AND WETLAND CONSERVATION DETERMINATION

Name: Novitzki, Richard Tract: 1283 Farm:
County: Linn Request Date: FSA Farm No.: 655

Wetlands Explanation

Wetland Label	Explanatory Comments
NW	Non-wetland; Description: An area that does not meet wetland criteria under natural conditions or wetlands that were converted prior to 12/23/85, not cropped prior to 12/23/85, does not meet wetland criteria, and has not been abandoned; Authorized cropping: No Restrictions; Authorized Maintenance: No restrictions unless the manipulation would convert adjacent wetland labels.
PC	Prior Converted Cropland; Description: An area that was drained, filled or manipulated prior to 12/23/85 and was cropped prior to 12/23/85 and was not abandoned and does not meet farmed wetland criteria; Authorized Cropping: No restrictions; Authorized Maintenance: No restrictions unless the manipulation would convert adjacent wetland labels.
W	Wetland; Description: An area that meets the wetland criteria including wetland farmed under natural conditions. Includes abandoned wetland resulting from abandonment of other wetland labels; Authorized Cropping: May be farmed under natural conditions without removal of woody vegetation; Authorized Maintenance: At level needed to maintain original system on related farmed wetland, farmed wetland pasture, and prior converted cropland. Must not convert additional wetlands or exceed "original scope and effect"; If you plan to clear, drain, fill, level or manipulate these areas contact NRCS* and COE**.

* Natural Resources Conservation Service
** Corps of Engineers

Remarks
The Non-Wetland area in UN-1 along Oak Creek is the spoil or dike along the channelized portion of the Creek.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

NRCS-CPA-026E
8-95

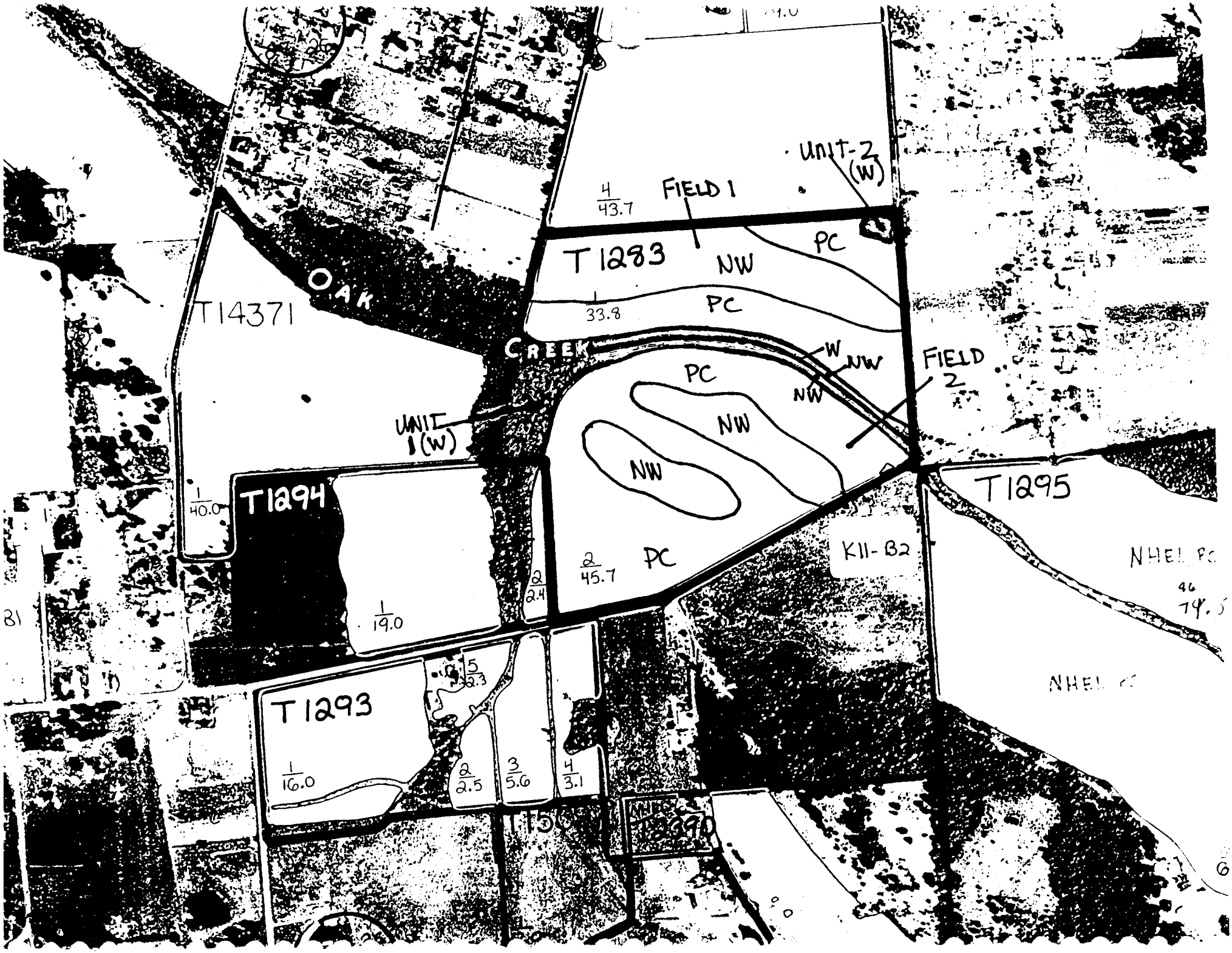
HIGHLY ERODIBLE LAND AND WETLAND CONSERVATION DETERMINATION

Name: Novitzki, Richard | Tract: 1283 | Farm:
County: Linn | Request Date: | FSA Farm No.: 655

I certify that the above determinations are correct and were conducted in accordance with policies and procedures contained in the National Food Security Act Manual.

Signature Designated Conservationist | Date

Allen Makinson | Apr 27, 1998


UNIT-2 (W)
4/43.7
FIELD 1
T1283
NW
PC
1/33.8
PC
OAK
CREEK
T14371
W
NW
NW
FIELD 2
PC
NW
NW
UNIT 1 (W)
T1294
1/40.0
T1295
K11-B2
2/45.7
PC
2/2.4
1/19.0
NHEL PC
5/2.3
T1293
1/16.0
2/2.5
3/5.6
4/3.1
T1299

Oregon
John A. Kitzhaber, M.D., Governor

Division of State Lands
775 Summer Street NE
Salem, OR 97310-1337
(503) 378-3805
FAX (503) 378-4844
TTY (503) 378-4615

RECEIVED 10-14-98

October 12, 1998

Richard Novitzki
R.P. Novitzki & Associates, Inc.
4853 NW Bruno Place
Corvallis, OR 97330

Dear Mr. Novitzki:

In response to your recent phone message regarding your hydrology analysis for the Oak Creek mitigation bank site, I would like to address more specifically the basis of my wetland determination. As I noted in my letter of October 2, 1998, the determination is based upon a composite consideration of soils, vegetation and hydrology data. Observed hydrology is considered by wetland determination practitioners to be the least reliable variable due to the normal fluctuations in climatic patterns and rainfall patterns, and also timing of site observations. I don't believe that an independent evaluation of your data by another hydrologist is needed or even appropriate for two reasons: (1) you are, to my knowledge, a highly skilled hydrologist; and (2) an accurate wetland determination does not necessarily hinge on an evaluation of groundwater levels and "higher-than average" rainfall.

Specifically, on this site most of the wetland is in an area of Dayton silt loam, a widespread soil series found on fairly flat surfaces in the Willamette Valley. Dayton soils are characterized by a dense clay subsoil at about 15-18 inches below the surface. This clay layer has very low permeability which creates a confining layer that retards water movement from both above and below. The confining layer perches rainwater, making these perched wetlands highly responsive to frequency of rainfall events. Characteristically, these wetlands become saturated above the confining layer well before the regional groundwater has been recharged by winter rains. I have many times (including with Dr. Herb Huddleston) observed saturated and ponded conditions *only* above the clay layer. Below the clay layer, the soil can be moist or quite dry. Gradually, through the fall and winter, the regional water table rises and the clay layer becomes saturated from above and/or below.

The same phenomenon occurs in reverse in the Spring. The factor that can be most critical in terms of sustaining wetland conditions through the Spring growing season on Dayton and similar soils is the *frequency* of rains rather than the amount of rain. The regional groundwater level certainly plays an important role if it remains high, but even if it drops, rainfall alone will continue to perch, keeping the upper layers of the soil saturated. I've monitored Dayton soils and found that they are highly responsive to rainfall events, and frequent Spring rains are typical of our region.

There's no question that the last few years have had above-average rainfall, after many years of "drought." It is nearly impossible to collect data at just the right time in a "normal" year, as most any year is some variation around "normal." The question here is, over the long term and taking into consideration site alterations, is the site wet enough to support a predominance of hydrophytic vegetation? The ground water wells, particularly those not placed near the Oak Creek berm or near the road, support the positive wetland determination. Soil saturation above the confining layer was not independently evaluated. The plant species composition is strongly hydrophytic; it is more common to find many annual weedy FACU or U species mixed in with FAC and FACW species as initial colonizers of disturbed sites (including at a known wetland site I visited this year).

More data could be collected next Spring, including saturation data, but another wet Winter and Spring is expected and more data would not resolve the "normal year" arguments that, in my experience, are never resolved. Pacific Habitat Services, a firm we both respect that has many years of wetland determination experience, concluded from their data and knowledge that the wetland areas, though altered, still meet wetland criteria under the 1987 manual. In my nine years of conducting or reviewing more than 1,000 wetland delineations in the region, I reached the same conclusion.

Dick, we need to move on to finalizing the restoration plan and arrangements regarding credit units. As Larry has likely mentioned, we area working toward development of mitigation ratios for "restoration" of agriculturally managed wetlands that are intermediate between the current standard ratios for restoration and for enhancement.

Sincerely,

Janet C. Morlan

Janet C. Morlan, PWS
Wetlands Program Leader

P.S. The PC determination made by Allen Makinson may be used by the Corps of Engineers, at their discretion. Normally, under the Interim Operating Procedures, the Corps would take the lead on a determination for a mitigation bank that will serve development activities. You might want to discuss that with Jim Goudzwaard. As we have already advised, the PC determination has no bearing on the state permitting process for this activity.

cc: Larry Devroy, DSL
Jim Goudzwaard, Corps of Engineers

Oregon
John A. Kitzhaber, M.D., Governor

Division of State Lands
775 Summer Street NE
Salem, OR 97310-1337
(503) 378-3805
FAX (503) 378-4844
TTY (503) 378-4615

RECEIVED 10-5-98

October 2, 1998

Richard Novitzki
R.P. Novitzki & Associates, Inc.
4853 NW Bruno Place
Corvallis, OR 97330

Re: Wetland Delineation for the Oak Creek Mitigation Bank near Lebanon
T12S R2W S26; DSL Det. # 98-0400

Dear Mr. Novitzki:

I have carefully reviewed the wetland delineation report prepared by Pacific Habitat Services (PHS), the supplemental hydrologic data that you provided, and the aerial photographs of the above site. Based upon my review, I conclude that for the purposes of the proposed mitigation bank under the state removal-fill law, the areas mapped by PHS as non wetland (NW) are not wetland, the areas mapped as wetland (W) are wetland, the areas mapped as prior-converted cropland (PC) are wetland, and Oak Creek is a water of the state.

The unusually wet Winter and Spring, like extended periods of drought, are factors we deal with on a regular basis. It's one reason that the evaluation of all factors together—soils, vegetation, short-term climatic variation, hydrology, and site alterations—not any single factor, is fundamental to the wetland determination process and decision. The data, especially the rapid colonization of the site by obligate and FACW perennial plant species, strongly supports the conclusion that despite the altered hydrology, the areas mapped as PC are still wetland under the 1987 Corps manual criteria.

Your letter notes that you would alter the mitigation plan should DSL determine that the PC areas still meet wetland criteria. Although I have not seen the restoration plan, I doubt that any change to the plan is needed, since reversing the historic hydrologic alterations on the site is most

likely still appropriate. That's a matter for Larry Devroy and the MBRT to determine in consultation with you, of course.

Thank you for the report and your data. Please phone me if you have any questions.

Sincerely,

Janet C. Morlan

Janet C. Morlan, PWS
Wetlands Program Leader

cc: Larry Devroy, DSL
Jim Goudzwaard, Corps of Engineers
Allen Makinson, NRCS
Fred Small, PHS
Ken Franklin, DSL

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, Oregon 97070
Telephone number: (503) 570-0800 Fax number: (503) 570-0855

Project Memorandum

Date: **November 24, 1998**

Re: **Summary of wetland delineation at the Oak Creek Wetland Mitigation Bank Site**

INTRODUCTION

Pacific Habitat Services, Inc. (PHS) conducted a wetland delineation on an 88.2-acre property south of Lebanon, Oregon (Township 12 South, Range 2 West, Section 63, Linn County). The site is under consideration as a potential wetland mitigation bank. This discussion summarizes findings from an October 16, 1997 wetland determination and a February 18, 1998, wetland delineation.

WETLAND CRITERIA DISCUSSION

Hydrology

- The project area has been hydrologically manipulated for many decades, with Oak Creek and tributary branches excavated to enhance drainage across the site. Berms along Oak Creek have restricted the frequency of overbank flooding into the adjacent fields.

- The most prominent hydrologic feature on the site is the large excavated channel of Oak Creek, which flows roughly southeast to northwest across the site. The sidecastings have been used to raise berms on average up to 2 feet above the level of the surrounding fields, resulting in channel sidewalls up to 5 feet high. The channel bottom ranges from 6 to 10 feet wide; flowing water from 6 to 12 inches deep was evident at the time of the field visit.

- Two additional excavated channels (both located near the western property boundary) serve as tributaries to Oak Creek. The tributary that reaches the creek from the north side is as much as 4 feet deep and wide, with steep sidewalls. Its flows are limited to

high rainfall periods; the ditch was dry during the site visit. The tributary flowing from the south to meet Oak Creek was much larger, however, and may be perennial. Its channel was 6 to 8 feet wide by 5 feet deep, with slowly flowing surface water up to 10 inches deep at that time.

- The wetland hydrology criterion was satisfied at the wetland sampling sites by evidence of near-surface soil saturation and/or shallow ponding, and active oxidized rhizospheres.

Soils

- The Natural Resources Conservation Service (NRCS, formerly SCS) has mapped Clackamas variant silt loam (#24), Courtney gravelly silty clay loam (#29), Dayton silt loam (#33), and Holcomb silt loam (#46) within the study area. Both the Courtney and Dayton soils are considered hydric, while the remaining two soils may contain hydric inclusions. In communication with Allen Makinson of the NRCS, the presence of a mapped 'island' of Holcomb silt loam south of Oak Creek was disputed. However, on visiting the site, the same general area appeared to contain a non-hydric soil, perhaps reinforcing the original mapping.

- Soils sampled south of the creek often revealed a clay pan at less than 15 inches below grade, conforming to the Dayton profile. Soils north of the creek were typically more gravelly, and usually without the near-surface clay pan. Nevertheless, the hydric soils criterion was satisfied over much of the site (primarily within flat to shallowly depressional areas subject to seasonal ponding and high water tables) by the presence of low chroma soils (chroma 1 or 2) with redoximorphic features.

Vegetation

- The property is primarily composed of cultivated agricultural fields, typically seeded to annual ryegrass. The site has been in agricultural production since early this century, subject to periodic vegetation clearing as well as hydrologic manipulations to enhance site drainage.

- Mature Oregon ash-dominated bottomland forest borders the southern tributary ditch from Rock Hill Road north to Oak Creek and beyond. The Oak Creek channel is primarily dominated by scrub-shrub thickets until reaching the ash forest near the site's western edge. A small stand of mature Oregon ash is present in the northeast corner of the site. In addition, broken scrub-shrub thickets dominate the eastern and northern fencelines.

- The large agricultural fields are mostly dominated by a non-native grass seed crop, Italian ryegrass (*Lolium multiflorum*). Other species commonly encountered include vernal-grass (*Anthoxanthum odoratum*), meadow and water foxtails (*Alopecurus*

pratensis, A. geniculatus), mannagrass *(Glyceria occidentalis*), witchgrass (*Panicum* sp.), and barnyard grass *(Echinochloa crusgalli*). Common forbs include marsh cudweed (*Gnaphalium palustre*), curvepod yellowcress (*Rorippa curvisiliqua*), and hairy catsear (*Hypochaeris radicata*). Most species found in the fields tend to be weedy (i.e. are tolerant of disturbance or are poor competitors, preferring bare ground).

- The mature Oregon ash (*Fraxinus latifolia*) stands in the west and northeast portions of the site include a few scattered black cottonwood (*Populus trichocarpa*) and Douglas fir (*Pseudotsuga menziesii*). Himalayan blackberry (*Rubus discolor*) and sweetbrier rose (*Rosa eglanteria*) are common along the forest fringes, on the fencelines, and along the Oak Creek channel. Willows (*Salix* spp.) are also common along the Oak Creek channel.

- Table 1 below illustrates the diversity of species encountered during the determination, along with their wetland indicator status.

Table 1. Plant species observed within proposed Lebanon Mitigation Bank Study Area

Scientific Name	Common Name	Reg. 9 Indicator
TREES		
Fraxinus latifolia	Oregon ash	FACW
Populus trichocarpa	black cottonwood	FAC
Salix lasiandra	Pacific willow	FACW+
SHRUBS		
Amelanchier alnifolia	Saskatoon serviceberry	FACU
Cornus stolonifera	red osier dogwood	FACW
Corylus cornuta	beaked hazel-nut	FACU
Crataegus douglasii	Douglas' hawthorn	FAC
Crataegus monogyna	ornamental hawthorn	FACU+
Rhamnus purshiana	cascara buckthorn	FAC-
Rhus diversiloba	poison oak	UPL
Rosa eglanteria	sweetbriar rose	FACW
Rosa pisocarpa	clustered rose	FAC
Rubus discolor	Himalayan blackberry	FACU
Rubus laciniatus	evergreen blackberry	FACU+
Rubus ursinus	California blackberry	FACU
Salix piperi	Piper's willow	FACW
Salix sitchensis	Sitka willow	FAC
Spiraea douglasii	Douglas' spiraea	FACW
Symphoricarpos albus	snowberry	FACU

HERBS		
Agrostis exarata	spike bentgrass	FACW
Agrostis tenuis	colonial bentgrass	FAC
Aira sp.	hairgrass	UPL
Alopecurus geniculatus	water foxtail	OBL
Alopecurus pratensis	meadow foxtail	FACW
Anagallis arvensis	scarlet pimpernel	FAC
Anaphilis margaritacea	pearly everlasting	UPL
Anthoxanthum aristatum		UPL
Anthoxanthum odoratum	sweet vernal grass	FACU
Aster chilensis ssp. hallii	Hall's aster	FAC
Avena fatua	wild oats	UPL
Bellis perennis	English daisy	UPL
Bidens frondosa	devil's beggar tick	FACW+
Brassica campestris	field mustard	UPL
Callitriche stagnalis	water starwort	OBL
Camassia quamash	common camas	FACW
Cardamine oligosperma	few-seed bittercress	FAC
Carex deweyana	short-scale sedge	FACU
Carex obnupta	slough sedge	OBL
Centaurum umbellatum	common centaury	FAC
Cerastium vulgatum	mouse-ear chickweed	FACU
Chrysanthemum leucanthemum	oxeye daisy	UPL
Cirsium arvense	Canada thistle	FACU+
Cirsium vulgare	bull thistle	FACU
Conium maculatum	poison hemlock	FAC+
Convolvulus arvense	field morning-glory	UPL
Cynodon dactylon	bermuda grass	FACU
Cyperus acuminatus	short-point flatsedge	OBL
Dactylis glomerata	orchard grass	FACU
Daucus carota	Queen Anne's lace	UPL
Dianthus armeria		UPL?
Digitalis purpurea	foxglove	FACU
Dipsacus sylvestris	teasel	FAC
Eleocharis acicularis	needle spikerush	OBL
Eleocharis ovata	ovate spikerush	OBL
Epilobium watsonii	Watson's willow-herb	FACW-
Equisetum arvense	field horsetail	FAC
Festuca arundinacea	Kentucky fescue	FAC-
Festuca rubra	red fescue	FAC

Geranium robertianum	herb Robert	UPL
Glyceria occidentalis	northwestern manna grass	OBL
Gnaphalium palustre	western marsh cudweed	FAC+
Holcus lanatus	common velvet grass	FAC
Hordeum brachyantherum	meadow barley	FACW-
Hypericum perforatum	common St. John's wort	UPL
Hypochaeris radicata	hairy cats-ear	UPL
Juncus effusus	soft rush	FACW
Juncus tenuis	slender rush	FACW-
Lactuca serriola	prickly lettuce	FACU
Leersia oryzoides	rice cutgrass	OBL?
Leontodon nudicaulis	hairy hawkbit	UPL
Lolium multiflorum	Italian ryegrass	UPL
Lotus corniculatus	birds-foot trefoil	FAC
Lythrum hyssopifolia	hyssop loosestrife	OBL
Melilotus alba	white sweet-clover	FACU
Mentha citrata	bergamont mint	FACW
Mentha pulegium	pennyroyal	OBL
Oenothera hookeri	Hooker's evening-primrose	UPL
Panicum capillare	witchgrass	FACU+
Parentucellia viscosa	yellow parentucellia	FAC-
Phalaris arundinacea	reed canarygrass	FACW
Plagiobothrys scouleri	Scouler's popcorn flower	FACW
Plantago lanceolata	English plantain	FAC
Plantago major	common plantain	FACU+
Polygonum lapathifolium	willow-weed	FACW
Polygonum persicaria	ladysthumb	FACW
Polystichum munitum	sword fern	FACU
Prunella vulgaris	heal-all	FACU+
Pteridium aquilinum	bracken fern	FACU
Ranunculus repens	creeping buttercup	FACW
Raphanus sativus	wild radish	NI
Rorippa curvisiliqua	curve-pod yellowcress	OBL
Rumex acetosella	sour dock	FACU+
Rumex crispus	curly dock	FAC+
Scirpus microcarpus	small-fruit bulrush	OBL
Scirpus validus	soft-term bulrush	OBL
Solanum dulcamara	climbing nightshade	FAC+
Sonchus asper	prickly sowthistle	FAC-
Spergula arvensis		

Taraxacum officinale	common dandelion	FACU
Tolmiea menziesii	piggy-back plant	FAC
Trifolium dubium	hop clover	UPL
Trifolium pratense	red clover	FACU
Trifolium repens	white clover	FAC
Typha latifolia	broad-leaf cattail	OBL
Urtica dioica	stinging nettle	FAC+
Veronica americana	American speedwell	OBL
Vicia sativa	common vetch	UPL

WETLAND DISCUSSION AND CONCLUSIONS

National Wetlands Inventory

The U.S. Fish and Wildlife Service, as part of the National Wetlands Inventory (NWI) program, has mapped Oak Creek as riverine, intermittent, streambed, seasonally flooded, excavated (R4SBCx). A tributary flowing north into Oak Creek has been mapped as a combination of R4SBCx, PSSA (palustrine scrub-shrub temporarily flooded), and PFOA (palustrine, forested, temporarily flooded). The results of the PHS delineation confirm the presence of these wetland types, although the forested and scrub shrubs areas have been dewatered due to excavation of the Oak Creek tributary. The NWI maps are generated primarily based on interpretation of color infrared aerial photographs (scale of 1:58,000), with limited "ground truthing" to confirm the interpretations.

Wetland Delineation Conclusions

Based on our investigation and on two site visits with Alan Makinson of the NRCS, PHS concludes that 50.20 acres of the site is prior converted cropland, 7.4 acres is wetland, and the remaining 30.60 acres is upland. The site has been under agricultural production for many years, has not been abandoned for more than 5 years, and the manipulation of the site hydrology (excavation of Oak Creek, drainage ditches, and a tributary) has occurred prior to December 23, 1985.

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	1

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	0.5	**Inches**	**Drift lines:**	
Depth to free water:	0	**Inches**	**Drainage patterns:**	
Depth to saturation:	0	**Inches**	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Dayton silt loam **On Hydric Soils list?:** Yes
Classification: Typic Albaqualf **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations		Other Hydric Soil Field Indicators	Comments
				Color	abundance/size/contrast		
0-6		10YR 3/2	SCL	10YR 3/6	common, fine, distinct		
6-8		10YR 3/1	SCL				
8-15		10YR 3/1	C	10YR 3/6	few, fine, faint		

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
*Alopecurus geniculatus**	OBL	25
*Glyceria occidentalis**	OBL	70
Lolium multiflorum	UPL	5

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100% **Criteria Met:** Yes

Comments: Open ag. field
Strong soils, hydro, veg indicators

Determination: Wetland

Wetland Det mination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank		**Number:**	7-1512
County:	Linn	**Township:** 12S	**Range:** 2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):** FS		**Sample Site:**	2

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		Inches	**Drift lines:**	
Depth to free water:	1	Inches	**Drainage patterns:**	
Depth to saturation:	0	Inches	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Bashaw silty clay **On Hydric Soils list?:** Yes
Classification: Typic Pelloxererts **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comm-ents
0-7		10YR 3/2	SL				
7-14		10YR 3/1	SCL	7.5YR 3/3	common, medium, distinct		small % gravel

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (50%)	Status	% Cover
*Fraxinus latifolia**	FACW	100

Shrub Stratum (10%)	Status	% Cover
*Fraxinus latifolia**	FACW	40
*Rosa eglanteria**	FACW	30
*Rosa pisocarpa**	FAC	30

Herbaceous Stratum (35%)	Status	% Cover
Agrostis stolonifera	FACW	10
*Carex obnupta**	OBL	20
Dipsacus sylvestris	FAC	3
Epilobium watsonii	FACW-	5
*Phalaris arundinacea**	FACW	30
*Ranunculus repens**	FACW	30
Rumex sp.	FAC	2

Woody Vine Stratum (5%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 88% **Criteria Met:** Yes

Comments: Intact OR ash overstory

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	3

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	1	**Inches**	**Drift lines:**	
Depth to free water:	0	**Inches**	**Drainage patterns:**	
Depth to saturation:	0	**Inches**	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Dayton silt loam **On Hydric Soils list?:** Yes
Classification: Typic Albaqualf **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-3		10YR 3/2	SCL				
3-4		10YR 3/1	SCL				
4-7		10YR 3/2	SCL	10YR 3/4	few, fine, faint		
7-14		10YR 3/1	SCL	10YR 4/4	few, medium, distinct		

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

High organic content in upper layers **Criteria Met:** Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover	Herbaceous Stratum (100%)	Status	% Cover
			*Glyceria occidentalis**	OBL	80
			Lolium multiflorum	UPL	10
			Senecio vulgare	FACU	tr
			Alopecurus geniculatus	OBL	10
Shrub Stratum (0%)	**Status**	**% Cover**			
			Woody Vine Stratum (0%)	**Status**	**% Cover**

Percent of dominant species FAC, FACW, or OBL *: 100% **Criteria Met:** Yes

Comments: Open ag. field, near shallow ditch

Determination: Wetland

Wetland De. mination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank		**Number:**	7-1512
County:	Linn	**Township:** 12S	**Range:** 2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):** FS		**Sample Site:**	4

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		**Inches**	**Drift lines:**	
Depth to free water:	>18	**Inches**	**Drainage patterns:**	
Depth to saturation:	>18	**Inches**	**Oxidized rhizospheres:**	
Other:			**Sediment deposits:**	

some seepage into pit from rainfall

Criteria Met: No

SOILS

Mapped Series: Holcomb silt loam **On Hydric Soils list?:** No

Classification: Mollic albaqualf **Drainage Class:** somewhat poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations		Other Hydric Soil Field Indicators	Comm-ents
				Color	abundance/size/contrast		
0-14		10YR 2/2	SL				gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (85%)	Status	% Cover
Anthoxanthum odoratum	FACU	10
Chrysanthemum leucanthemum	UPL	5
Hypochaeris radicata	FACU	5
*Lolium multiflorum**	UPL	20
*Spergula arvensis**	UPL	20
*Trifolium repens**	FAC	40

Woody Vine Stratum (15%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 25% **Criteria Met:** No

Comments: Open ag. field, slightly elevated position

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 12, 1998	**Investigator(s):**	FS			**Sample Site:**	5

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**
Depth of inundation:		**Inches**	**Drift lines:**
Depth to free water:	7	**Inches**	**Drainage patterns:**
Depth to saturation:		**Inches**	**Oxidized rhizospheres:**
Other:			**Sediment deposits:**

Criteria Met: Yes

SOILS

Mapped Series: Holcomb silt loam **On Hydric Soils list?:** No
Classification: Mollic albaqualf **Drainage Class:** somewhat poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-6		10YR 4/1	SL				
6-8			O				
8-14		10YR 3/2	L				

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

From 6-8": plowed under vegetation layer **Criteria Met:** No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (90%)	Status	% Cover
Hypericum perforatum	UPL	10
*Lolium multiflorum**	UPL	65
*Spergula arvensis**	UPL	20

Woody Vine Stratum (10%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 0% **Criteria Met:** No

Comments: Open ag. field, slightly elevated position

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank		**Number:**	7-1512
County:	Linn	**Township:** 12S	**Range:** 2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):** FS		**Sample Site:**	6

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		Inches	**Drift lines:**	
Depth to free water:	0	Inches	**Drainage patterns:**	Yes
Depth to saturation:	0	Inches	**Oxidized rhizospheres:**	Yes
Other:	broad concave area		**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Dayton silt loam
Classification: Typic Albaqualf
On Hydric Soils list?: Yes
Drainage Class: poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-7		10YR 3/2	SL	10YR 3/6	few, fine, faint		
7-9		10YR 4/1	SCL				
9-14		10YR 3/1	SCL	10YR 3/4	few, medium, distinct		

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Epilobium watsonii	FACW-	tr
*Glyceria occidentalis**	OBL	90
Hypochaeris radicata	FACU	tr
Lolium multiflorum	UPL	10

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100%

Criteria Met: Yes

Comments: Open ag. field, adjacent to shallow drainageway

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank		**Number:**	7-1512
County:	Linn	**Township:** 12S	**Range:** 2W	**Section:**	63
Date:	February 12, 1998	**Investigator(s):** FS/DG		**Sample Site:**	7

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	1	**Inches**	**Drift lines:**	
Depth to free water:	0	**Inches**	**Drainage patterns:**	
Depth to saturation:	0	**Inches**	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Dayton silt loam **On Hydric Soils list?:** Yes
Classification: Typic Albaqualf **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-6		10YR 5/2	SL				plow
6-7	organic						disturbed
7-10		10YR 4/1	SCL	7.5YR 4/2	common, medium, distinct	+5G5 gley	
10-14		10YR 5/2	C				

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
*Alopecurus geniculatus**	OBL	25
Epilobium watsonii	FACW-	tr
*Glyceria occidentalis**	OBL	50
Gnaphalium palustre	FAC+	10
Lolium multiflorum	UPL	10
Rorippa curvisiliqua	OBL	5

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100% **Criteria Met:** Yes

Comments: Open ag. field, shallow ponding

Determination: Wetland

Wetland De[illegible]mination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 12, 1998	**Investigator(s):**	FS/DG			**Sample Site:**	8

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		**Inches**	**Drift lines:**	
Depth to free water:	10	**Inches**	**Drainage patterns:**	
Depth to saturation:	6	**Inches**	**Oxidized rhizospheres:**	
Other:	high WT may reflect recent heavy rains		**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Holcomb silt loam **On Hydric Soils list?:** No
Classification: Mollic albaqualf **Drainage Class:** somewhat poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations: Color	Redox Concentrations: abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-6		10YR 4/2	SL				
6-14		10YR 3/2	SL				gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (95%)	Status	% Cover
*Glyceria occidentalis**	OBL	20
Hypericum perforatum	UPL	10
Leontodon nudicaulis	UPL	5
*Lolium multiflorum**	UPL	30
Rumex acetosella	FACU+	10
Senecio vulgaris	FACU	5
Solidago canadensis	FACU	tr
*Trifolium repens**	FAC	20

Woody Vine Stratum (5%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 50%

Criteria Met: No

Comments: Open ag. field
30-40% unvegetated ground (matted dead vegetation from herbicide use?)

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	9

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		Inches	**Drift lines:**	
Depth to free water:	>14	Inches	**Drainage patterns:**	
Depth to saturation:	>14	Inches	**Oxidized rhizospheres:**	
Other:			**Sediment deposits:**	

Criteria Met: No

SOILS

Mapped Series: Holcomb silt loam **On Hydric Soils list?:** No

Classification: Mollic albaqualf **Drainage Class:** somewhat poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations		Other Hydric Soil Field Indicators	Comm-ents
				Color	abundance/size/contrast		
0-14		10YR 2/2	SL				gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (95%)	Status	% Cover
Anthoxanthum odoratum	FACU	5
Festuca arundinacea	FAC-	10
Hypochaeris radicata	FACU	5
*Lolium multiflorum**	UPL	20
Senecio vulgaris	FACU	1
*Spergula arvensis**	UPL	20
Trifolium pratense	FACU	15
*Trifolium repens**	FAC	20

Woody Vine Stratum (15%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 33% **Criteria Met:** No

Comments: Open ag. field, slightly elevated position.

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

PHS

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	10

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	0.5	**Inches**	**Drift lines:**	
Depth to free water:	0	**Inches**	**Drainage patterns:**	
Depth to saturation:	0	**Inches**	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Holcomb silt loam **On Hydric Soils list?:** No

Classification: Mollic albaqualf **Drainage Class:** somewhat poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-9		10YR 3/2	SL				plowed
9-14		10YR 3/1	CL	10YR 3/4	common, medium, distinct		gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Alopecurus geniculatus	OBL	5
Epilobium watsonii	FACW-	2
*Glyceria occidentalis**	OBL	80
Lolium multiflorum	UPL	5
Rorippa curvisiliqua	OBL	2
Trifolium repens	FAC	5

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100%

Criteria Met: Yes

Comments: Open ag. field, low ground near Oak Creek

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	11

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	0.5	Inches	**Drift lines:**	
Depth to free water:		Inches	**Drainage patterns:**	
Depth to saturation:	0	Inches	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Courtney silty clay loam — **On Hydric Soils list?:** Yes
Classification: Abruptic Argiaquoll — **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-9		10YR 3/1	SCL	7.5YR 3/3	fine, common, distinct		
9-14		10YR 3/1	C	7.5YR 4/6	many, medium, prominent		gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Dipsacus sylvestris	FAC	3
Epilobium watsonii	FACW-	5
*Glyceria occidentalis**	OBL	80
Lolium multiflorum	UPL	10

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100%

Criteria Met: Yes

Comments: Open ag. field, low ground associated with old drainageway N. of Oak Cr. channel

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank		**Number:**	7-1512
County:	Linn	**Township:** 12S	**Range:** 2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):** FS		**Sample Site:**	12

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	1	Inches	**Drift lines:**	
Depth to free water:	0	Inches	**Drainage patterns:**	
Depth to saturation:	0	Inches	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Courtney silty clay loam
Classification: Abruptic Argiaquoll
On Hydric Soils list?: Yes
Drainage Class: poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-10		10YR 2/1	SL				
10-14		10YR 3/1	SL	5YR 4/4	common, medium, prominent		

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Epilobium watsonii	FACW-	5
*Glyceria occidentalis**	OBL	75
Lolium multiflorum	UPL	10
Rorippa curvisiliqua	OBL	5

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100%

Criteria Met: Yes

Comments: Open ag. field, in broad swale (old drainageway or part of Oak Creek floodplain)

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	13

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**
Depth of inundation:		**Inches**	**Drift lines:**
Depth to free water:	>14	**Inches**	**Drainage patterns:**
Depth to saturation:	>14	**Inches**	**Oxidized rhizospheres:**
Other:			**Sediment deposits:**

Criteria Met: No

SOILS

Mapped Series: Clackamas Variant silt loam **On Hydric Soils list?:** No
Classification: Aquultic Haploxeroll **Drainage Class:** moderately well drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations		Other Hydric Soil Field Indicators	Comments
				Color	abundance/size/contrast		
0-8		10YR 3/3	L				gravelly
8-14		10YR 4/2	L				gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Holcus lanatus	FAC	5
*Lolium multiflorum**	UPL	20
Panicum sp.	FAC	tr
*Raphanus sativus**	NI	20
*Rumex acetosella**	FACU+	20
*Spergula arvensis**	UPL	30
Trifolium repens	FAC	2

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 0% **Criteria Met:** No

Comments: Open ag. field, elevated ground

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank		**Number:**	7-1512
County:	Linn	**Township:** 12S	**Range:** 2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):** FS		**Sample Site:**	14

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		Inches	**Drift lines:**	
Depth to free water:	0	Inches	**Drainage patterns:**	
Depth to saturation:	0	Inches	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Clackamas Variant silt loam **On Hydric Soils list?:** No
Classification: Aquultic Haploxeroll **Drainage Class:** moderately well drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations: Color	Redox Concentrations: abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-6		10YR 3/1	SL				gravelly
6-12		10YR 3/1	CL	10YR 3/3	common, coarse, faint		gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (60%)	Status	% Cover
*Fraxinus latifolia**	FACW	100

Shrub Stratum (10%)	Status	% Cover
*Fraxinus latifolia**	FACW	100

Herbaceous Stratum (25%)	Status	% Cover
*Camassia quamash**	FACW	30
UI grass seedlings	NI	60

Woody Vine Stratum (5%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 75% **Criteria Met:** Yes

Commen Intact OR ash overstory in NE corner of site, most of herb layer still unidentifiable seedling stage

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	15

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	1	**Inches**	**Drift lines:**	
Depth to free water:	0	**Inches**	**Drainage patterns:**	
Depth to saturation:	0	**Inches**	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

Criteria Met: Yes

SOILS

Mapped Series: Clackamas Variant silt loam **On Hydric Soils list?:** No
Classification: Aquultic Haploxeroll **Drainage Class:** moderately well drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-10		10YR 3/1	SL	10YR 3/6	common, medium, distinct		
10-14		10YR 4/2	SCL	10YR 4/6	common, medium, faint		

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Upper 10 inches plow disturbed **Criteria Met:** Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (20%)	Status	% Cover
*Fraxinus latifolia**	FACW	100

Herbaceous Stratum (80%)	Status	% Cover
*Glyceria occidentalis**	OBL	80
*Lolium multiflorum**	UPL	20

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 67% **Criteria Met:** Yes

Comments: Open ag. field, slightly depressional
OR ash seedlings & young saplings present

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	16

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	0.5	**Inches**	**Drift lines:**	
Depth to free water:	0	**Inches**	**Drainage patterns:**	
Depth to saturation:	0	**Inches**	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

few OR's at 3-5 inches

Criteria Met: Yes

SOILS

Mapped Series: Clackamas Variant silt loam **On Hydric Soils list?:** No

Classification: Aquultic Haploxeroll **Drainage Class:** moderately well drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations Color	Redox Concentrations abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-7		10YR 3/2	SL				
7-10		10YR 2/2	SL				
10-14		10YR 4/3	CL				

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (95%)	Status	% Cover
*Glyceria occidentalis**	OBL	20
Lolium multiflorum	UPL	10
*Panicum capillare**	FACU+	30
Raphanus sativus	NI	tr
*Rumex acetosella**	FACU+	20
Spergula arvensis	UPL	10
Trifolium repens	FAC	5

Woody Vine Stratum (5%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 25%

Criteria Met: No

Comments: Open ag. field, slightly depressional w/shallow inundation, but with insufficient hydric soils or veg. indicators

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	17

HYDROLOGY

Inundated (Yes/No):	Yes		**Water marks:**	
Depth of inundation:	1	Inches	**Drift lines:**	
Depth to free water:	0	Inches	**Drainage patterns:**	Yes
Depth to saturation:	0	Inches	**Oxidized rhizospheres:**	Yes
Other:			**Sediment deposits:**	

occasional OR's in band at 3 inches — **Criteria Met:** Yes

SOILS

Mapped Series: Courtney silty clay loam — **On Hydric Soils list?:** Yes
Classification: Abruptic Argiaquoll — **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations: Color	Redox Concentrations: abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-8		10YR 3/1	SL	10YR 3/4	few, fine, faint		gravelly
8-14		10YR 3/1	CL	10YR 4/4	many, fine, distinct		gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

clear boundary at 8 inches — **Criteria Met:** Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Epilobium watsonii	FACW-	2
*Glyceria occidentalis**	OBL	60
Hypochaeris radicata	FACU	tr
Lolium multiflorum	UPL	10
Lythrum hyssopifolia	OBL	5
Oenanthe sarmentosa	OBL	tr
Panicum capillare	FACU	2
Rorippa curvisiliqua	OBL	tr
Rumex sp.	FAC	tr
*Montia fontana**	OBL	20

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 100% — **Criteria Met:** Yes

Comments: Open ag. field, in broad swale paralleling Oak Cr.

Determination: Wetland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	18

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**
Depth of inundation:		Inches	**Drift lines:**
Depth to free water:	>14	Inches	**Drainage patterns:**
Depth to saturation:	>14	Inches	**Oxidized rhizospheres:**
Other:			**Sediment deposits:**

Criteria Met: No

SOILS

Mapped Series: Clackamas Variant silt loam **On Hydric Soils list?:** No
Classification: Aquultic Haploxeroll **Drainage Class:** moderately well drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations: Color	Redox Concentrations: abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-9		10YR 2/2	SL				gravelly
9-14		10YR 2/2	CL				larger gravel

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
*Dactylis glomerata**	FACU	20
*Festuca arundinacea**	FAC-	20
Hypochaeris radicata	FACU	2
*Lolium multiflorum**	UPL	25
Raphanus sativus	NI	5
Rumex acetosella	FACU+	5
Spergula arvensis	UPL	10
Trifolium repens	FAC	10

Woody Vine Stratum (10%)	Status	% Cover
*Rubus discolor**	FACU	100

Percent of dominant species FAC, FACW, or OBL *: 0% **Criteria Met:** No

Comments: Open ag. field, gentle slope between upper (north) terrace and historic Oak Cr. floodplain

Determination: Upland

Wetland Determination Data Form
Routine Onsite Method

Pacific Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	19

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**
Depth of inundation:		**Inches**	**Drift lines:**
Depth to free water:	>14	**Inches**	**Drainage patterns:**
Depth to saturation:	>14	**Inches**	**Oxidized rhizospheres:**
Other:			**Sediment deposits:**

Criteria Met: No

SOILS

Mapped Series: Clackamas Variant silt loam **On Hydric Soils list?:** No
Classification: Aquultic Haploxeroll **Drainage Class:** moderately well drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations		Other Hydric Soil Field Indicators	Comments
				Color	abundance/size/contrast		
0-14		10YR 3/2	SL				gravelly

*SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: No

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
*Agrostis tenuis**	FAC	20
Holcus lanatus	FAC	15
Hypochaeris radicata	FACU	5
*Lolium multiflorum**	UPL	20
*Rumex acetosella**	FACU+	40

Woody Vine Stratum	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 33% **Criteria Met:** No

Comments: Open ag. field, NW corner. E-W ditch along N property edge, with ponding apparent on adjacent property to N.

Determination: Upland

Wetland Determination Data Form
Routin Onsite Method

P. ic Habitat Services, Inc.

Applicant:	R. Novitzki	**Project:** Lebanon Mitigation Bank				**Number:**	7-1512
County:	Linn	**Township:**	12S	**Range:**	2W	**Section:**	63
Date:	February 18, 1998	**Investigator(s):**	FS			**Sample Site:**	20

HYDROLOGY

Inundated (Yes/No):	No		**Water marks:**	
Depth of inundation:		Inches	**Drift lines:**	
Depth to free water:	10	Inches	**Drainage patterns:**	
Depth to saturation:	8	Inches	**Oxidized rhizospheres:**	Yes
Other:	OR's upper 6 inches		**Sediment deposits:**	
	seepage into pit from recent rains		**Criteria Met:**	Yes

SOILS

Mapped Series: Courtney silty clay loam — **On Hydric Soils list?:** Yes
Classification: Abruptic Argiaquoll — **Drainage Class:** poorly drained

Depth (Inches)	Master Horizon	Matrix Color	Soil Texture*	Redox Concentrations: Color	Redox Concentrations: abundance/size/contrast	Other Hydric Soil Field Indicators	Comments
0-6		10YR 3/2	SL				
6-10		10YR 4/1	SCL				pebbles
10-14		10YR 4/2	C	10YR 4/6	many, medium, distinct		

SD=Sand, SDL=Sandy Loam, L=Loam, SDCL=Sandy Clay Loam, S=Silt, SL=Silt Loam, SCL=Silty Clay Loam, CL=Clay Loam, C=Clay

Criteria Met: Yes

VEGETATION

Tree Stratum (0%)	Status	% Cover

Shrub Stratum (0%)	Status	% Cover

Herbaceous Stratum (100%)	Status	% Cover
Chrysanthemum leucanthemum	UPL	5
Daucus carota	UPL	5
Dipsacus sylvestris	FAC	5
*Festuca rubra**	FAC+	20
Geranium molle	UPL	2
*Lolium multiflorum**	UPL	30
*Trifolium repens**	FAC	20

Woody Vine Stratum (0%)	Status	% Cover

Percent of dominant species FAC, FACW, or OBL *: 67% — **Criteria Met:** Yes

Comments: Open ag. field, in floodplain N of Oak Cr. berm
Very marginal wetland indicators

Determination: Wetland

Appendix C
OFWAM Assessment Results

Oregon Freshwater Wetland Assessment Methodology

(Revised Edition, April 1996)

Wetland Assessment Summary Sheet

Pacific Habitat Services, Inc.

Project Name:	Oak Creek Mitigation Bank	Wetland:	-
Project Location:	Linn County	Wetland Type(s):	PEM/R4

Date:	3/17/98	Approx. Area (acres):	57.00
Onsite Assessment?:	Yes	Investigator(s):	RPN
Wetland Location:	on Rock Hill Rd., E. of Main St., southern UGB of Lebanon		

Function and Condition Assessment Answers:

Wildlife Habitat		Fish Habitat		Water Quality		Hydrologic Control		Sensitivity to Impact	
Q	A	Q	A	Q	A	Q	A	Q	A
Q-1	C	Q-1	A	Q-1	B	Q-1	A	Q-1	A
Q-2	C	Q-2	C	Q-2	B	Q-2	B	Q-2	B
Q-3	C	Q-3	C	Q-3	C	Q-3	A	Q-3	A
Q-4	C	Q-4	C	Q-4	A	Q-4	C	Q-4	B
Q-5	A	Q-5	B	Q-5	B	Q-5	C	Q-5	B
Q-6	A	Q-6	B	Q-6	A	Q-6	B	Q-6	C
Q-7	C					Q-7	B		
Q-8	B								
Q-9A									
Q-9B	C								

Results:

Wildlife Habitat	Wetland provides habitat for some wildlife species
Fish Habitat	Wetland's fish habitat function is impacted or degraded
Water Quality	Wetland's water-quality function is impacted or degraded
Hydrologic Control	Wetland's hydrologic control is impacted or degraded
Sensitivity to Impact	Wetland is potentially sensitive to future impacts

Function and Condition Assessment Answers:

Enhancement Potential		Education		Recreation		Aesthetic Quality	
Q	A	Q	A	Q	A	Q	A
Q-1	A	Q-1	C	Q-1	C	Q-1	C
Q-2	C	Q-2	A	Q-2	C	Q-2	C
Q-3	A	Q-3	B	Q-3	C	Q-3	C
Q-4	A	Q-4	B	Q-4	B	Q-4	C
Q-5B	C	Q-5	C	Q-5	B	Q-5	A
Q-6	B	Q-6	B	Q-6	B	Q-6	B

Results:

Enhancement Potential	Wetland has moderate potential for enhancement
Education	Wetland site is not appropriate for educational use
Recreation	Wetland is not appropriate or does not provide rec. opportunities
Aesthetic Quality	Wetland is not aesthetically pleasing

Oregon Freshwater Wetland Assessment Methodology

Functions and Conditions Summary Sheet

Project:	Oak Creek Mitigation Bank	**Wetland:**	-
Location:	Linn County	**Approx. Area (acres):**	57.00
Date:	3/17/98	**Wetland Type(s):**	PEM/R4

Result:	**Wetland provides habitat for some wildlife species**	
Rationale:	One Class with less than 5 species	Adjacent Water Quality limited stream
	Herbaceous vegetation, no ponding	Adjacent land use is primarily agriculture
	Less than 0.5 acres of open water	Wetland buffer is less than 10%
Result:	**Wetland's fish habitat function is impacted or degraded**	
Rationale:	50% or more of stream is shaded	Adjacent Water Quality Limited stream
	Stream banks are extensively modified	Adjacent land use is primarily agriculture
	<10% of stream has instream structures	Warmwater fish present in stream
Result:	**Wetland's water-quality function is impacted or degraded**	
Rationale:	Primary water source is precipitation	Wetland is more than 5 acres in size
	Can't determine if wetland floods or ponds	Adjacent land use is primarily agriculture
	Low vegetation cover	Adjacent Water Quality Limited stream
Result:	**Wetland's hydrologic control is impacted or degraded**	
Rationale:	Wetland is within 100 year floodplain	Herbaceous vegetation, no ponding
	Can't determine if wetland floods or ponds	Agriculture downslope of wetland
	Water has unrestricted flow out of wetland	Agriculture upslope of wetland
Result:	**Wetland is potentially sensitive to future impacts**	
Rationale:	Stream modified <1 mile upstream	Adjacent land use is primarily agriculture
	Water is not being taken out upstream	Adjacent zoning is primarily agriculture
	Adjacent Water Quality Limited stream	Herbaceous vegetation, no ponding
Result:	**Wetland has moderate potential for enhancement**	
Rationale:	Wetland functions are impacted or degraded	Wetland is greater than 5 acres
	Primary water source is precipitation	Wetland buffer is less than 10%
	Flow into wetland is not restricted	Potentially sensitive to future impacts
Result:	**Wetland site is not appropriate for educational use**	
Rationale:	No access allowed to wetland	No access point to wetland exists
	No visible hazards to public	Wetland is not limited mobility accessible
	Other habitats can be observed not accessed	
Result:	**Wetland is not appropriate or does not provide rec. opportunities**	
Rationale:	No access point to wetland exists	Wetland provides habitat for some wildlife
	No boat launching can be developed	No fishing is allowed
	No trails or viewing areas exist	No hunting is allowed
Result:	**Wetland is not aesthetically pleasing**	
Rationale:	One Cowardin class is visible	Wetland surrounded by development
	Less than 25% of wetland can be seen	Natural odors present at wetland
	Visual detractors present, can't be removed	Continuous traffic and natural noises occur

Appendix D
WET Assessment

BACKGROUND INFORMATION

Location:	**Section**	26
	Township	12S
	Range	2W
	State	Oregon

Evaluator: Richard P. Novitzki

Trained in WET 2.0? Yes.

Agencies/Experts Contacted

US Army Corps of Engineers
OR Division of State Lands
Linn County
City of Lebanon
City of Albany

Wetland is Non-tidal.

Only average annual conditions will be used.

Were alternative ratings used to evaluate the functions and values? No.

IDENTIFICATION AND DELINEATION OF EVALUATION AREAS

Estimation of acreages:

Assessment area		88.230 **acres**
Watershed of assessment area	15 **sq. mi. or**	9375.000 **acres**
Wetlands in assessment area		7.000 **acres**
Wetlands in watershed of closest service area		0.000 **acres**
Wetlands and deepwater in the watershed of closest service area		0.000 **acres**

EVALUATION SUMMARY

Site: Oak Creek Mitigation Bank Site
IA: Assessment Area

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Function	Social Significance	Effectiveness	Opportunity
Ground Water Recharge	Low	Low	-
Ground Water Discharge	Low	Low	-
Floodflow Alteration	Low	Moderate	High
Sediment Stabilization	Low	High	-
Sediment/Toxicant Retention	Low	High	High
Nutrient Removal/Transformation	Low	High	Low
Production Export	-	Low	-
Wildlife Diversity/Abundance	Low	-	-
Breeding	-	Low	-
Migration	-	Low	-
Wintering	-	Moderate	-
Aquatic Diversity/Abundance	Low	Low	-
Uniqueness/Heritage	Low	-	-
Recreation	Low	-	-

Harvested Waterfowl Groups	Value
Inland Geese - Migrating	Low
Prairie Dabblers - Migrating	Low

Wetland-Dependent Bird Species	Value
Snipe, Common - All Year	Low

(Note: An (*) represents an alternative value)

Social Significance Answer Set Level 1

Site: Oak Creek Mitigation Bank Site

IA: Assessment Area

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Question	Answer	Comment
1	No	
2	No	
3	No	
4	No	
5	No	
6	No	
7	No	
8	No	
9	No	
10	No	
11	No	
12	No	
13	No	
14	No	
15	No	
16	No	
17	No	
18	Inappropriate	
19	No	
20	No	
21	No	
22	Inappropriate	
23	No	
24	No	
25	No	
26	No	
27	No	
28	No	
29	No	
30	No	
31	No	

Social Significance Answer Set Level 2

Site: Oak Creek Mitigation Bank Site

IA: Assessment Area

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Question	Answer	Comment
1	No	
2	No	
3	No	
4	No	

Effectiveness and Opportunity Answer Set All Levels

Site: Oak Creek Mitigation Bank Site

IA: Assessment Area

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Question	Average	Wet	Dry	Comment
1.1	No			
1.2	No			
1.3	No			
2.1.1	No			
2.1.2	No			
2.1.3	No			
2.2.1	No			
2.2.2	No			
3.1	Yes			
3.2	No			
3.3	No			
4.1	No			
4.2A	No			
4.2B	Yes			
4.2C	No			
4.2D	No			
5.1.1		Yes		
5.1.2		No		
5.2		Yes		
6.1	No			
6.2	No			
7	No			
8.1	No			
8.2	No			
8.3	No			
8.4	No			
9.1		Yes		
9.2		No		
9.3		No		
10A	No			
10B	Yes			
10C	No			
10D	No			
10E	No			
10F	No			
11	No	No	No	
12A	No	No	No	
12Aa	No	No	No	
12Ab	No	No	No	
12Ac	No	No	No	
12Ad	No	No	No	

Question	Average	Wet	Dry	Comment
12Ae	No	No	No	
12B	No	No	No	
12Ba	No	No	No	
12Bb	No	No	No	
12Bc	No	No	No	
12Bd	No	No	No	
12Be	No	No	No	
12C	No	No	No	
12Ca	No	No	No	
12Cb	No	No	No	
12Cc	No	No	No	
12Cd	No	No	No	
12D	No	No	No	
12Da	Yes	No	No	
12Db	No	No	No	
12E	No	No	No	
13A	No	No	No	
13Aa	No	No	No	
13Ab	No	No	No	
13Ac	No	No	No	
13Ad	No	No	No	
13Ae	Yes	No	No	
13B	No	No	No	
13Ba	No	No	No	
13Bb	No	No	No	
13Bc	No	No	No	
13Bd	No	No	No	
13Be	No	No	No	
13C	No	No	No	
13Ca	No	No	No	
13Cb	No	No	No	
13Cc	No	No	No	
13Cd	No	No	No	
13D	No	No	No	
13Da	Yes	No	No	
13Db	No	No	No	
13E	No	No	No	
14.1	No	No	No	
14.2	No	No	No	
15.1A	Yes			
15.1B	No			

Question	Average	Wet	Dry	Comment
15.1C	No			
15.2	No			
16A	Yes	No	No	
16B	No	No	No	
16C	No	No	No	
17	No			
18	Yes			
19.1A	Yes			
19.1B	No			
19.2	No			
19.3	Yes			
20.1	No			
20.2	No			
21A	No			
21B	No			
21C	No			
21D	Yes			
21E	No			
22.1.1	Yes			
22.1.2	No			
22.2	No			
22.3	No			
23	Yes			
24.1	No			
24.2	No			
24.3	No			
24.4	Yes			
24.5	No			
25.1	No			
25.2A	Inappropriate			
25.2B	Yes			
25.3	No			
26.1	No			
26.2	No			
26.3	No			
27.1	No			
27.2	Inappropriate			
27.3	Inappropriate			
28	Yes			
29.1	Yes			
29.2				

Question	Average	Wet	Dry	Comment
30	No	No	No	
31.1	Yes	Yes	Yes	
31.2	No	Yes	No	
31.3	No	No	No	
31.4	Inappropriate	Inappropriate	Inappropriate	
31.5	Yes	Yes	Yes	
31.6A	No	No	No	
31.6B	No	No	No	
31.6C	No	No	No	
31.6D	Yes	Yes	Yes	
31.6E	No	No	No	
32A	No			
32B	No			
32C	No			
32D	No			
32E	Yes			
32F	No			
32G	No			
32H	No			
32I	No			
32J	No			
32K	No			
33A	No			
33B	No			
33C	No			
33D	Yes			
33E	No			
33F	No			
33G	No			
33H	No			
33I	No			
33J	No			
33K	No			
34.1	No			
34.2	No			
34.3.1	No			
34.3.2	Inappropriate			
35.1	No			
35.2	Yes			
36.1.1	No	No	No	
36.1.2	No	No	No	

Question	Average	Wet	Dry	Comment
36.2.1	Yes	No	No	
36.2.2	No	No	No	
36.2.3	No	No	No	
37				
38.1	No			
38.2	Yes			
38.3	No			
38.4	No			
38.5	No			
38.6	Yes			
38.7	No			
38.8	Inappropriate			
39	No			
40.1	No			
40.2	Inappropriate			
41.1		Yes		
41.2		No		
42.1.1	Yes	No	No	
42.1.2	No	No	No	
42.1.3	No	No	No	
42.2.1	Yes	Yes	No	
42.2.2	No	No	No	
42.2.3	No	No	No	
43A	Yes	No	No	
43B	No	No	No	
43C	No	No	No	
43D	No	No	No	
43E	No	No	No	
43F	No	No	No	
43G	No	No	No	
43H	No	No	No	
43I	No	No	No	
44A	Yes	No	No	
44B	No	No	No	
44C	No	No	No	
44D	No	No	No	
44E	No	No	No	
44F	No	No	No	
44G	No	No	No	
44H	No	No	No	
44I	No	No	No	

Question	Average	Wet	Dry	Comment
45A	Yes			
45B	No			
45C	No			
45D	No			
45E	No			
45F	No			
45G	No			
46A	Yes	Yes	No	
46B	No	No	No	
46C	No	No	No	
47A	Yes			
47B	No			
47C	No			
48A	Yes	No	No	
48B	No	No	No	
48C	No	No	No	
48D	No	No	No	
48E	No	No	No	
48F	No	No	No	
49.1.1	No	No	No	
49.1.2	No	No	No	
49.2	No	No	No	
49.3	No	No	No	
50	No	No	No	
51.1	No			
51.2	No			
52.1	No			
52.2	No			
53.1	Inappropriate			
53.2	Inappropriate			
54	No	No	No	
55.1	No			
55.2	No			
55.3	No			
55.4	No			
56.1	Inappropriate			
56.2	Inappropriate			
57.1	No			
57.2	No			
58				
59.1	No			

Question	Average	Wet	Dry	Comment
59.2	No			
60	No			
61	Inappropriate			
62	Yes			
63.1	No			
63.2	No			
64		No		

Species, Species Groups, Recreational Activities, and Consumptive Activities observed at the AA/IA.

Harvested Waterfowl Groups	**Observed**
Inland Geese - Migrating	No
Prairie Dabblers - Migrating	No

Wetland-Dependent Bird Species	**Observed**
Snipe, Common - All Year	No

Consumptive Activities

Agriculture

Habitat Suitability Analysis

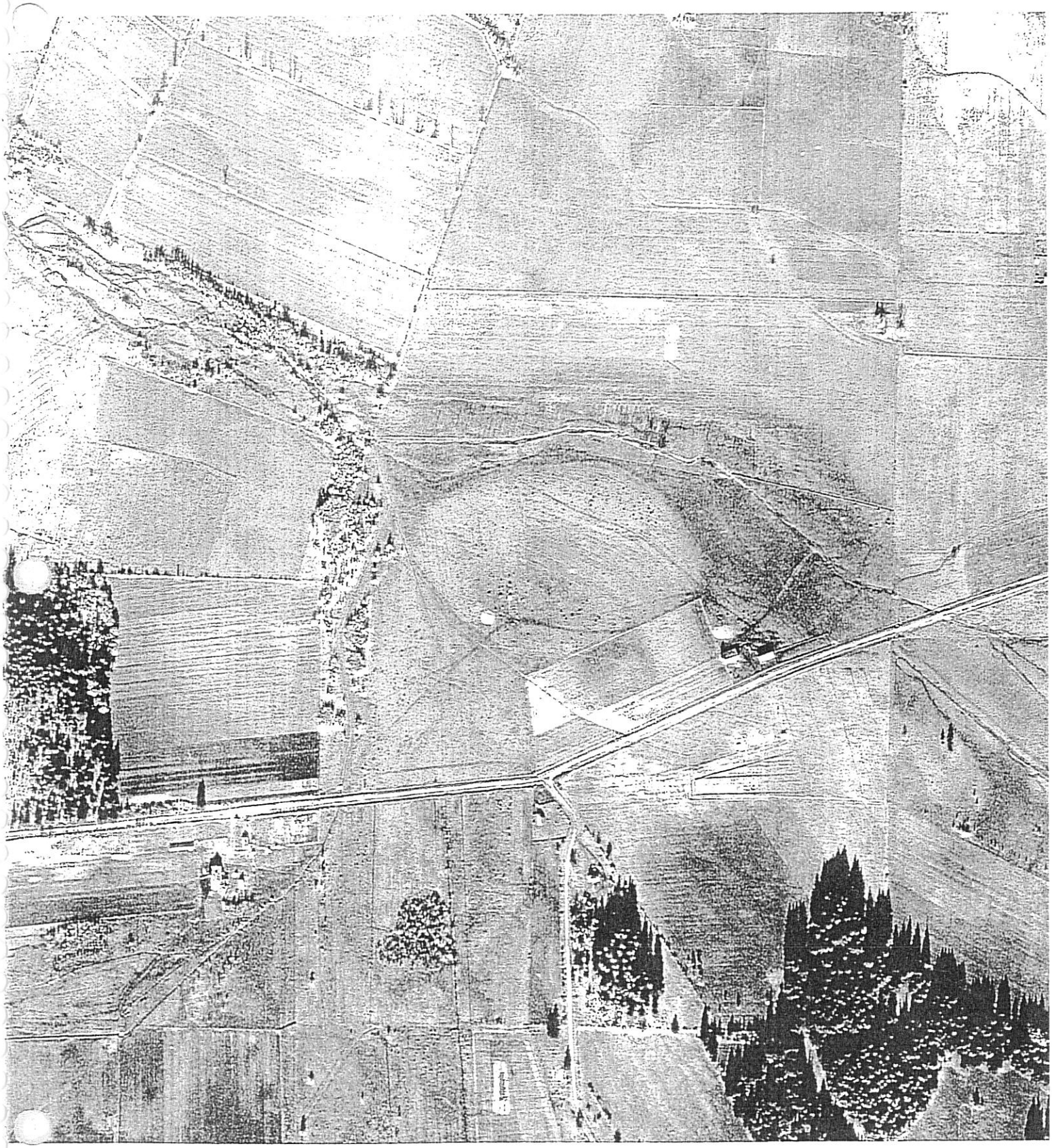
Site: Oak Creek Mitigation Bank Site
IA: Assessment Area

Prepared by WETWorks Demonstration Copy

Printed 03/17/98

Species	Value	Comment
Inland Geese - Migrating	Low	
Prairie Dabblers - Migrating	Low	
Snipe, Common - All Year	Low	

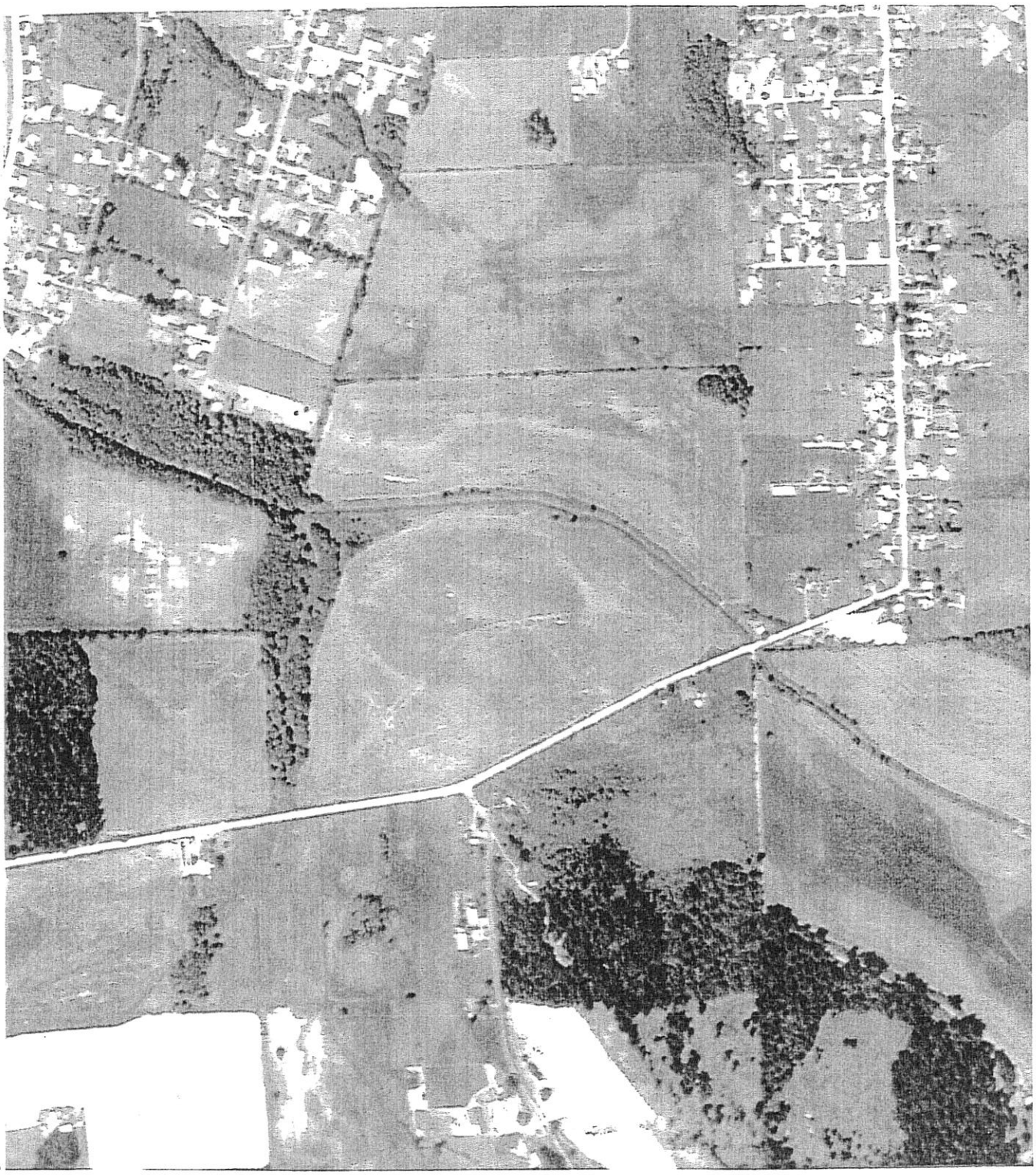
Appendix E
Historic Aerial Photos



N↑ 1936 Willamette Valley Project 844

NA 6-28-1948 DFM 20-35)

N 5-27-1963 DFM CDC(115)



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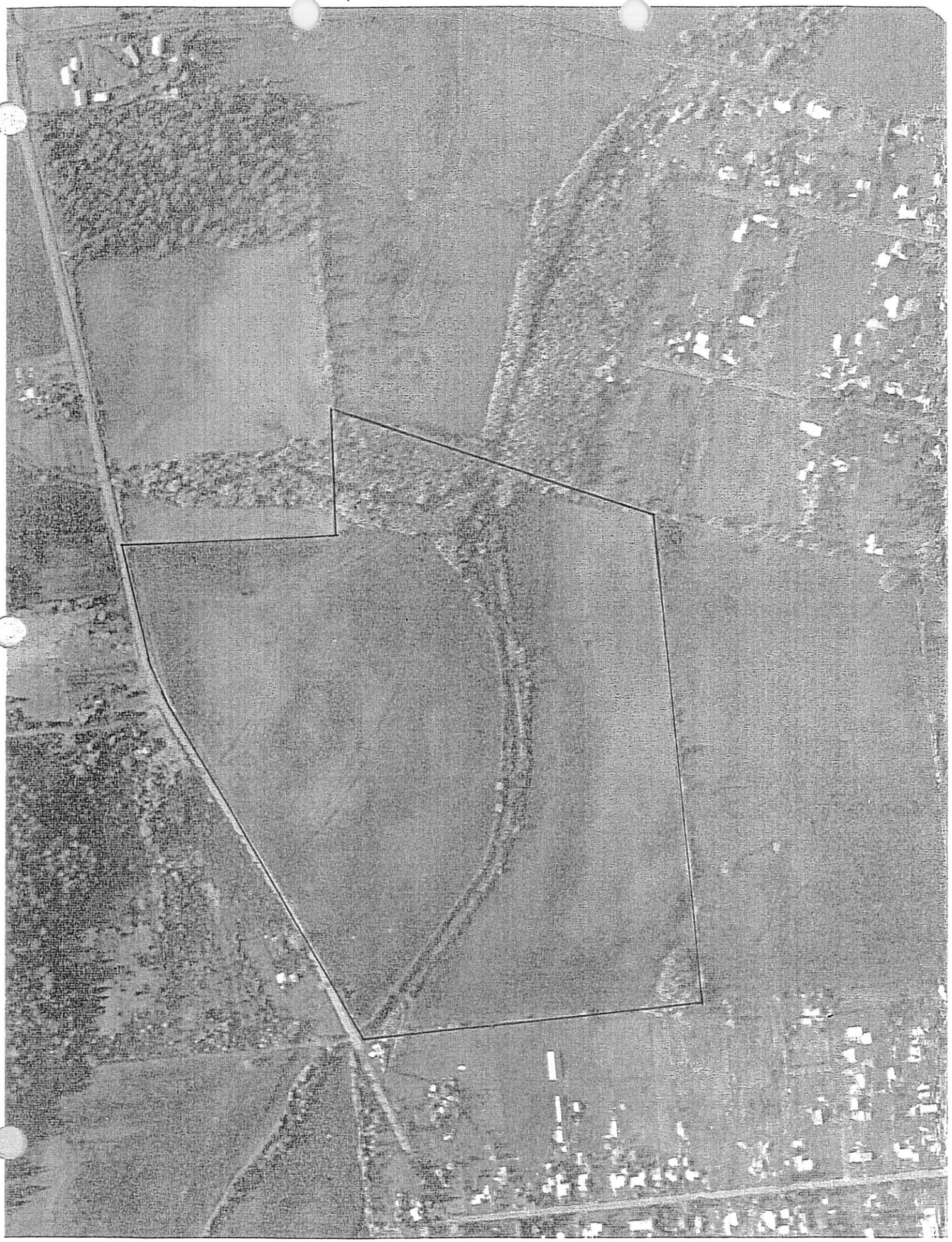
COE 96-1707 12/17/96



Appendix F
Vegetation Monitoring Report

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September 19, 1997

Vegetation Monitoring: Lebanon, Oregon Mitigation Bank Site

Objectives

- Develop a sampling protocol for vegetation at the Lebanon, OR Mitigation Bank Site and the Stoltz Hill Road reference wetland;
- Document vegetation at the Stoltz Hill Road reference site, a U.S. Fish and Wildlife Service conservation easement, and the Lebanon, OR Mitigation Bank Site prior to restoration;
- Map habitat types at each site; and
- Characterize each habitat type by measuring the species diversity and density.

Sampling Protocol

The intent of this monitoring program is to describe changes in species diversity over time at the Lebanon Mitigation Bank Site by evaluating the plant community types and structure and comparing them to reference sites. This will be accomplished by conducting annual vegetation surveys at the mitigation site and developing a species list for the reference sites.

This report covers the first annual vegetation survey and the monitoring protocol. Two reference sites were identified in the same watershed as the mitigation site. The first reference site is located on Stoltz Hill Road down stream of the mitigation site. The second reference site is a U.S. Fish and Wildlife Service conservation easement upstream of the mitigation site (see Merrifield, 1994 for a complete description). Species-area curves were developed for each habitat type at the Stoltz Hill Road Site and Lebanon Mitigation Site using transect and quadrat sampling. A species list for the U.S. Fish and Wildlife Service conservation easement was developed from a previous vegetation study (Merrifield, 1994).

The following describes in detail the sampling design:

1. Vegetation Protocol
   a. A general reconnaissance was conducted to map existing habitat types (see Figs. 1-3).
   b. Transects were established that orient parallel to the long axis of each habitat type.
   c. All species encountered along the transects were recorded.
   d. Ten 1m x 1m quadrats were evenly spaced along each transect and herbaceous species occurrence and percent cover were recorded in each quadrat. The classes used for percent cover were 1-5%, 6-25%, 26-50%, 51-75%, 76-95%, and 96-100%. Species-area curves were developed after sampling each quadrat. Sampling stopped after the species-area curve flattened out (note: this required more or less than 10 quadrats).
   e. If shrub/sapling or tree strata exist, they were sampled in a ten meter radius circle surrounding the meter square quadrat. Percent cover by shrubs was estimated and the diameter at breast height (DBH) was measured for all trees with a DBH

greater than 10 cm. Any tree that had a DBH less than 10 cm was considered a sapling. Both tree and sapling stems were counted in each 10 m radius circle.

f. Panoramic photographs of habitat types were taken to document existing conditions (Figs. 4-20). The general location of each photograph is indicated in Figs. 1-3.
g. Standard field forms were developed to ensure compatibility of data taken between years (Appendix 8).

2. Sample Allocation and Timing of Survey
   a. Three habitat types (sedge meadow, forested wetland, and riparian zone) were identified in the field.
   b. In order to establish baseline conditions, a survey was completed prior to restoration at the Lebanon Mitigation Bank Site.
   c. After restoration, one survey should be conducted annually at the time of the maximum standing crop. This will allow for documentation of changes in species composition and density as a result of restoration.

3. Additional Recommendations
   a. Only observers familiar with Willamette Valley vegetation should conduct the monitoring.
   b. Sampling quadrats must be at least 20 meters apart to prevent overlap of sampling of shrubby and woody vegetation.
   c. If a habitat type is too small to allow for 10 quadrats then the maximum number of quadrats should be sampled and the entire habitat type should be carefully evaluated to ensure all species that characterize the habitat are recorded.
   d. A general reconnaissance of each habitat type should be conducted following the vegetation sampling to identify any additional species.

Vegetation Classification

A. Lebanon Mitigation Bank Site

Prior to restoration, the vegetation at the Lebanon Mitigation Bank Site was monitored on August 31 and September 3, 1997. The site consists of three habitat types: a forested wetland, degraded riparian zone, and a cultivated grass field (proposed sedge meadow) (Fig. 1).

Grass Field (Proposed Sedge Meadow)

The cultivated grass field was defoliated with a herbicide in the spring of 1997. At the time of sampling, the grass field was predominately comprised of exposed soil and dead grass mats (Figs. 1 & 4-6). Surprisingly, 45 species were found that had germinated since the application of the herbicide (Table 1, Appendix 1). The field was dominated by cultivated rye grass (51-75%). The second most common species was Western marsh cudweed (*Gnaphalium palustre*, FAC+), which is an annual native forb that is tolerant of alkaline conditions and is typically found in vernal pools. Various exotic weedy species, typical of highly disturbed waste sites, were found throughout the fields. Typical species included *Anagallis arvensis*, *Anthemis cotula*, *Avena fatua*, *Cerastium viscosum*, *Digitaria sanguinalis*, *Senecio vulgaris*, *Solanum dulcamara*, *Solanum sarrachoides*, *Rumex acetosella* , and *Verbascum blattaria* (Table 1). Several species common in Willamette

wetland prairies were also found. These species included fragrant popcornflower (*Plagiobothrys figuratis*, FACW), Western yellowcress (*Rorippa curvisiliqua*, FACW+), Watson's willow-herb (*Epilobium ciliatum* ssp. *watsonii*, FACW-), bog St. John's-wort (*Hypericum anagalloides*, OBL), water-purslane (*Ludwigia palustris*, OBL), short-pointed flat sedge (*Cyperus acuminatus*), and witchgrass (*Panicumcapillare*, FACU+). Presence of these species indicated that a viable wetland seedbank may exist at the site. Interestingly, short-pointed flat sedge was found in the low areas of the North field and like Western marsh cudweed, it is also tolerant of alkaline conditions.

Forested Wetland

A remnant Oregon ash (*Fraxinus latifolia*, FACW) community was found along the Western border of the mitigation site (Figs. 1&7). Oregon ash was the only tree species identified in this habitat. The average DBH, the number of trees, and the number of saplings are summarized in Table 4. Evidence of prior cutting was observed but several large ash trees were still present. The understory was dominated by a variety of sedges, including slough sedge (*Carex obnupta*, OBL) short-scale sedge (*Carex deweyana*, FACU), dense sedge (*Carex densa*, OBL), woolly sedge (*Carex lanuginosa*, OBL) one-sided sedge (*Carex unilateralis*, FACW) and green-sheathed sedge (*Carex feta*, FACW) (Table 2, Appendix 2). Each of these species covered an average of 6-25% of the understory. Several areas of exposed soil were observed, which indicated standing water was present late in the growing season. In addition, debris trapped in woody vegetation indicated periods of flowing water. Evergreen blackberry (*Rubus laciniatus*) and Himalayan blackberry (*Rubus discolor*) were common along the edge of the forest and in clearings (Table 2, Appendix 2). A large patch of Camas (*Camassia quamash*, FACW) was found near photograph location D (Fig. 1) in a clearing. Evidence of nutria activity was found along the West edge of the forest and several nutria burrows were found in the small tributary of Oak Creek.

A small patch of forest dominated by Oregon ash was found in the Northeast corner of the property. Nutria burrows and evidence of impounded water were found within this small forested area.

Riparian Zone Along Oak Creek

Oak Creek and its riparian zone were in a very degraded state at the Lebanon Mitigation Bank Site. Oak Creek was essentially dry for most of its length (six out of ten sampling points had no standing water) (Figs. 1, 8,&9). In the remaining pools of water, green algae blooms were common and several dead fish were found floating along the edges. The active channel was an average of 1.2 meters wide and the average channel width was 5.7 meters. The average cover over the creek was 26-50% and the average cover over the 10 m radius circle sampling points was 6-25%. The channel itself appeared to have been dredged and levees were found along the entire length of the stream. The remaining riparian zone was very narrow, approximately 10 meters wide and was dominated by Himalayan blackberry and clustered rose (*Rubus pisocarpa*, FAC) (Table 3, Appendix 3). The blackberry and rose formed an almost impenetrable barrier between the field and Oak Creek. Only a few large trees remain, however several willow (*Salix* spp.), Oregon ash, Red-Osier dogwood (*Cornus sericea*, FACW), and Pacific ninebark (*Physocarpus capitatus*, FACW-) saplings were found along the banks of Oak Creek (Table 4). The dredging and levees appeared to have disconnected Oak Creek from its floodplain, which historically would have included much of the cultivated grass fields. Two abandoned

beaver dams were found and most of the willows along the creek were heavily damaged by beaver. Nutria scat, trails, and burrows were found along the entire length of the creek. Most of the herbaceous vegetation along the creek was grazed to the ground by the nutria. The herbaceous vegetation along the banks of the creek was dominated by ovate spike rush (*Eleocharis ovata*, OBL), Western mannagrass (*Glyceria occidentalis*, OBL), bird's-foot trefoil (*Lotus corniculatus*, FAC), water purslane (*Ludwigia palustris*, OBL), and peppermint (*Mentha piperita*, FACU+) (Table 3). Needle-spike rush (*Eleocharis acicularis*, OBL) provided ground cover along most of the stream bank.

B. Stoltz Hill Road Reference Wetland Site

This site was selected as a reference for the Lebanon, OR Mitigation Bank project. This site was evaluated to provide a bench mark for evaluating the mitigation site prior to and after restoration. The habitat types that were identified and surveyed were: a sedge meadow, forested wetland, and the riparian zone along Oak Creek (Fig. 2). The surveys were conducted on August 29 and 30, 1997.

Sedge Meadow

A small sedge meadow existed along the front edge of the owner's property (Figs. 2, 10, 11). Several black hawthorn (*Crataegus douglasii*, FAC) and Oregon ash snags were found in the meadow and seedlings of both species were observed. The owner's son informed us that the sedge meadow was historically forested and was clear-cut approximately a decade ago. It was then heavily grazed until a few years ago. Evidence of ditching and installation of a driveway appeared to have altered the hydrology of the site making it drier.

The meadow was dominated by reed canary-grass (*Phalaris arundinacea*, FACW), slough sedge, velvet grass (*Holcus lanatus*, FAC), common rush (*Juncus effusus*, FACW), and dagger-leaf rush (*Juncus ensifolius*, FACW) (Table 1, Appendix 4). Most of the meadow had an underlying ground cover of needle spike-rush and/or moss. Various wetland prairie species were also observed in the meadow, including a patch of camas. Blackberry, rose, and Douglas' spiraea (*Spiraea douglasii*, FACW) also dotted the meadow (Table 1). Mound-type ant hills were found throughout the meadow indicating high water during the winter months (Guard, 1995).

Forested Wetland

Remnants of an Oregon ash community existed along the Western border of the reference site (Figs. 2, 12, & 13). This area had been extensively cut and openings were over-run with blackberry and rose. A small patch, approximately 30 m x 100 m, of relatively undisturbed forest was still present. Only this undisturbed area was evaluated, which limited the number of samples to three (Appendix 5). The forest was dominated by Oregon ash, black hawthorn, and a few cultivated pear (*Pyrus communis*) trees (Table 4). The understory was dominated by spreading rush (*Juncus patens*, FACW), large-leaf avens (*Geum macrophyllum*, FACW-), Watson's willow herb, short-scale sedge, and slough sedge (Table 2, Appendix 5). Twenty-five to fifty percent of the area was covered by what appeared to be vernal pools. These pools were devoid of vegetation and were covered with alluvial silt. There was also evidence of flowing water as indicated by debris trapped in woody vegetation.

Riparian Zone Along Oak Creek

Oak Creek and its riparian zone were in a fairly degraded state at the Stoltz Hill Reference Site (Figs 2, 14, & 15). Oak Creek was sampled from the Stoltz Hill Road bridge to a location approximately 250 meters upstream. Water was present along the entire length of the creek, however at a few locations the creek was less than a half meter wide. Fish, tadpoles, snails, and frogs were observed in many of the remaining pools. One large abandoned beaver dam was found that created a pool approximately 5 meters wide, 30 meters long, and 20 cm deep (Fig. 14). The active channel was an average of 4.0 meters wide and the average channel width was 8.6 meters. The average cover over the creek was 6-25% and the average cover over the 10 m radius circle sampling points was 6-25%. The channel appeared to have been dredged and levees were found along the entire length of the creek. The levees were dominated by blackberry, rose, and snowberry (*Symphoricarpos albus*, FACU). These shrub thickets formed an impenetrable barrier between Oak Creek and the surrounding forest. Nine species of trees were observed along the Creek with Oregon ash and willows being the most common (Table 4). In addition, a few large black cottonwoods (*Populus trichocarpa*, FAC) were found.

The herbaceous vegetation along the banks of the creek was dominated by water purslane, Western mannagrass, rice-cut grass (*Leersia oryzoides*, OBL), bird's-foot trefoil, slough sedge, and knotgrass (*Paspalum distichum*). In addition, a submergent species, *Potamogeton* sp. (OBL), was also observed. Needle-spike rush provided ground cover along most of the bank.

C. U.S. Fish and Wildlife Service Reference Wetland Site

A complete vegetation survey was conducted at the U.S. Fish and Wildlife Service Reference Wetland Site during 1993 and 1994 (Merrifield, 1994). This vegetation survey is summarized in Tables 1-3 for the three habitat types used in this report and Figure 3 is a site map. Figure 16-20 are photographs of each habitat type. Abundance ratings from the Merrifield (1994) report were modified to allow comparison to the Stoltz Hill Road Reference Site and Lebanon Mitigation Bank Site. The abundance ratings were modified as follows:

Merrifield Report (1994)	Ave % Cover
1 = dominates community layer; abundant	51-75%;
2 = co-dominates community layer; common	26-50%;
3 = not dominant or co-dominant	6-25%;
4 = difficult to find but not rare	1-5%;
5 = extremely hard to find, rare	<1%.

Descriptions of each habitat type were discussed in the Merrifield (1994) report. Excerpts from the report are included in Appendix 7.

Summary

A. Grass Field (Proposed Sedge Meadow)

The grass field (proposed sedge meadow) at the mitigation site was highly disturbed. However, several wetland species were observed. The sedge meadow at the Stoltz Hill Road reference wetland was dominated by species more typical of the forested wetland it

once was. The grazed pasture at the U.S. Fish and Wildlife Service conservation easement was a blend of non-native invasive species and wet prairie species. Both the Stoltz Hill Road sedge meadow and the grazed pasture at the conservation easement represent moderately disturbed sites and may provide and intermediate bench mark for restoration efforts. The ungrazed wet prairie at the U.S. Fish and Wildlife Service conservation easement may represent the optimal goal for restoration of the grass field at the mitigation site.

B. Forested Wetland

All three sites had remnant Oregon ash/*Carex* communities. This community type was typified by moderate disturbance and was restricted to a small zone as a result of cutting, alteration of hydrology, and grazing. With some restoration efforts, the ash communities could be enlarged at both the Stoltz Hill Road and mitigation sites. The Oregon ash/*Carex* communities at both of these sites were similar but had slightly different sedge species dominating the understory. The remnant Oregon ash/*Carex* community at either the Stoltz Hill Road or mitigation site could provide a blueprint for restoration of this community type. The Oregon ash/*Carex* community appeared to have been historically much larger at the mitigation site, as supported by the Northeast pocket of mature Oregon ash and numerous ash seedlings in the grass field.

C. Riparian Zone Along Oak Creek

The reaches of Oak Creek at each of the sites were in a highly degraded state. The channels have been down-cut and/or dredged and diked to the point that they appeared to be disconnected from the surrounding landscape. The levees were dominated by upland weedy species and impenetrable blackberry thickets. Abandoned beaver dams were found at both the Stoltz Hill Road and Lebanon mitigation sites, and evidence of past beaver activity was observed at all three sites. Beaver used to play an active role in the structure and function of these systems but now have been replaced by non-native nutria that play a very different role. Beaver dams impounded water, which: provided refugia for aquatic life; provided settling basins for sediment loads; raised the water table in the surrounding riparian zone; and provided for some flood water storage. Conversely, nutria activity resulted in elaborate channels and burrow systems adding to bank degradation and sediment loading.

Remnant riparian vegetation was present along the reaches of Oak Creek at both the Stoltz Hill Road and Lebanon mitigation sites, however, it no longer had the structure of a functioning riparian system. The riparian vegetation provided little shade or cover above the stream and was isolated to a fairly narrow band directly adjacent to the creek.

References

Guard, B.J. 1995. *Wetland Plants of Oregon and Washington.* Lone Pine Publishing, Redmond, WA, 239p.

Hitchcock, C.L. and A. Cronquist. 1973. *Flora of the Pacific Northwest.* University of Washington Press, Seattle, WA, 730 p.

Merrifield, K. 1994. *Botanical Survey of Six Willamette Valley Conservation Easements.* Prepared for Western Oregon Refuges Complex, U.S. Fish & Wildlife Service Unpublished Government Report.

Table 1. Vegetation recorded in the sedge meadow and grass fields of the Stoltz Hill Road Reference Site, the U.S. Fish and Wildlife Service conservation easement, and the Lebanon, OR Mitigation Bank Site.

Common Name	Scientific Name	Averege Percent Cover		
		U.S. Fish and Wildlife Reference Site[1]	Stolz Hill Road Reference Site[2]	Lebanon, OR Mitigation Bank Site[3]
Ground Cover:				
Dead Grass Mat				16-25
Needle Spike-Rush	*Eleocharis acicularis*		26-50	
Exposed Soil/Rock				1-5
Moss			6-25	
Herbaceous Layer:				
Colonial Bentgrass	*Agrostis capillaris (A. tenuis)*	6-25	1-5	
Meadow Foxtail	*Alopecurus pratensis*	6-25		1-5
Scarlet Pimpernel	*Anagallis arvensis*			<1
Mayweed Chamonile	*Anthemis cotula*			<1
Sweet Vernal Grass	*Anthoxanthum odoratum*	6-25		
Hall's Aster	*Aster hallii*	1-5		
Wild Oat	*Avena fatua*			<1
Leafy Beggarticks	*Bidens frondosa*			<1
Little Quaking Grass	*Briza minor*	<1		
Harvest Brodiaea	*Brodiaea coronaria*	1-5		
Hyacinth Brodiaea	*Brodiaea hyacinthina*	1-5	1-5	
Ryebrome	*Bromus secalinus*	1-5		
Blue-Joint Reedgrass	*Calamagrostis canadensis*	6-25		
Common Camas	*Camassia quamash*		<1	
Dense Sedge	*Carex densa*	6-25	<1	
Green-Sheathed Sedge	*Carex feta*	1-5	<1	
Woolly Sedge	*Carex lanuginosa (C. pellita)*		1-5	
Slough Sedge	*Carex obnupta*		6-25	
One-Sided Sedge	*Carex unilateralis*	1-5	<1	
Centaury	*Centaurium erythraea*	6-25	<1	
Sticky Chickweed	*Cerastium viscosum*	1-5		<1
Rabbit Brush	*Chrysanthemum leucanthemum* var. *pinnatifidum*	1-5		
Common Thistle	*Cirsium vulgare*	6-25		<1
Cultivated Grass				6-25
Cultivated Rye Grass				51-75
Crested Dog's-Tail Grass	*Cynosurus cristatus*	1-5		
Short-Pointed Flat Sedge	*Cyperus acuminatus*			<1
Orchard Grass	*Dactylis glomerata*	6-25		
Queen Anne's Lace	*Daucus carota*	6-25		<1
Maiden Pink	*Dianthus deltoides*		<1	
Hairy Crabgrass	*Digitaria sanguinalis*			<1
Teasel	*Dipsacus fullonum*	1-5	<1	
Large Barnyard Grass	*Echinochloa crus-galli*			<1
Ovate Spike-Rush	*Eleocharis ovata*			<1
Creeping Spike-Rush	*Eleocharis palustris*			<1
Watson's Willow Herb	*Epilobium ciliatum* ssp. *watsoni*	1-5	<1	<1
Red Fescue	*Festuca rubra*	6-25		
Pacific Bedstraw	*Galium cymosum*	1-5		
Wall Bedstraw	*Galium parisiense*	1-5	<1	
Carolina Geranium	*Geranium carolinianum*	1-5		
Large-Leaf Avens	*Geum macrophyllum*		<1	
Western Marsh Cudweed	*Gnaphalium palustre*			6-25
Velvet Grass	*Holcus lanatus*	26-50	6-25	<1
Meadow Barley	*Hordeum brachyantherum*	1-5		
Bog St. John's-Wort	*Hypericum anagalloides*		1-5	<1
Common St. John's Wort	*Hypericum perforatum*	1-5		
Spotted Cat's-Ear	*Hypochaeris radicata*	1-5		<1
Jointed Rush	*Juncus articulatus*		<1	
Common Rush	*Juncus effusus*	1-5	6-25	
Dagger-Leaf Rush	*Juncus ensifolius*		6-25	

Table 1. (continued)

Common Name	Scientific Name	Averege Percent Cover		
		U.S. Fish and Wildlife Reference Site[1]	Stolz Hill Road Reference Site[2]	Lebanon, OR Mitigation Bank Site[3]
Slender Rush	*Juncus tenuis*	1-5	1-5	
Red Dead-Nettle	*Lamium purpureum*	1-5		
Nipplewort	*Lapsana communis*	6-25		
Grass Peavine	*Lathyrus sphaericus*	1-5		
Pale Flax	*Linum angustifolium*	1-5		
Italian Ryegrass	*Lolium multiflorum*	1-5		
Bradshaw's Lomatium	*Lomatium bradshawii*	6-25		
Bird's-Foot Trefoil	*Lotus corniculatus*			<1
Spanish Clover	*Lotus purshiana*			<1
Water-Purslane	*Ludwigia palustris*			<1
Hyssop Loosestrife	*Lythrum hyssopifolia*			<1
Stinking Tarweed	*Madia glomerata*			<1
Pennyroyal	*Mentha pulegium*		1-5	<1
Yellow-and-Blue Forget-Me-Not	*Myosotis discolor*	6-25		
Small-Flowered Forget-Me-Not	*Myosotis laxa*		<1	
Skunkweed	*Navarretia squarrosa*			<1
Common Witchgrass	*Panicum capillare*			<1
Yellow Parentucellia	*Parentucellia viscosa*	1-5	<1	
Reed Canary-Grass	*Phalaris arundinacea*		26-50	
Common Timothy	*Phleum pratense*	6-25		
Fragrant Popcornflower	*Plagiobothrys figuratis*	1-5		<1
English Plantain	*Plantago lanceolata*	1-5		<1
Kentucky Bluegrass	*Poa pratensis*		1-5	
Smartweed	*Polygonum* spp.			<1
Straight-Beak Buttercup	*Ranunculus orthorhynchus*	6-25		
Hooked Buttercup	*Ranunculus uncinatus*	1-5		
Western Yellowcress	*Rorippa curvisiliqua*	1-5		<1
Sourweed	*Rumex acetosella*	1-5		<1
Clustered Dock	*Rumex conglomeratus*	1-5		
Tansy Ragwort	*Senecio jacobaea*	<1	<1	
Common Groundsel	*Senecio vulgaris*			<1
Blue Star	*Sisyrinchium angustifolium*	1-5		
Black Nightshade	*Solanum nigrum*			<1
Hairy Nightshade	*Solanum sarrachoides*			<1
Stickwort	*Spergula arvensis*			<1
Biennial Stanleya	*Stanleya confertiflora*			<1
Common Dandelion	*Taraxacum officinale*	1-5		<1
Red Clover	*Trifolium pratense*	1-5		<1
White Clover	*Trifolium repens*	1-5		
Moth Mullein	*Verbascum blattaria*			<1
Marsh Speedwell	*Veronica scutellata*	1-5	1-5	
Slender Vetch	*Vicia tetrasperma*	1-5		
Woody Layer:				
Black Hawthorn (saplings)	*Crataegus douglasii*		1-5	
Oregon Ash (seedlings)	*Fraxinus latifolia*		1-5	<1
Nootka Rose	*Rosa nutkana*	<1	<1	
Clustered Rose	*Rosa pisocarpa*	1-5	1-5	
Himalayan Blackberry	*Rubus discolor*	1-5	1-5	<1
Evergreen Blackberry	*Rubus laciniatus*		1-5	<1
Douglas' Spiraea	*Spiraea douglasii*	1-5	1-5	

[1] Surveys conducted from October 6, 1993 to July 13, 1994 (From Merrifield 1994).
[2] Survey conducted on August 29, 1997.
[3] Survey conducted on September 3, 1997.

Table 2. Vegetation recorded in the forested areas of the Stoltz Hill Road Reference Site, the U.S. Fish and Wildlife Service conservation easement, and the Lebanon, OR Mitigation Bank Site.

Common Name	Scientific Name	Averege Percent Cover		
		U.S. Fish and Wildlife Reference Site[1]	Stolz Hill Road Reference Site[2]	Lebanon, OR Mitigation Bank Site[3]
Ground Cover:				
Needle Spike-Rush	*Eleocharis acicularis*		<1	
Exposed Soil/Rock			26-50	6-25
Moss			6-25	6-25
Herbaceous Layer:				
Bur Chervil	*Anthriscus scandicina*	1-5		
English Daisy	*Bellis perennis*	6-25		
Shining Oregongrape	*Berberis aquifolium*	1-5		
Leafy Beggarticks	*Bidens frondosa*		1-5	
Harvest Brodiaea	*Brodiaea coronaria*	1-5		
Common Camas	*Camassia quamash*	26-50	<1	<1
Great Camas	*Camassia leichtlinii*	6-25		
Willamette Valley Bittercrest	*Cardamine penduliflora*	6-25		
Dense Sedge	*Carex densa*			<1
Short-Scale Sedge	*Carex deweyana*		6-25	6-25
Green-Sheathed Sedge	*Carex feta*			6-25
Woolly Sedge	*Carex lanuginosa (C. pellita)*			6-25
Slough Sedge	*Carex obnupta*		<1	6-25
One-Sided Sedge	*Carex unilateralis*			6-25
Sticky Chickweed	*Cerastium viscosum*	1-5		
Miner's Lettuce	*Claytonia perfoliata*	1-5		
Cultivated Grass				6-25
Tufted Hairgrass	*Deschampsia cespitosa*		<1	
Grass Pink	*Dianthus armeria*	1-5		
Teasel	*Dipsacus fullonum*			<1
Watson's Willow Herb	*Epilobium ciliatum* ssp. *watsoni*		6-25	
Broadpetal Strawberry	*Fragaria virginiana* var. *platypetala*	6-25		
Sweetscented Bedstraw	*Galium triflorum*	6-25		
Carolina Geranium	*Geranium carolinianum*	1-5		
Dovefoot Geranium	*Geranium molle*	6-25		
Large-Leaf Avens	*Geum macrophyllum*	<1	6-25	<1
Velvet Grass	*Holcus lanatus*			<1
Common Rush	*Juncus effusus*			<1
Spreading Rush	*Juncus patens*		26-50	6-25
Slender Rush	*Juncus tenuis*		1-5	
Nipplewort	*Lapsana communis*	6-25		
Water-Purslane	*Ludwigia palustris*		<1	
Moneywort	*Lysimachia nummularia*	6-25	1-5	
Garden Balm	*Melissa officinalis*	<1		
Peppermint	*Mentha piperita*			<1
Narrow-Leaf Montia	*Montia linearis*	6-25		
Yellow-and-Blue Forget-Me-Not	*Myosotis discolor*	6-25		
Small-Flowered Forget-Me-Not	*Myosotis laxa*		<1	
Mountain Sweet-Root	*Osmorhiza chilensis*	1-5		
Gairdner's Yampah	*Perideridia gairdneri*	6-25		
Reed Canary-Grass	*Phalaris arundinacea*			1-5
English Plantain	*Plantago lanceolata*	1-5		
Annual Bluegrass	*Poa annua*	1-5		
Roughstalk Bluegrass	*Poa trivialis*			6-25
Smartweed	*Polygonum* spp.		1-5	
Sword-Fern	*Polystichum munitum*	1-5	1-5	<1
Self-Heal	*Prunella vulgaris*	6-25	1-5	<1
Water-Plantain Buttercup	*Ranunculus alismifolius*	6-25		
Western Buttercup	*Ranunculus occidentalis*	6-25		
Straight-Beak Buttercup	*Ranunculus orthorhynchus*	1-5		

Table 2. (continued)

Common Name	Scientific Name	Averege Percent Cover		
		U.S. Fish and Wildlife Reference Site[1]	Stolz Hill Road Reference Site[2]	Lebanon, OR Mitigation Bank Site[3]
Hooked Buttercup	*Ranunculus uncinatus*	6-25		
Clusterd Dock	*Rumex conglomeratus*		6-25	<1
Pacific Sanicle	*Sanicula crassicaulis*	6-25		
Oregon Saxifrage	*Saxifraga oregana*	1-5		
Tansy Ragwort	*Senecio jacobaea*	<1		
Bittersweet Nightshade	*Solanum dulcamara*			<1
Mexican Betony	*Stachys mexicana*		6-25	
Chickweed	*Stellaria media*	1-5		
Common Dandelion	*Taraxacum officinale*	1-5		
Fringecup	*Tellima grandiflora*	1-5		
Subterranean Clover	*Trifolium subterraneum*	1-5		
American Brookline	*Veronica americana*		1-5	
Marsh Speedwell	*Veronica scutellata*			<1
Woody Layer:				
Serviceberry	*Amelanchier alnifolia*	1-5		
Black Hawthorn	*Crataegus douglasii*	6-25		
Oregon Ash	*Fraxinus latifolia*	1-5		
Indian Plum	*Oemleria cerasiformis*	1-5		
Black Cottonwood	*Populus trichocarpa*	<1		
Northwest Cinquefoil	*Potentilla gracilis*	1-5		
Cultivated Pear	*Pyrus communis*	26-50	<1	
Cultivated Apple	*Pyrus malus*	1-5		
Sweetbriar	*Rosa eglanteria*	1-5	1-5	1-5
Clustered Rose	*Rosa pisocarpa*	6-25	6-25	<1
Himalayan Blackberry	*Rubus discolor*	1-5	1-5	6-25
Evergreen Blackberry	*Rubus laciniatus*	1-5	6-25	6-25
Douglas' Spiraea	*Spiraea douglasii*	1-5	6-25	
Snowberry	*Symphoricarpos albus*	1-5		

[1] Surveys conducted from October 6, 1993 to July 13, 1994 (From Merrifield 1994).
[2] Survey conducted on August 29, 1997.
[3] Survey conducted on August 31, 1997.

Table 3. Vegetation recorded in the riparian zone along Oak Creek at the Stoltz Hill Road Reference Site, the U.S. Fish and Wildlife Service conservation easement, and the Lebanon, OR Mitigation Bank Site.

Common Name	Scientific Name	Averege Percent Cover		
		U.S. Fish and Wildlife Reference Site[1]	Stolz Hill Road Reference Site[2]	Lebanon, OR Mitigation Bank Site[3]
Ground Cover:				
Needle Spike-Rush	*Eleocharis acicularis*		6-25	6-25
Exposed Rock/Soil			6-25	6-25
Herbaceous Layer:				
Water Plantain	*Alisma plantago-aquatica*		1-5	<1
Meadow Foxtail	*Alopecurus pratensis*	6-25		
Hall's Aster	*Aster hallii*			<1
American Slough Grass	*Beckmannia syzigachne*	1-5		
Leafy Beggarticks	*Bidens frondosa*			<1
Beggerticks	*Bidens* spp.	1-5		
Little Quaking Grass	*Briza minor*	<1		
Hyacinth Bodiaea	*Brodiaea hyacinthina*	1-5		
Vernal Water-Starwort	*Callitriche verna*	6-25		
Willamette Valley Bittercrest	*Cardamine penduliflora*	6-25		
Dense Sedge	*Carex densa*	6-25		
Green-Sheathed Sedge	*Carex feta*	1-5		
Woolly Sedge	*Carex lanuginosa (C. pellita)*			<1
Slough Sedge	*Carex obnupta*		6-25	
Coastal Stellate Sedge	*Carex phyllomanica*	6-25		
One-Sided Sedge	*Carex unilateralis*	1-5		
Sticky Chickweed	*Cerastium viscosum*	1-5		
Queen Anne's Lace	*Daucus carota*			<1
Tufted Hairgrass	*Deschampsia cespitosa*	6-25		
Teasel	*Dipsacus fullonum*		<1	1-5
Common Downingia	*Downingia elegans*	1-5		
Large Barnyard Grass	*Echinochloa crus-galli*			<1
Needle Spike-Rush	*Eleocharis acicularis*	1-5		
Ovate Spike-Rush	*Eleocharis ovata*		1-5	6-25
Creeping Spike-Rush	*Eleocharis palustris*	6-25	1-5	<1
Watson's Willow Herb	*Epilobium ciliatum* ssp. *watsoni*	1-5		<1
Horsetail	*Equisetum* spp.		<1	<1
Rush-Leaf Coyote-Thistle	*Eryngium petiolatum*	1-5	<1	
Western Mannagrass	*Glyceria occidentalis*	1-5	6-25	6-25
Common American Hedge-Hyssop	*Gratiola neglecta*	<1		
Jointed Rush	*Juncus articulatus*		<1	
Common Rush	*Juncus effusus*	1-5	1-5	1-5
Dagger-Leaf Rush	*Juncus ensifolius*	6-25		<1
Spreading Rush	*Juncus patens*	6-25		
Slender Rush	*Juncus tenuis*	1-5		
Rice-Cut Grass	*Leersia oryzoides*		6-25	<1
Bradshaw's Lomatium	*Lomatium bradshawii*	6-25		
Bird's-Foot Trefoil	*Lotus corniculatus*		6-25	26-50
Water-Purslane	*Ludwigia palustris*		26-50	6-25
Moneywort	*Lysimachia nummularia*		1-5	1-5
Wild Mint	*Mentha arvensis*		<1	
Peppermint	*Mentha piperita*		1-5	6-25
Pennyroyal	*Mentha pulegium*	6-25	<1	<1
Narrow-Leaf Montia	*Montia linearis*	6-25		
Yellow-and-Blue Forget-Me-Not	*Myosotis discolor*	6-25		
Small-Flowered Forget-Me-Not	*Myosotis laxa*	1-5		
True Forget-Me-Not	*Myosotis scorpioides*			<1
Knotgrass	*Paspalum distichum*		6-25	
Reed Canary-Grass	*Phalaris arundinacea*		1-5	1-5
Fragrant Popcornflower	*Plagiobothrys figuratus*	1-5		
Scouler's Popcornflower	*Plagiobothrys scouleri*	1-5		
Water Smartweed	*Polygonum amphibium*	6-25		
Prostrate Knotweed	*Polygonum aviculare*		<1	

Table 3. (continued)

Common Name	Scientific Name	Averege Percent Cover		
		U.S. Fish and Wildlife Reference Site[1]	Stolz Hill Road Reference Site[2]	Lebanon, OR Mitigation Bank Site[3]
Water Pepper	*Polygonum hydropiperoides*		1-5	<1
Smartweed	*Polygonum* spp.		1-5	1-5
Floating-Leaf Pondweed	*Potamogeton natans*		<1	
Pondweed	*Potamogeton* spp.		1-6	
Self-Heal	*Prunella vulgaris*			<1
Water Crowfoot	*Ranunculus aquatilis*	1-5		
Clusterd Dock	*Rumex conglomeratus*			<1
Small-Friuted Bulrush	*Scirpus microcarpus*		1-5	1-5
Tansy Ragwort	*Senecio jacobaea*			<1
Bittersweet Nightshade	*Solanum dulcamara*		1-5	<1
Red Clover	*Trifolium pratense*			<1
Speedwell	*Veronica americana*			<1
Marsh Speedwell	*Veronica scutellata*	6-25		
Woody Layer:				
Red-Osier Dogwood	*Cornus sericea (C. stolonifera)*		1-5	
Pacific Ninebark	*Physocarpus capitatus*		1-5	
Poison Oak	*Rhus diversiloba*		<1	
Nootka Rose	*Rosa nutkana*		1-5	
Clustered Rose	*Rosa pisocarpa*		6-25	26-50
Himalayan Blackberry	*Rubus discolor*		26-50	51-75
Evergreen Blackberry	*Rubus laciniatus*		1-5	
Willow	*Salix* spp.		1-5	1-5
Douglas' Spiraea	*Spiraea douglasii*		1-5	6-25
Snowberry	*Symphoricarpos albus*		1-5	<1

[1]Surveys conducted from October 6, 1993 to July 13, 1994 (From Merrifield 1994).
[2]Survey conducted on August 30, 1997.
[3]Survey conducted on September 3, 1997.

Table 4. Woody vegetation recorded in the sedge meadows, forested wetlands and the riparian corridors of the Lebanon Mitigation Bank Site and the Stolz Hill Reference Site on August 29, 30, 31, and September 3, 1997.

Common Name	Scientific Name	Average DBH (cm)		# Trees/ha		# Saplings/ha	
		Stoltz Hill Road Site	Lebanon Mitigation Site	Stoltz Hill Road Site	Lebanon Mitigation Site	Stoltz Hill Road Site	Lebanon Mitigation Site
Sedge Meadow:							
Black Hawthorn	*Crataegus douglasii*	14		10		312	
Oregon Ash	*Fraxinus latifolia*	21		35		321	
Forested Wetland:							
Black Hawthorn	*Crataegus douglasii*	23		64			
Oregon Ash	*Fraxinus latifolia*	44	38	1634	2024	2196	800
Cultivated Pear	*Pyrus communis*	29		21			
Riparian Zone:							
Big-leaf Maple	*Acer macrophyllum*					29	
Red Alder	*Alnus rubra*					20	3
Red-Osier Dogwood	*Cornus sericea*	18		3		373	95
Black Hawthorn	*Crataegus douglasii*					41	
Oregon Ash	*Fraxinus latifolia*	33	35	38	32	145	80
Pacific Ninebark	*Physocarpus capitatus*						48
Black Cottonwood	*Populus trichocarpa*	88		6			
Cultivated Apple	*Pyrus malus*	25		3			
Willow	*Salix* spp.	21	32	23	16	558	875

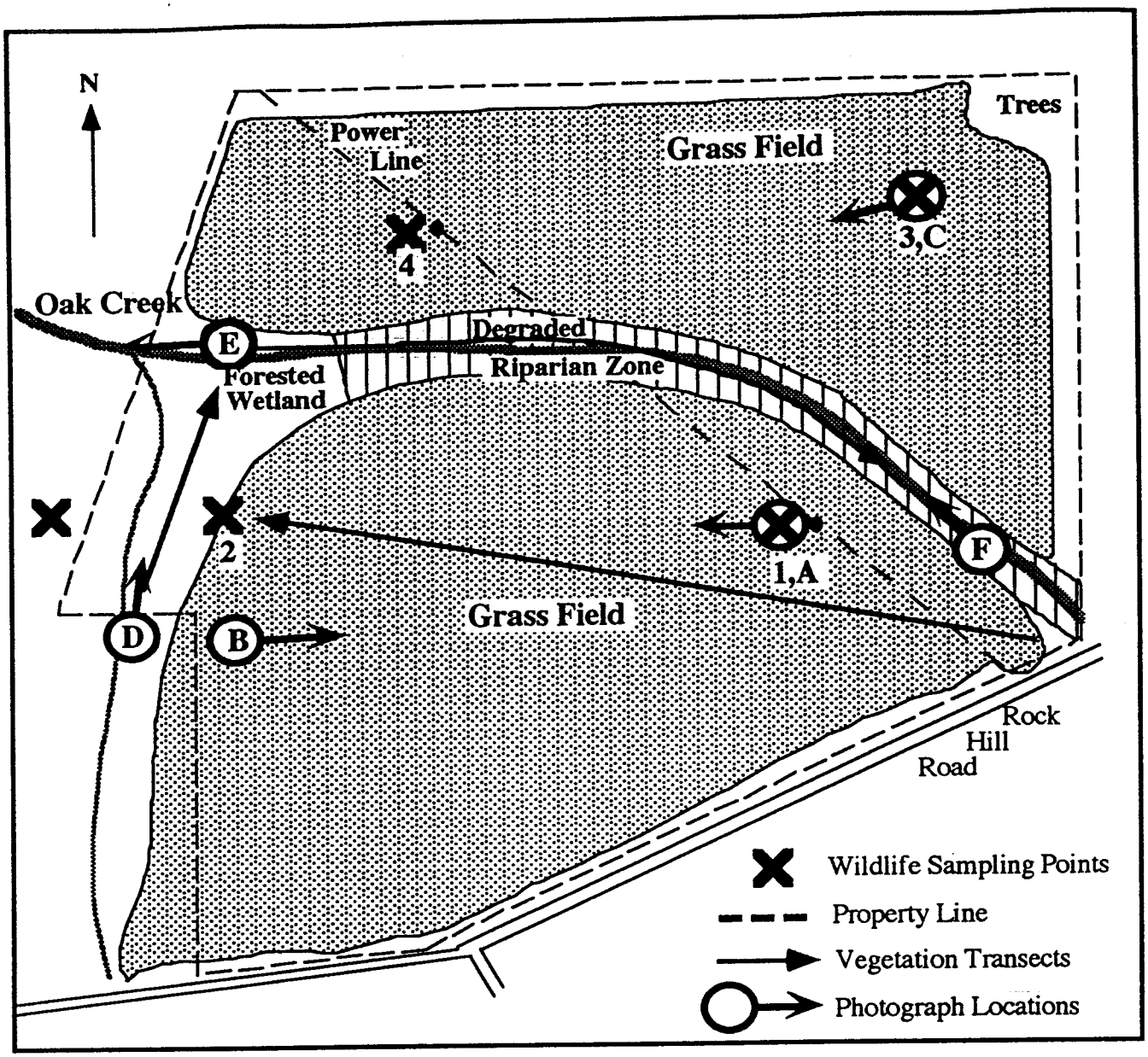

Figure 1. Site map for the Lebanon, Oregon Mitigation Bank Site prior to restoration.

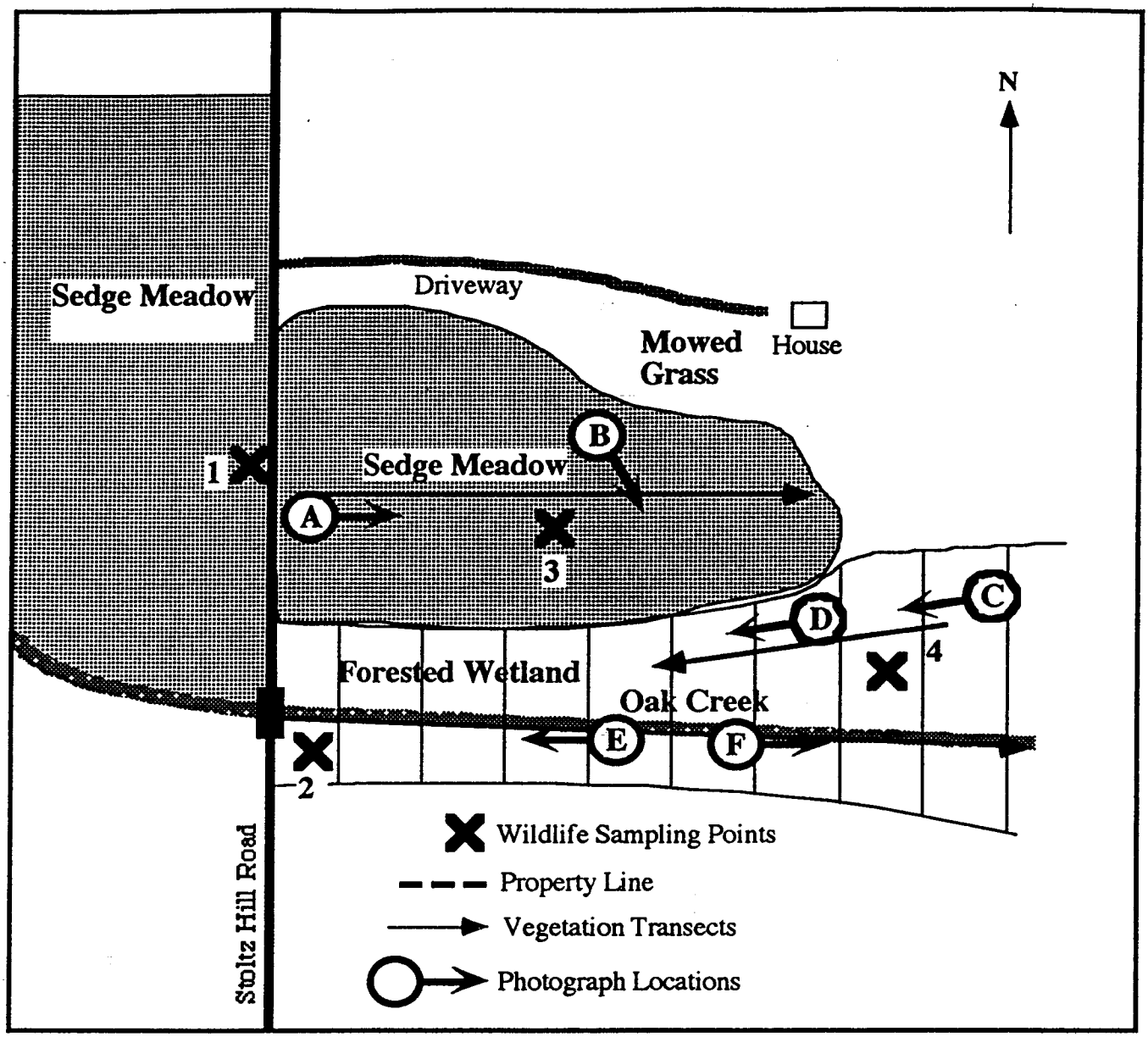

Figure 2. Site map for the Stoltz Hill Road Reference Wetland Site.

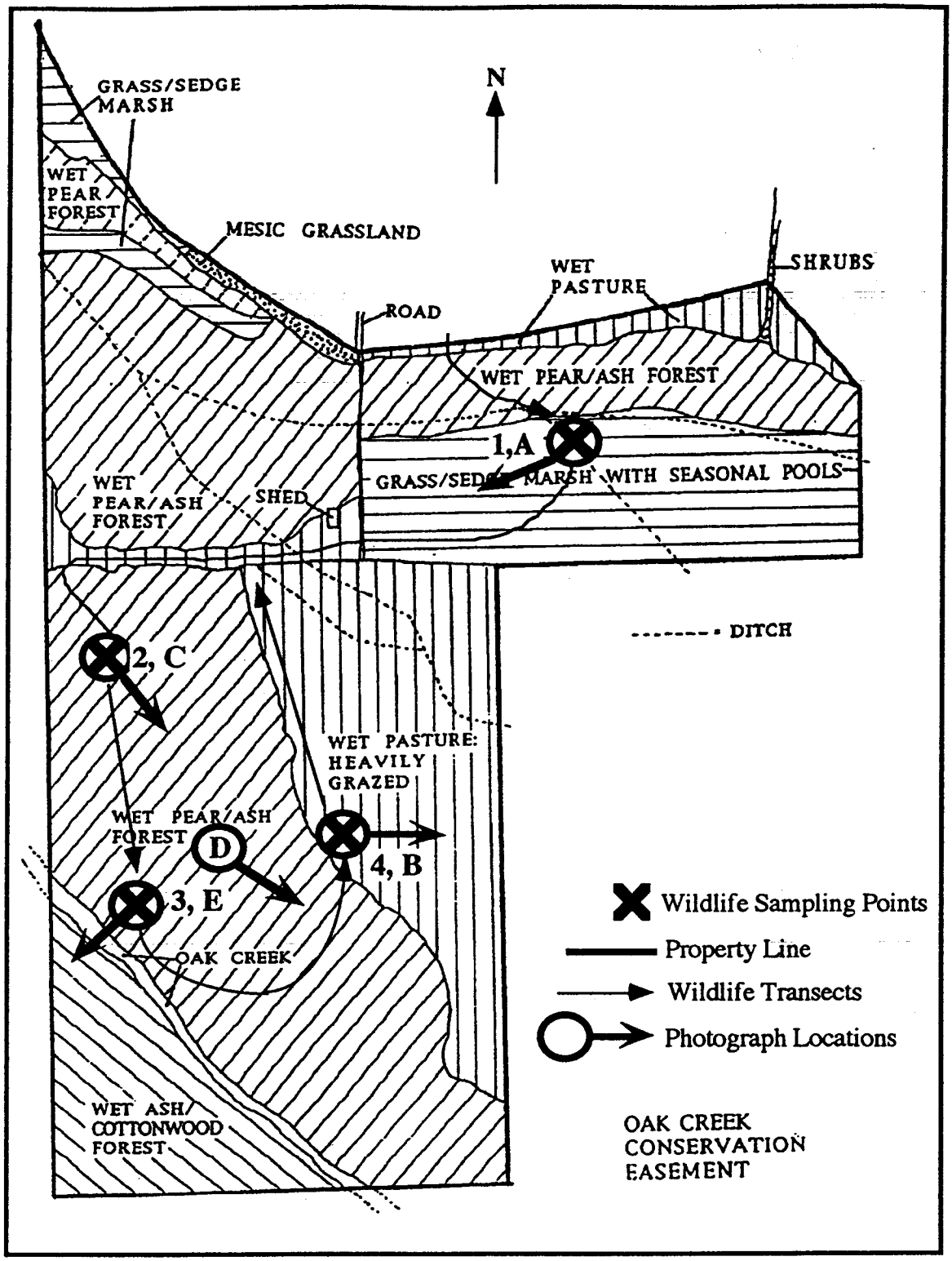

Figure 3. Site map for the U.S. Fish and Wildlife Reference Wetland Site (adapted from Merrifield 1994).

Figure 4. Grass field at the Lebanon Mitigation Bank prior to restoration on September 3, 1997. Photograph taken at location A (Fig.1) facing West.

Figure 5. Grass field at the Lebanon Mitigation Bank prior to restoration on September 3, 1997. Photograph taken at location B (Fig.1) facing East.

Figure 6. Grass field at the Lebanon Mitigation Bank prior to restoration on September 3, 1997. Photograph taken at location C (Fig. 1) facing Southwest.

Figure 7. Forested wetland at the Lebanon Mitigation Bank prior to restoration on September 3, 1997. Photograph taken at location D (Fig. 1) facing North.

Figure 8. Oak Creek at the Lebanon Mitigation Bank prior to restoration on September 3, 1997. Photograph taken at location E (Fig. 1) facing West

Figure 9. Oak Creek at the Lebanon Mitigation Bank prior to restoration on September 3, 1997. Photograph taken at location F (Fig. 1) facing Northwest

Figure 10. Sedge meadow at the Stoltz Hill Road Reference Site on August 30, 1997. Photograph taken at location A (Fig.2) facing East.

Figure 11. Sedge meadow at the Stoltz Hill Road Reference Site on August 30, 1997. Photograph taken at location B (Fig.2) facing Southeast.

Figure 12. Forested wetland at the Stoltz Hill Road Reference Site on August 30, 1997. Photograph taken at location C (Fig.2) facing West.

Figure 13. Forested wetland at the Stoltz Hill Road Reference Site on August 30, 1997. Photograph taken at location D (Fig.2) facing West.

Figure 14. Oak Creek, above an abandoned beaver dam, at the Stoltz Hill Road Reference Site on August 30, 1997. Photograph taken at location E (Fig.2) facing West.

Figure 15. Oak Creek at the Stoltz Hill Road Reference Site on August 30, 1997. Photograph taken at location E (Fig.2) facing East.

Figure 16. Sedge meadow at the U.S. Fish and Wildlife Conservation Easement on July 2, 1997. Photograph taken at location A (Fig.3) facing Southwest.

Figure 17. Sedge meadow at the U.S. Fish and Wildlife Conservation Easement on July 2, 1997. Photograph taken at location B (Fig.3) facing East.

Figure 18. Forested wetland at the U.S. Fish and Wildlife Conservation Easement on July 2, 1997. Photograph taken at location C (Fig.3) facing South.

Figure 19. Forested wetland at the U.S. Fish and Wildlife Conservation Easement on July 2, 1997. Photograph taken at location D (Fig.3) facing Southeast.

Figure 20. Riparian zone along Oak Creek at the U.S. Fish and Wildlife Conservation Easement on July 2, 1997. Photograph taken at location E (Fig.3) facing East.

Appendix 1. Vegetation recorded in the grass field (proposed sedge meadow) at the Lebanon, OR Mitigation Bank Site on August 31, 1997. Ten sampling locations were randomly sampled along a transect parallel to the long axis of the habitat type.

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Ground Cover[2]:													
Dead Grass Mat								76-95	76-95			2	16-25
Exposed Soil/Rock							26-50					1	1-5
Herbaceous Layer[2]:													
Alopecurus pratensis		1-5				6-25						2	1-5
Anagallis arvensis		1-5										1	<1
Anthemis cotula											x	0	<1
Avena fatua											x	0	<1
Bidens frondosa											x	0	<1
Cerastium viscosum											x	0	<1
Cirsium vulgare											x	0	<1
Cultivated Grass						1-5	51-75	26-50	1-5	1-5		5	6-25
Cultivated Rye Grass	96-100	96-100	96-100	96-100	76-95	51-75						6	51-75
Cyperus acuminatus											x	0	<1
Daucus carota											x	0	<1
Digitaria sanguinalis											x	0	<1
Echinochloa crus-galli											x	0	<1
Eleocharis ovata											x	0	<1
Eleocharis palustris											x	0	<1
Epilobium ciliatum ssp. *watsoni*											x	0	<1
Fraxinus latifolia											x	0	<1
Gnaphalium palustre			1-5	1-5	1-5	6-25		6-25	6-25	76-95		7	6-25
Holcus lanatus											x	0	<1
Hypericum anagalloides											x	0	<1
Hypochaeris radicata											x	0	<1
Lotus corniculatus											x	0	<1
Lotus purshiana											x	0	<1

Appendix 1. (continued)

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Ludwigia palustris											x	0	<1
Lythrum hyssopifolia											x	0	<1
Madia glomerata											x	0	<1
Mentha pulegium											x	0	<1
Navarretia squarrosa											x	0	<1
Panicum capillare											x	0	<1
Plagiobothrys figuratis											x	0	<1
Plantago lanceolata											x	0	<1
Polygonum spp.											x	0	<1
Rorippa curvisiliqua						1-5						1	<1
Rubus discolor											x	0	<1
Rubus laciniatus											x	0	<1
Rumex acetosella											x	0	<1
Senecio vulgaris									1-5			1	<1
Solanum nigrum											x	0	<1
Solanum sarrachoides											x	0	<1
Spergula arvensis											x	0	<1
Stanleya confertiflora											x	0	<1
Taraxacum officinale											x	0	<1
Trifolium pratense		1-5										1	<1
Verbascum blattaria											x	0	<1

[1]Vegetation found along transects but not in sampling plots.

[2]One meter square plots were sampled to identify the ground cover layer and herbaceous layer.

Appendix 2. Vegetation recorded in the forested wetland at the Lebanon, OR Mitigation Bank Site on September 3, 1997. Seven sampling locations were randomly sampled along a transect parallel to the long axis of the habitat type.

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Ground Cover[2]:													
Moss		6-25	6-25	1-5		51-75						4	6-25
Exposed Soil/Rock				51-75	6-25		1-5					3	6-25
Herbaceous Layer[2]:													
Camassia quamash											x	0	<1
Carex densa											x	0	<1
Carex deweyana				6-25	26-50							2	6-25
Carex feta						26-50						1	6-25
Carex lanuginosa (C. pellita)					26-50							1	6-25
Carex obnupta		26-50										1	6-25
Carex unilateralis		6-25	1-5	6-25	26-50	26-50						5	6-25
Cultivated Grass	51-75											1	6-25
Dipsacus fullonum			1-5									1	<1
Geum macrophyllum											x	0	<1
Holcus lanatus											x	0	<1
Juncus effusus											x	0	<1
Juncus patens			51-75									1	6-25
Mentha piperita		6-25									x	0	<1
Phalaris arundinacea												1	1-5
Poa trivialis	6-25	6-25	6-25		1-5	6-25	76-95					6	6-25
Polystichum munitum						1-5						1	<1
Prunella vulgaris			1-5			1-5						2	<1
Rubus discolor			1-5			1-5						2	<1
Rubus laciniatus		1-5			6-25	1-5						3	1-5
Rumex conglomeratus						1-5						1	<1
Solanum dulcamara		1-5										1	<1
Veronica scutellata			1-5									1	<1

Appendix 2. (continued)

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Woody Layer[3]:													
Rosa eglanteria		1-5	1-5			1-5						3	1-5
Rosa pisocarpa				1-5	1-5							2	<1
Rubus discolor		1-5	1-5	1-5	6-25	6-25	1-5					6	6-25
Rubus laciniatus		6-25	6-25	1-5	6-25	6-25	1-5					6	6-25

[1] Vegetation found along transects but not in sampling plots.

[2] One meter square plots were randomly sampled along a transect parallel to the long axis of the habitat type.

[3] Woody vegetation was recorded in a 10 m radius surrounding the one meter square plots.

Appendix 3. Vegetation recorded in the riparian zone along Oak Creek at the Lebanon, OR Mitigation Bank Site on September 3, 1997. Ten sampling locations were randomly sampled along a transect parallel to the long axis of the habitat type.

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Ground Cover[2]:													
Eleocharis acicularis				6-25	1-5	1-5	51-75	1-5	6-25			6	6-25
Exposed Rock/Soil								26-50		51-75		2	6-25
Herbaceous Layer[2]:													
Alisma plantago-aquatica											x	0	<1
Aster hallii					1-5							1	<1
Bidens frondosa											x	0	<1
Carex lanuginosa (C. pellita)											x	0	<1
Daucus carota					1-5							1	<1
Dipsacus fullonum			6-25									1	1-5
Echinochloa crus-galli							1-5					1	<1
Eleocharis ovata	6-25					1-5	26-50	1-5	51-75			5	6-25
Eleocharis palustris						1-5						1	<1
Epilobium ciliatum ssp. *watsoni*											x	0	<1
Equisrtum spp.											x	0	<1
Glyceria occidentalis					76-95	26-50	6-25					3	6-25
Juncus effusus					6-25							1	1-5
Juncus ensifolius	1-5											1	<1
Leersia oryzoides							1-5			1-5		2	<1
Lotus corniculatus	6-25	6-25	26-50	76-95		51-75			1-5	51-75		7	26-50
Ludwigia palustris	6-25					1-5	1-5	1-5	26-50			5	6-25
Lysimachia nummularia		1-5							6-25			2	1-5
Mentha piperita		26-50	6-25	26-50		26-50		1-5		6-25		6	6-25
Mentha pulegium											x	0	<1
Myosotis scorpioides				1-5					1-5			2	<1
Phalaris arundinacea		6-25										1	1-5
Polygonum hydropiperoides	1-5											1	<1
Polygonum spp.		1-5		1-5	1-5	1-5						4	1-5

Appendix 3. (continued)

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Prunella vulgaris	1-5		1-5									2	<1
Rubus discolor	6-25							6-25				2	1-5
Rumex conglomeratus											x	0	<1
Salix spp.	1-5	1-5	1-5							1-5		4	1-5
Scirpus microcarpus		6-25										1	1-5
Senecio jacobaea											x	0	<1
Solanum dulcamara						1-5						1	<1
Trifolium pratense	1-5											1	<1
Veronica americana	1-5			1-5	1-5							3	<1
Woody Layer[3]:													
Rosa pisocarpa		1-5	51-75	6-25	26-50	6-25	51-75		26-50	6-25		8	26-50
Rubus discolor	51-75	51-75	26-50	51-75	26-50	51-75	51-75	51-75	51-75	76-95		10	51-75
Spiraea douglasii					51-75			6-25				2	6-25
Symphoricarpos albus				1-5		1-5						2	<1

[1] Vegetation found along transects but not in sampling plots.

[2] One meter square plots were randomly sampled along a transect parallel to the long axis of the habitat type.

[3] Woody vegetation was recorded in a 10 m radius surrounding the one meter square plots.

Appendix 4. Vegetation recorded in the sedge meadow at the Stolz Hill Road Reference Site on August 29, 1997. Ten sampling locations were randomly sampled along a transect parallel to the long axis of the habitat type.

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Ground Cover[2]:													
Eleocharis acicularis			76-95	26-50	76-95	76-95		1-5				5	26-50
Moss	26-50	76-95	1-5	96-100								4	6-25
Herbaceous Layer[2]:													
Agrostis capillaris (A. tenuis)							1-5	6-25	1-5			3	1-5
Brodiaea hyacinthina					6-25							1	1-5
Camassia quamash											x	0	<1
Carex densa						1-5						1	<1
Carex feta			1-5					1-5				2	<1
Carex lanuginosa (C. pellita)	1-5	6-25										2	1-5
Carex obnupta			26-50				26-50			51-75		3	6-25
Carex unilateralis						1-5				1-5		2	<1
Centaurium erythraea					1-5							1	<1
Crataegus douglasii									26-50	1-5		2	1-5
Dianthus deltoides											x	0	<1
Dipsacus fullonum								1-5	1-5			2	<1
Epilobium ciliatum ssp. *watsoni*					1-5							1	<1
Fraxinus latifolia	1-5	1-5	1-5			1-5		1-5				5	1-5
Galium parisiense							1-5					1	<1
Geum macrophyllum	1-5			1-5								2	<1
Holcus lanatus								26-50	51-75			2	6-25
Hypericum anagalloides			6-25	1-5		1-5		1-5				4	1-5
Juncus articulatus											x	0	<1
Juncus effusus	26-50	26-50		6-25					6-25	1-5		5	6-25
Juncus ensifolius			1-5	1-5		1-5		6-25	76-95			5	6-25
Juncus tenuis	1-5			1-5			1-5					3	1-5
Mentha pulegium					6-25							1	1-5

Appendix 4. (continued)

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Myosotis laxa							1-5					1	<1
Parentucellia viscosa								1-5				1	<1
Phalaris arundinacea	51-75	26-50	26-50	26-50	26-50	76-95	26-50	6-25	1-5	26-50		10	26-50
Poa pratensis	1-5			26-50		1-5	26-50					4	1-5
Rosa pisocarpa				6-25								1	1-5
Rubus laciniatus	1-5	1-5		6-25								3	1-5
Senecio jacobaea											x	0	<1
Spiraea douglasii		6-25										1	1-5
Veronica scutellata			1-5		6-25	6-25						3	1-5
Woody Layer[3]:													
Rosa nutkana	1-5											1	<1
Rosa pisocarpa	1-5	1-5		6-25					1-5			4	1-5
Rubus discolor			6-25					1-5	1-5	1-5		4	1-5
Rubus laciniatus	1-5	1-5	1-5	6-25	1-5		1-5	1-5	1-5	1-5		9	1-5
Spiraea douglasii	6-25	1-5	1-5					1-5		1-5		5	1-5

[1] Vegetation found along transects but not in sampling plots.

[2] One meter square plots were randomly sampled along a transect parallel to the long axis of the habitat type.

[3] Woody vegetation was recorded in a 10 m radius surrounding the one meter square plots.

Appendix 5. Vegetation recorded in the forested wetland at the Stolz Hill Road Reference Site on August 29, 1997. Three sampling locations were randomly sampled along a transect parallel to the long axis of the habitat type.

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Ground Cover[2]:													
Eleocharis acicularis											x	0	<1
Exposed Soil/Rock		51-75	26-50								x	2	26-50
Moss	6-25	1-5	1-5									3	6-25
Herbaceous Layer[2]:													
Bidens frondosa	1-5											0	0
Camassia quamash												1	1-5
Carex deweyana	6-25	6-25	6-25								x	0	<1
Carex obnupta												3	6-25
Deschampsia cespitosa											x	0	<1
Epilobium ciliatum ssp. *watsoni*	6-25										x	0	<1
Geum macrophyllum	6-25	6-25										1	6-25
Juncus patens	1-5	6-25	51-75									2	6-25
Juncus tenuis	1-5											3	26-50
Ludwigia palustris												1	1-5
Lysimachia nummularia	1-5										x	0	<1
Myosotis laxa												1	1-5
Polygonum spp.	1-5										x	0	<1
Polystichum munitum	1-5											1	1-5
Prunella vulgaris	1-5											1	1-5
Pyrus communis												1	1-5
Rubus laciniatus		1-5	1-5								x	0	<1
Rumex conglomeratus	26-50	1-5										2	1-5
Stachys mexicana	26-50											2	6-25
Veronica americana	1-5											1	6-25
												1	1-5
Woody Layer[3]:													
Rosa eglanteria	1-5											1	1-5

Appendix 5. (continued)

Species	Percent Cover for Each Sampling Location (%)										Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10			
Rosa pisocarpa	1-5	1-5	26-50									3	6-25
Rubus discolor	1-5											1	1-5
Rubus laciniatus		1-5	26-50									2	6-25
Spiraea douglasii	6-25	1-5	6-25									3	6-25

[1]Vegetation found along transects but not in sampling plots.

[2]One meter square plots were randomly sampled along a transect parallel to the long axis of the habitat type.

[3]Woody vegetation was recorded in a 10 m radius surrounding the one meter square plots.

Appendix 6. Vegetation recorded in the riparian zone along Oak Creek at the Stolz Hill Road Reference Site on August 30, 1997. Eleven one meter square plots were randomly sampled along a transect parallel to the long axis of the habitat type.

Species	Percent Cover for Each Sampling Location (%)											Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10	11			
Ground Cover[2]:														
Eleocharis acicularis	1-5	26-50	26-50		6-25		1-5		1-5				6	6-25
Exposed Soil/Rock		1-5		6-25			6-25	26-50					4	6-25
Herbaceous Layer[2]:														
Alisma plantago-aquatica		1-5			1-5		1-5	1-5					4	1-5
Carex obnupta				6-25	26-50				51-75				3	6-25
Cornus sericea (C. stolonifera)							6-25						1	1-5
Dipsacus fullonum									1-5				1	<1
Eleocharis ovata	1-5	6-25			6-25		1-5	1-5					5	1-5
Eleocharis palustris		6-25											1	1-5
Equisetum spp.												x	0	<1
Eryngium petiolatum												x	0	0
Glyceria occidentalis						1-5			26-50	26-50	26-50		4	6-25
Juncus articulatus		1-5											1	<1
Juncus effusus					1-5					26-50			2	1-5
Leersia oryzoides			1-5	1-5	6-25		1-5	26-50	6-25				6	6-25
Lotus corniculatus	1-5		6-25		6-25	1-5		1-5	6-25	6-25	6-25		8	6-25
Ludwigia palustris	1-5	1-5			26-50		76-95	6-25	1-5	26-50	6-25		8	26-50
Lysimachia nummularia	1-5		1-5	1-5	1-5						1-5		5	1-5
Mentha arvensis												x	0	<1
Mentha piperita			26-50			1-5					6-25		3	1-5
Mentha pulegium							1-5				6-25		2	<1
Paspalum distichum	76-95		76-95										2	6-25
Phalaris arundinacea						1-5		1-5		1-5	1-5		4	1-5
Polygonum aviculare								1-5					1	<1
Polygonum hydropiperoides	6-25		1-5	1-5	1-5	1-5			1-5				6	1-5
Polygonum spp.						26-50							1	1-5
Potamogeton natans											1-5		1	<1
Potamogeton spp.							26-51						2	1-6
Rubus discolor				1-5									1	<1

Appendix 6. (continued)

Species	Percent Cover for Each Sampling Location (%)											Between Plots[1]	Number of Occurances	Average % Cover
	1	2	3	4	5	6	7	8	9	10	11			
Rubus laciniatus				1-5									1	<1
Salix spp.		6-25			1-5	1-5			1-5				4	1-5
Scirpus microcarpus		6-25	1-5	1-5									3	1-5
Solanum dulcamara						26-50							1	1-5
Woody Layer[3]:														
Physocarpus capitatus					6-25	1-5		1-5	6-25				4	1-5
Rhus diversiloba									1-5				1	<1
Rosa nutkana							6-25						1	1-5
Rosa pisocarpa		6-25	6-25	1-5	6-25			6-25	6-25		6-25		7	6-25
Rubus discolor	26-50	6-25	51-75	6-25	26-50	51-75	51-75	51-75	51-75	51-75	26-50		11	26-50
Rubus laciniatus	1-5	6-25	1-5	6-25							6-25		5	1-5
Spiraea douglasii		1-5		6-25	6-25	1-5				1-5			5	1-5
Symphoricarpos albus	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5	1-5		11	1-5

[1] Vegetation found along transects but not in sampling plots.

[2] One meter square plots were randomly sampled along a transect parallel to the long axis of the habitat type.

[3] Woody vegetation was recorded in a 10 m radius surrounding the one meter square plots.

Appendix 7. Description of the vegetation at the U.S. Fish and Wildlife Service Conservation Easement (Taken from Merrifield, 1994).

OAK CREEK CONSERVATION EASEMENT

" First visit: October 6, 1993.
Second visit: April 20, 1994.
Third visit: May 23, 1994.
Fourth visit: July 13, 1994.

The canopy of the riparian woodland in the western and part of the northern portion of this easement is dominated by pear (*Pyrus communus* L.), which is either a very old orchard reproducing by seed or a non-orchard escape. Ash *(Fraxinus latifolia)* and hawthorne *(Crataegus douglasii)* are less common canopy trees, but hawthorne is common in the understory. Ash is more common as a canopy tree in the south than in the north part of the easement. Under the canopy, there are several small creek branches and sloughs as well as low, undrained areas of various sizes (1 to 10m diam) where the water table is above the soil surface in April but not later than July. Upland vegetation - mostly herbs but a few shrubs - occurs under the canopy where the soil level is a little higher, while obligate and facultative aquatic species occupy the low areas. Several weedy species have invaded the upland areas, including English daisy *(Bellis perennis)*, red dead-nettle *(Lamium purpureum)*, and dandelion *(Taraxacum officinale)*. *Aulacomnium palustre*, a moss usually occurring in bogs (i.e., *Sphagnum* -influenced areas) is well distributed among the grasses in the wet areas. Mound-type anthills are dotted throughout the wet forest.

There was evidence of heavy cow use in the forest in October 1993, as well as one pile of deer droppings. Ash shoots were eaten off nearly at ground level. Some large trees had been chewed by beavers a few years back. The forest herb layer was heavily grazed and trampled in July 1994.

The non-forested areas consist of marshy areas and wet pastures (wet areas apparently planted for and/or used as pasture), including one heavily grazed pasture. The latter pasture is grazed to the point at which few species are readily discernable. Recognizeable species correlate well with those of non-grazed wet pastures. Other open areas with a high water level are marshes dominated by sedges *(Carex* spp.) and aquatic or semi-aquatic grasses. Occasional ditches harbor deeper water emergents, while frequent lower areas hold standing water during the wettest seasons. These low areas contain some species characteristic of vernal pools, such as coyote thistle *(Eryngium petiolatum)* and at least two popcorn flowers *(Platiogothrys* species). I considered plants in these seasonal pool areas as aquatic species, and abbreviations indicate this.

No measurements were available to calculate scale on the vegetation map. The easement covers 69.56 acres. "

Appendix 8. Standard field forms for vegetation surveys.

Herbaceous Vegetation Sampling - 1m x 1m quadrat

Observer: _____

Site: _____

Date: _____

Habitat Type (Transect): _____

Sample Point: _____

Species	Percent Cover					
	1-5%	6-25%	26-50%	51-75%	76-95%	96-100%
Example: Thypha latifolia			x			
Example: Glyceria occidentalis		x				

Herbaceous Vegetation Along Transect Not Observed in Quadrats

Observer: _____

Site: _____

Date: _____

Habitat Type (Transect): _____

Species	Location	Notes
Example: Lomatium bradshawii	between quadrats 1 and 2	
Example: Melissa officianalis	between quadrats 1 and 2	

Trees and Shrubs - 10 m radius

Observer: _____

Site: _____

Date: _____ % Open _____

Habitat Type (Transect): _____ Sample # _____

Species	Tree or Sapling Measurement		% Cover by Species
	DBH (cm)	# of Saplings	
Example: Fraxinus pennsylvanica	20		
Example: Salix spp.		3	

Appendix G
Wildlife Monitoring Reports

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June 19, 1997

Proposed Wildlife Monitoring: Lebanon, Oregon Mitigation Bank Site

Prepared for: R.P. Novitzki & Associates, Inc.

Objectives:

- Develop a sampling protocol for wildlife observations at the Oregon mitigation bank site and a nearby reference riverine wetland system,
- Document baseline conditions at the Oregon mitigation bank site prior to restoration, and
- Compare the distribution and abundance of wildlife assemblages at the Oregon mitigation bank site to a reference riverine wetland system.

Work to be Completed:

The intent of this monitoring program is to describe regional trends at the mitigation and reference sites by evaluating the abundance and distribution of all wildlife species. Monitoring will be conducted following the point count method developed for monitoring bird populations. A set of standardized methods was recently developed at the Symposium on Monitoring Bird Population Trends by Point Counts (Ralph et al. 1995). These censusing standards and a method developed by Grover and Baldassarre (1995) to measure bird species richness will be adapted for monitoring the abundance and distribution of birds, mammals, amphibians and reptiles.

The following is a brief outline of the sampling design:

1. Protocol
   a. Census stations will be located at the mitigation and reference sites and the locations will be permanently marked in the field to allow for consistent sampling in subsequent years.
   b. All individual birds, mammals, amphibians and reptiles detected within the mitigation and reference sites will be recorded during a 20 minute observation period. In addition, all wildlife observed while walking between census stations will be recorded (including direct and indirect measures).
   c. Wildlife recorded at a previous sampling station will not be recorded again.
   d. Only one observer will be permitted to count at a single station.
   e. A standard field form will be used to ensure compatibility of data taken between years.
   f. Location, breeding status, sex, and habitat type will also be recorded.

2. Sample Allocation
   a. 2 to 4 permanent census stations will be located in the field. The number of samples necessary to meet the program objectives is dependent upon maximizing the visual coverage of the sites and the final number will be determined in the field.

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July 7, 1997

Wildlife Monitoring: Lebanon, Oregon Mitigation Bank Site

Objectives:

- Develop a sampling protocol for wildlife observations at the Lebanon mitigation bank site and two nearby reference riverine wetland systems,
- Document baseline conditions at the Oregon mitigation bank site prior to restoration, and
- Compare the distribution and abundance of wildlife assemblages at the Oregon mitigation bank site to the two reference riverine wetland systems.

A. Sampling Protocol

The intent of this monitoring program was to describe regional trends at the Lebanon mitigation bank site and two reference wetland sites by evaluating the abundance and distribution of all wildlife species. Wildlife was monitored at the Lebanon mitigation bank site and the Stoltz Hill Road reference wetland site on June 28, 1997. Wildlife was monitored at the U.S. Fish and Wildlife reference site on July 2, 1997. Monitoring was conducted following the point count method developed for monitoring bird populations. A set of standardized methods was recently developed at the Symposium on Monitoring Bird Population Trends by Point Counts (Ralph et al. 1995). These censusing standards and a method developed by Grover and Baldassarre (1995) to measure bird species richness were adapted for monitoring the abundance and distribution of birds, mammals, amphibians and reptiles.

The following describes in detail how the monitoring was accomplished:

1. Wildlife Monitoring Protocol
   a. Four census stations were located at the mitigation site and each reference site (see Figs. 1-3).
   b. The locations of the census stations were permanently marked at the mitigation site with PVC pipes to allow for consistent sampling in subsequent years.
   c. Census stations were systematically located with a random starting point.
   d. All individual birds, mammals, amphibians and reptiles detected at the census station were recorded during a 15 minute observation period.
   e. Wildlife detected within a radius of 50 m surrounding the census station were recorded separately from those at all distances.
   f. Birds that were detected flying over the census station were recorded separately from those that were detected from within the vegetation (see data sheet).
   g. All wildlife observed while walking between census stations were recorded including direct (observed animals) and indirect (scat, tracks, bones, etc.) measures.

b. Systematic placement of samples without regard to current habitat configurations and a random starting point will be employed.
c. A combination of road and off-road point counts will be sampled.

3. Timing of Surveys
   a. Two surveys annually to be conducted in the winter and spring.
   b. Winter survey should be conducted between January 1-February 1.
   c. Spring surveys should be conducted between May 15-June 15.
   d. Surveys will be conducted between official sunrise and the ensuing 3-4 hours.
   e. No surveys will be conducted when it is raining, during heavy fog, or during high winds.

Deliverable:
1. Sampling protocol,
2. List and abundance of wildlife observed,
3. Description of wildlife habitat use, and
4. Standard field data sheets for future surveys.

Cost:
$500.00

h. Wildlife recorded at a previous sampling station was not recorded again.
i. Only one observer was permitted to count at a single station.
j. Standard field forms were used to ensure compatibility of data taken between years (included at the end of this report).
k. Location, behavior and habitat type were also recorded.

2. Timing of Surveys
   a. Two surveys annually to be conducted in the winter and spring.
   b. Winter survey should be conducted between January 1-February 1.
   c. Spring surveys should be conducted between May 15-June 15.
   d. Surveys should be conducted between official sunrise and the ensuing 3-4 hours.
   e. No surveys should be conducted when it is raining, during heavy fog, or during high winds.

3. Additional Recommendations
   a. Only observers able to identify birds by site and sound should conduct the monitoring.
   b. Counts should begin immediately when the observer reaches the census station.
   c. A bird flushed within 50 m of the station's center, as an observer approaches or leaves the station, should be counted as being at the station if the observer feels that this individual was not already counted.
   d. If a flock is encountered during a census period, it may be followed after the end of the observation period to determine its composition and size. An observer should follow a flock for no longer than 10 minutes.
   e. A bird or animal giving an unknown song or sound may be tracked down after the count period for confirmation.
   f. Recording data or bird songs with a tape recorder can help minimize the time that the observer spends looking at the data sheet.
   g. Contact the neighbor whose property abuts the southeast corner of the site prior to any wildlife surveys since we were informed that we would be shot for coming on the property without authorization.

B. Wildlife Usage

Lebanon Mitigation Bank Site

Twenty different bird species were identified at the Lebanon Mitigation Bank Site with a total of 86 birds recorded (Table 1, Fig. 1). A variety of birds were observed in the open cultivated fields, including mourning doves, American robins, European starlings, Brewer's blackbirds and savannah sparrows. Even though the grass fields were recently defoliated with a herbicide, many birds continue to forage on the remnant grass seed. One Canada goose was observed foraging on newly sprouted grass in the cultivated field in the southwestern portion of the property. Tree and barn swallows were observed flying over the cultivated fields, especially in the southeastern section. An American kestrel and red-tailed hawk were observed hunting over the open fields and were observed perching on the telephone poles within or at the edge of the field. Several willow flycatchers and song sparrows, and two rufous-sided towhees were observed throughout the degraded riparian zone. Black-capped chickadees, bushtits and Swainson's thrushes were only observed or heard in the western portion of the property that was forested. One black-crowned night heron was observed foraging in Oak Creek in the center of the property. A single downy

woodpecker (*Picoides pubescens*) was observed flying over the property to the tree stand in the northeastern corner of the site. It should be noted that the landowner's whose property abuts the southeastern corner of the site have several bird feeders that are probably attracting birds to the site.

Nutrias (*Myocastor coypus*) were plentiful at the Lebanon Mitigation Bank Site. Indications of their presence consist of: nutria trails from Oak Creek to the open field, nutria burrows along the bank of Oak Creek, hundreds of nutria pellets lining the berm of Oak Creek, one freshly killed juvenile nutria found next to census point 1, and eight nutria carcasses found along the north-central edge of Oak Creek (Table 4). These eight nutria carcasses along with two opossum (*Didelphis marsupialis*) carcasses were shot and several shell casings were found nearby. Red fox (*Vulpes fulva*) and raccoon (*Procyon lotor*) scat, and deer (*Odocoileus* spp.) tracks were observed along the edge of the degraded riparian zone. In addition, indications of deer bedding were found in a dense stand of reed canary grass surrounded by blackberry thickets at the edge of the forested wetland along Oak Creek (between census points 2 and 3). Numerous small fishes and the remains of a snake were observed in the degraded portion of Oak Creek.

Stoltz Hill Road Reference Wetland Site

Twenty-five different bird species were identified at the Stoltz Hill Road Reference Wetland Site, with a total of 96 birds recorded (Table 2, Fig. 2). A variety of birds were observed in the sedge meadows to the west and east of Stoltz Hill Road including: one killdeer, tree and barn swallows, red-winged blackbirds, song sparrows, and American robins. In addition, a black-crowned night heron and a belted kingfisher were observed foraging in Oak Creek at the Stoltz Hill Road bridge. The belted kingfisher was observed hunting from a perch on the telephone wires along the western side of Stoltz Hill Road. Black-capped chickadees, bushtits, an orange-crowned warbler, a common yellowthroat and a female black-headed grosbeak all were observed in the ash trees along the edge of the sedge meadow on the east side of Stoltz Hill Road. A Swainson's thrush, warbling vireo and chipping sparrow were heard in the forest wetland along Oak Creek.

A variety of other wildlife was observed at the Oak Creek bridge including a nutria swimming in Oak Creek, an adult bull frog (*Rana catesbeiana*), bull frog tadpoles and a number of small fishes (Table 5). A brush rabbit (*Sylvilagus bachmani*) was observed in the grass meadow along the driveway to the landowner's house. The current landowners informed us that they usually try to keep the sedge meadow portion of their property mowed but that they could not get access to the area with their tractor this year because the ground was too wet.

U.S. Fish and Wildlife Reference Wetland Site

Twenty-four different bird species were identified at the U.S. Fish and Wildlife Reference Wetland Site, with a total of 76 birds recorded (Table 3, Fig. 3). Very different avian assemblages were found at census stations 1 and 4 compared to station's 2 and 3. Barn swallows, a violet-green swallow, common yellowthroats, American goldfinches, savannah sparrows, and Western meadowlarks were observed in the grass/sedge meadows and the wet pasture that received heavy grazing by cattle. Many black-capped chickadees were observed along the edge of the pear/ash forest and the wet pasture that receives

grazing. A ring-necked pheasant and mourning dove, twenty starlings, American robins, song sparrows and an American goldfinch all were heard or observed in the wet pasture to the north of the property. Willow flycatchers, Swainson's thrushes, a Brewer's blackbird, a chipping sparrow, and rufous-sided towhees were heard or observed in the wet pear/ash forest. The third census station had the greatest species diversity. This point fell within the wet pear/ash forest along Oak Creek but was much more open than most of the forested areas, with fewer ashes and more open grass/blackberry thickets. Five willow flycatchers, cedar waxwings, bushtits, black-capped chickadees, an orange-crowned warbler, a Brewer's blackbird, two rufous-sided towhees, and a male black-headed grosbeak all were observed in the pear trees of this area. Several cedar waxwings were also observed in the pear trees near the shed in the central portion of the property.

Other wildlife observed include: red fox scat and one set of deer tracks found by the shed in the center of the property and a hornets' nest found along the western fence of the wet grazed pasture (Table 6). Unidentified moths with black and red markings were observed in a tall stand of *Eleocharis palustris* near the shed as well.

Summary

Comparable levels of wildlife abundance were observed at all three wetland sites. A greater diversity of avian species was observed at the two reference wetlands which is expected given the greater plant coverage, more developed plant community types, and lower levels of disturbance. More indirect measurements of mammals were observed at the Lebanon mitigation bank site because the site was much more open (80% defoliated) and tracks and scat could easily be observed compared to the two reference sites. Even though the riparian zone of Oak Creek at the mitigation bank site is greatly degraded, a variety of birds and mammals continue to use it.

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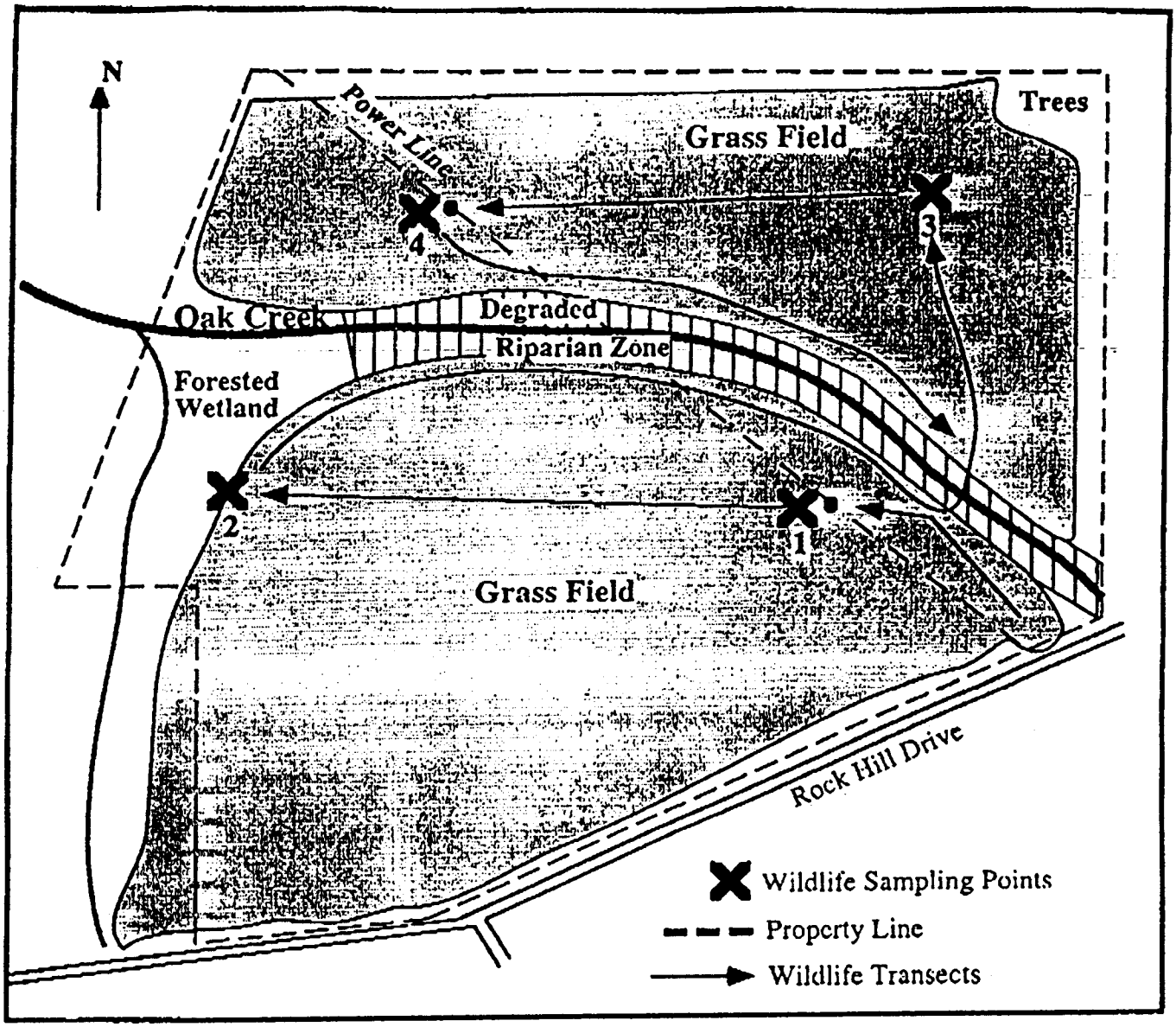

Figure 1. Site map for the Lebanon, Oregon Mitigation Bank Site prior to restoration.

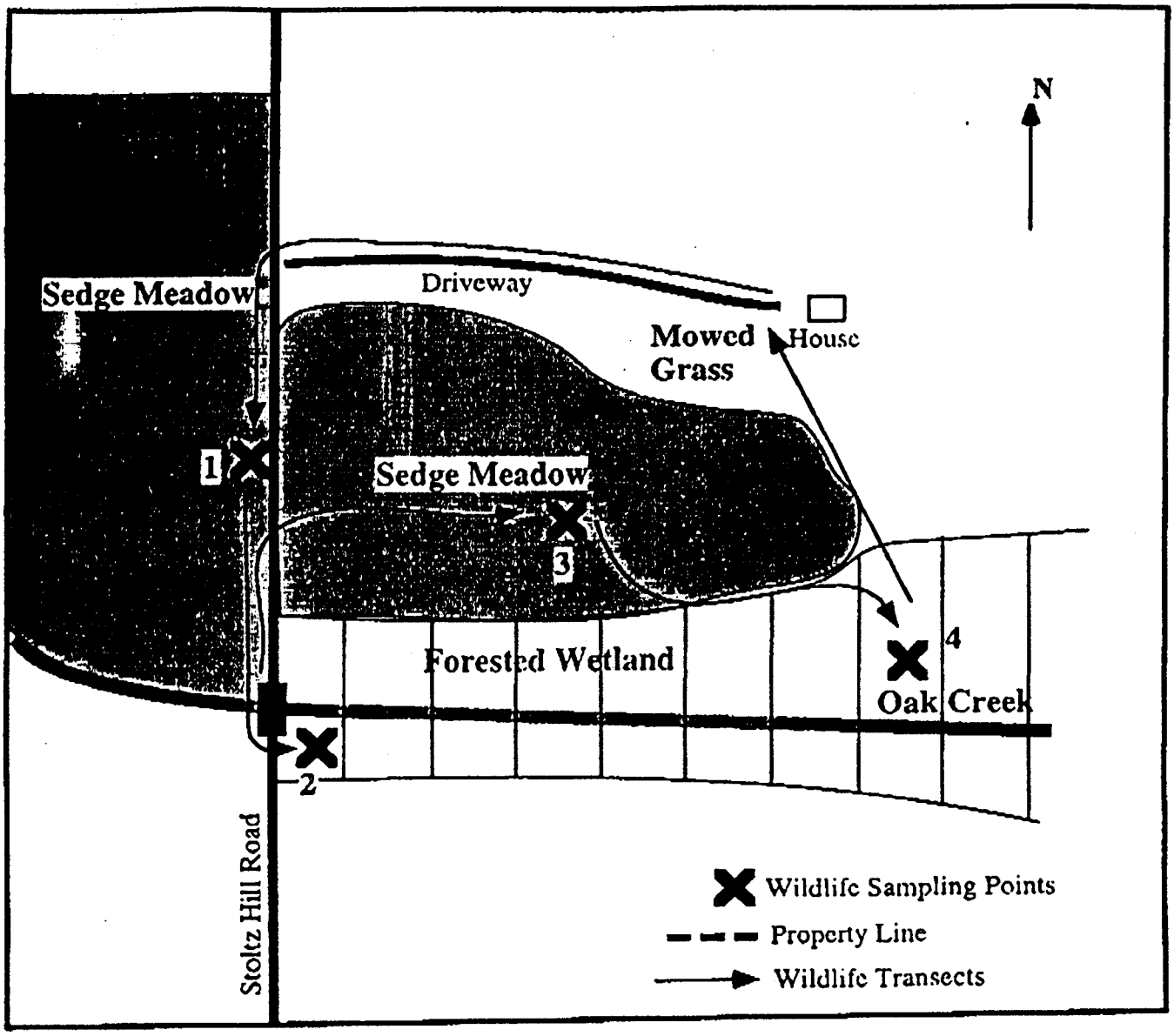

Figure 2. Site map for the Stoltz Hill Road Reference Wetland Site.

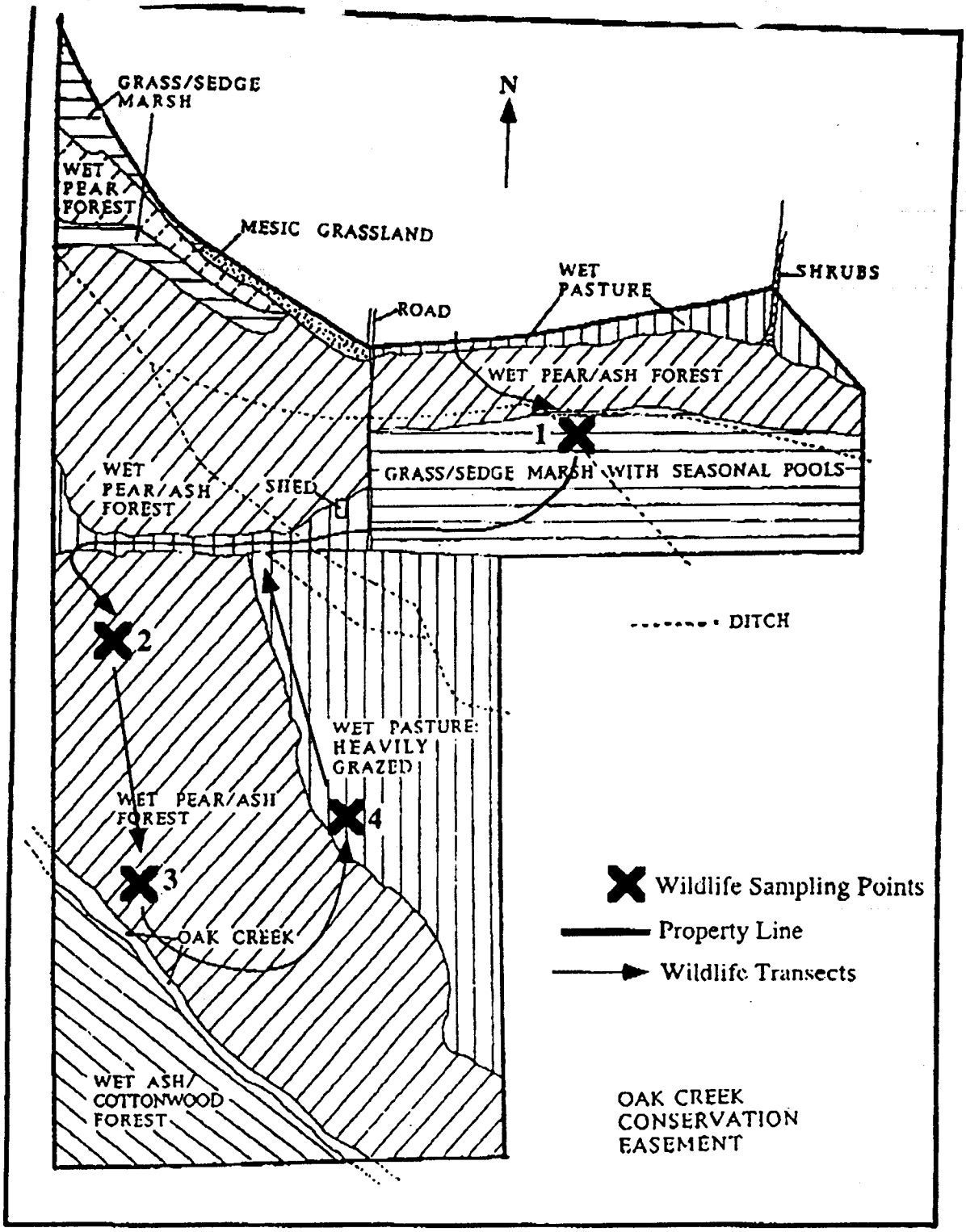

Figure 3. Site map for the U.S. Fish and Wildlife Reference Wetland Site (adapted from Merrifield 1994).

Table 1. Avian sightings at the Lebanon, Oregon Mitigation Bank Site on June 28, 1997.

Species					
Common Name	Scientific Name	≤ 50 m	> 50 m	Fly-overs	TOTAL
Black-crowned Night Heron	*Nycticorax nycticorax*	--	1	--	1
Ring-necked Pheasant	*Phasianus colchicus*	--	1	--	1
Red-tailed Hawk	*Buteo jamaicensis*	--	1	--	1
American Kestrel	*Falco sparverius*	1	--	--	1
Mourning Dove	*Zenaida macroura*	--	--	6	6
Willow Flycatcher	*Empidonax traillii*	7	3	--	10
Tree Swallow	*Tachycineta bicolor*	--	--	5	5
Barn Swallow	*Hirundo rustica*	2	--	5	7
American Crow	*Corvus brachyrhynchos*	--	4	1	5
Scrub Jay	*Aphelocoma coerulescens*	--	4	--	4
Black-capped Chickadee	*Parus atricapillus*	1	1	--	2
Bushtit	*Psaltriparus minimus*	--	--	2	2
American Robin	*Turdus migratorius*	7	7	3	17
Swainson's Thrush	*Catharus ustulatus*	--	2	--	2
European Starling	*Sturnus vulgaris*	--	--	4	4
Brewer's Blackbird	*Euphagus cyanocephalus*	--	--	2	2
Fox Sparrow	*Passerella iliaca*	--	2	--	2
Song Sparrow	*Melospiza melodia*	6	4	--	10
Savannah Sparrow	*Passerculus sandwichensis*	--	2	--	2
Rufous-sided Towhee	*Pipilo erythrophthalmus*	--	2	--	2
				Total =	86

Table 2. Avian Sightings at the Stoltz Hill Road Reference Wetland Site on June 28, 1997.

Species					
Common Name	Scientific Name	≤ 50 m	> 50 m	Fly-overs	TOTAL
Black-crowned Night Heron	*Nycticorax nycticorax*	1	1	--	2
Killdeer	*Charadrius vociferus*	1		--	1
Ring-necked Pheasant	*Phasianus colchicus*		1	--	1
Belted Kingfisher	*Ceryle alcyon*	1		--	1
Mourning Dove	*Zenaida macroura*	1		--	1
Willow Flycatcher	*Empidonax traillii*	1	1	--	2
Tree Swallow	*Tachycineta bicolor*	--	--	4	4
Barn Swallow	*Hirundo rustica*	--	--	20	20
American Crow	*Corvus brachyrhynchos*	--	1	5	6
Black-capped Chickadee	*Parus atricapillus*	6	2	--	8
Bushtit	*Psaltriparus minimus*	--	--	4	4
American Robin	*Turdus migratorius*	7	6	--	13
Swainson's Thrush	*Catharus ustulatus*	--	1	--	1
Cedar Waxwing	*Bombycilla cedrorum*	--	--	1	1
Warbling Vireo	*Vireo gilvus*	--	1	--	1
Orange-crowned Warbler	*Vermivora celata*	--	1	--	1
Common Yellowthroat	*Geothlypis trichas*	--	1	--	1
Brewer's Blackbird	*Euphagus cyanocephalus*	--	--	3	3
Red-winged Blackbird	*Agelaius phoeniceus*	3	1	--	4
Chipping Sparrow	*Spizella passerina*	1	--	--	1
Fox Sparrow	*Passerella iliaca*	1	--	2	3
Song Sparrow	*Melospiza melodia*	8	5	--	13
Rufous-sided Towhee	*Pipilo erythrophthalmus*	1	--	1	2
Black-headed Grosbeak	*Pheucticus melanocephalus*	1	--	--	1
				Total =	95

Table 3. Avian Sightings at the U.S. Fish & Wildlife Reference Wetland Site on July 2, 1997.

Species					
Common Name	Scientific Name	≤ 50 m	> 50 m	Fly-overs	TOTAL
Canada Goose	*Branta canadensis*	--	1	--	1
Mallard	*Anas platyrhynchos*	--	--	1	1
Ring-necked Pheasant	*Phasianus colchicus*	--	1	--	1
Mourning Dove	*Zenaida macroura*	--	1	--	1
Willow Flycatcher	*Empidonax traillii*	5	2	--	7
Violet-Green Swallow	*Tachycineta thalassina*	--	--	1	1
Barn Swallow	*Hirundo rustica*	--	--	5	5
American Crow	*Corvus brachyrhynchos*	--	--	1	1
Scrub Jay	*Aphelocoma coerulescens*	--	2	--	2
Black-capped Chickadee	*Parus atricapillus*	4	5	--	9
Bushtit	*Psaltriparus minimus*	--	--	2	2
American Robin	*Turdus migratorius*	3	4	2	9
Swainson's Thrush	*Catharus ustulatus*	3	1	--	4
Cedar Waxwing	*Bombycilla cedrorum*	2	--	2	4
Orange-crowned Warbler	*Vermivora celata*	--	1	--	1
Common Yellowthroat	*Geothlypis trichas*	1	1	--	2
Brewer's Blackbird	*Euphagus cyanocephalus*	--	1	--	1
Western Meadowlark	*Sturnella neglecta*	1	2	--	3
Chipping Sparrow	*Spizella passerina*	1	--	--	1
Song Sparrow	*Melospiza melodia*	3	4	--	7
Savannah Sparrow	*Passerculus sandwichensis*	4	2	--	6
Rufous-sided Towhee	*Pipilo erythrophthalmus*	3	1	--	4
Black-headed Grosbeak	*Pheucticus melanocephalus*	1	--	--	1
American Goldfinch	*Cardeulis tristis*	1	1	--	2
				Total =	76

able 4. Wildlife observations between points at the Lebanon, Oregon Mitigation Bank Site on June 28, 1997.

Species	Quantity	Habitat Type	Location	Behavior	Notes
Fox	1 pile of scat	edge of grass field and stream	between car & pt.1		berries in scat
Raccoon	1 pile of scat	edge of grass field and stream	between car & pt.1		berries in scat
Nutria	1 carcass, young	grass field	between stream & pt. 1	dead	fresh carcass w/neck ripped open
Fox	1 pile of scat	middle of grass field	between 1 &2		along drainage way
American Robin	2	grass fields	between pts. 1&2	flying	
Mourning Dove	1	grass fields	between pts. 1&2	flying	
Downy Woodpecker	1	flying	between pts. 1&2	flying	
Nutria	42 pellets	grass field, near pt. 2	20 meters from pt. 2		along drainage way
Deer	2 sets of tracks	edge of field	at point 2		one large set and one small set
Nutria	100's of pellets	Oak Creek & field	between pts. 2&3		pellets all along field edge!
Fox	1 pile of scat	edge of field	between pts. 2&3		
Mourning Dove	2	grass fields	between pts. 2&3	on ground	
Barn Swallow	3	grass fields	between pts. 2&3	flying	
Snake	1	in Oak Creek	between pts. 2&3	dead	just tail
Fishes (minnows)	~50	in Oak Creek	between pts. 2&3	schooling	in pool
Canada Goose	1	landed in south field	between pts. 3&4	feeding	
Mourning Dove	5	grass fields	near point 4	flying	
Savannah Sparrow	2	grass fields	near point 4	flying	
Nutria	8	edge of field	between pt. 4 & Oak Creek	dead	several carcasses in a small area
Opossum	2	edge of field	between pt. 4 & Oak Creek	dead	several carcasses in a small area

Table 5. Wildlife observations between points at the Stoltz Hill Road Reference Wetland Site on June 28, 1997.

Species	Quantity	Habitat Type	Location	Behavior	Notes
Brush Rabbit	1	grass meadow	along driveway	feeding	
Bull Frog	1	Oak Creek	by bridge		heard croaking
Nutria	1 set of tracks	bank of Oak Creek	under bridge		den under bridge
Nutria	1	in Oak Creek	under bridge	swimming	small juvenile
Fishes	10 -15	in Oak Creek	under bridge	feeding	<1" long
Bull Frog Tadpoles	5	in Oak Creek	under bridge	feeding	~2" long

able 6. Wildlife observations between points at the U.S. Fish and Wildlife Reference Wetland Site on July 2, 1997.

Species	Quantity	Habitat Type	Location	Behavior	Notes
American Robin	2	cultivated field	before pt. 1	flying	
Song Sparrow	3	cultivated field	before pt. 1	sitting	on fence row
European Starlings	20	cultivated field	before pt. 1	feeding	
American Goldfinch	1	cultivated field	before pt. 1		
Song Sparrows	3	cultivated field	between pts. 1&2		on telephone wires
Cedar Waxwings	4	pear trees	between pts. 1&2	feeding	
Rufous-sided Towhee	1	pear-ash forest	between pts. 3&4		
Hornet	1 nest	along west fence of grazed prairie	after pt. 4		Watch Out!
Red Fox	scat	by pole barn	after pt. 4		
Red and Black Moths	10	in *Eleocharis palustris*	after pt. 4		
Deer	1 set of tracks	by pole barn	after pt. 4		

Point Count Data Form for Wildlife Observations

Observer: _____

Site: _____

Date: _____

Start Time: _____ End Time: _____

Sample Point: _____

Species	Habitat Type	≤50 m	>50 m	Fly-over	Notes
Example: Song Sparrow	grass field	III			feeding
Example: American Robin	shrubs along Oak Creek		I		song only

Wildlife Observations: Between Points

Site: _____

Date: _____

Time: _____

Observer: _____

Species	Quantity	Habitat Type	Location	Behavior	Notes
Example: Deer	1 set of tracks	grass field along Oak Creek	between Pt. 1&2	. . .	. . .
Example: Nutria	25 pellets	river bank of Oak Creek	between points 2&3	. . .	. . .

Appendix H
Statement of Qualifications

RICHARD P. NOVITZKI Professional Hydrologist

EDUCATION: BS in Civil Engineering, University of North Dakota, 1964; Graduate courses (MS) in Hydraulics and Hydrology at Cornell University, Ithaca, NY, 1967-1968; Registered Professional Hydrologist, American Institute of Hydrology; Registered Professional Wetland Scientist, Society of Wetland Scientists; Senior Executive Development Program, U.S. Office of Personnel Management.

EMPLOYMENT HISTORY: Private consultant, 1995 to present; Research Scientist, ManTech Environmental Technology, Inc., Corvallis, OR, 1990-1995; District Chief, US Geological Survey, Water Resources Division, Champaign, IL, 1988-1990; Subdistrict Chief, US Geological Survey, Water Resources Division, Ithaca, NY, 1979-1988; Hydrologist, US Geological Survey, Water Resources Division, Madison, WI, 1968-1979; Hydraulic Engineer/Hydrologist, US Geological Survey, Water Resources Division, St. Paul, MN, 1964-1967.

YEARS OF EXPERIENCE BY SPECIALIZATION:

- 3 years consulting professional hydrologist and professional wetland scientist - Provided hydrologic design for wetland mitigation banks in Wisconsin and Oregon. Provided hydrologic design for compensatory wetland mitigation projects. Provided hydrologic design for stream restoration and management plans. Conducted hydrologic site assessments. Applied HGM concepts in wetland assessments. Participated in development of Oregon's wetland mitigation banking rules. Participated in review of Washington's development of the HGM approach.

- 5 years managing national programs - ManTech's program supporting the National Marine Fisheries Service, U.S. Fish and Wildlife Service, and U.S. EPA's West Coast Salmon Restoration Program and EPA's Environmental Management and Assessment Program for wetlands (EMAP-Wetlands).

  The West Coast Salmon Restoration project assessed available literature to establish a framework for developing conservation efforts. This required synthesis of available information to identify characteristics of healthy aquatic ecosystems, watershed processes than affect aquatic ecosystems, and regulations and practices that protect aquatic ecosystems. Assembled and directed a specialized team of aquatic biologists, hydrologists, and forest and rangeland scientists to complete project..

  The EMAP-Wetlands program involved research to develop relations among wetland functions, values, and indicators to develop indices of wetland condition. This required developing a multidisciplenary team of wetland ecologists, aquatic biologists, data base management specialists, and geographic information system specialists to plan, conduct, and report on the research.

- 2 years managing the US Geological Survey's Water Resources Division (WRD) program for the state of Illinois. The program included research on contaminant movement from Super Fund sites; ground water flow modeling; innovative technologies for measuring surface water flow, disseminating data in real time to users (e.g., satellite transmission), and flood warning programs; impacts of agricultural practices on ground water quality; and maintaining the surface and ground water quantity and quality monitoring network.

- 9 years managing the USGS Ithaca, NY office, conducting the US Geological Survey's WRD program in the western half of New York State. The program involved research addressing multiphase contaminant transport in ground water (associated with the Niagara Falls/Love Canal area); radionuclide transport in ground water (associated with the West Valley Nuclear Waste Repository); fractured rock hydrology (associated with Niagara Falls Superfund Sites); conservative contaminant transport associated with nitrate contamination in Olean New York; impact of conservation tillage practices on ground water quality; impact of waste disposal practices on ground water quality; water quality functions of wetlands; leachate treatment and metal fixation in artificial wetlands; and maintaining the surface and ground water quantity and quality monitoring network.

- 11 years conducting water resources research in the US Geological Survey WRD office, Madison, Wisconsin. This research involved ground water flow modeling, ground water recycling, cold water fishery/hatchery studies, stream/ground water interaction studies, flow augmentation studies, lake and wetland hydrology studies, developing lake and wetland hydrologic classifications, local and regional water supply and water resource assessments, and establishing and maintaining monitoring networks.

- 3 years conducting river basin studies, collecting streamflow and ground water data, and water quality samples.

- 4 years presenting ground-water hydrology and wetland hydrology seminars at Cornell University, Syracuse University, and SUNY Binghamtom; conducted a conference and published proceedings on the Impact of Wast Storage and Disposal on Ground-Water Resources, 1982.

EXPERIENCE OVERVIEW:

Mr. Novitzki is an experienced hydrologist and wetland scientist. He is also an experienced manager of complex, multidiscipline, national and regional programs. He has over 33 years research experience describing wetland hydrology, developing a hydrologic classification system for wetlands, and quantifying wetland water balance; describing ground water hydrology, including aquifer description, developing equations describing ground water balance, and ground water modeling; and monitoring surface water resources, describing ground water and surface water interactions, developing satellite data relay networks, developing flood warning systems, describing water quality characteristics of lakes, streams, and wetlands, and describing water level fluctuations in lakes and wetlands. He is recognized as an international expert on wetland hydrology, and is also recognized for his skills and knowledge in surface and ground water hydrology.

DIRECT SUPERVISORY AND PROJECT MANAGEMENT EXPERIENCE:

Program Management. Mr. Novitzki, as a research scientist with Mantech Environmental Technology, Inc., Corvallis, OR, served as Project Manager of the National Marine Fisheries Service (NMFS) Salmon Conservation Project for one year and as Technical Director of EPA's Environmental Monitoring and Assessment Program for 3.5 years. He directed development of the Management Plan to conduct the NMFS Salmon Conservation study (coordinated through the Office of Personnel Management) and coordinated activities of ManTech scientists synthesizing a technical foundation document, identifying planning and monitoring strategies, and developing training materials for federal agency staff. He directed the EMAP-Wetlands program, directed development of a research plan, and coordinated activities of EMAP scientists with the academic community and other components of the EMAP program, other EPA Offices, and other federal agencies to develop a program to develop protocols to monitor the condition of the Nation's wetland resources. Staff under his direction developed a pilot study research plan for salt marshes in Louisiana, and subsequently, a pilot study research plan for prairie pothole wetlands in the Midwest.

Mr. Novitzki also directed the water resources research and data collection activities of USGS-WRD in Illinois. He managed a staff of 65 and a $3.8M program that included surface water, ground water, and water quality programs, the USGS National Water Quality Assessment (NAWQA) program, US EPA Superfund sites, US EPA Great Lakes National Program Office (GLNPO) activities, International Joint Commission (IJC) activities, storm-runoff modeling, fractured rock hydrology, agricultural chemical research, GIS applications and land use from SLAR. He developed a team that increased program size and diversity, attracted specialized professionals including National Research Program staff and senior scientists from State and Federal agencies, coordinated USGS programs with existing State and Federal water resource programs and needs, and established new programs with Illinois EPA, GS, Water Survey, and DOC; and USEPA, SCS, CSRS, ARS, and C of E.

Mr. Novitzki also directed the water resources research and data collection activities of USGS-WRD in western New York. He increased the staff from 6 to 28 and increased the program from $500K to $2.6M to include surface water, ground water, and water quality programs, NURP study, Nuclear Hydrology, USEPA Superfund sites, solute transport modeling, and fractured rock hydrology. Under his direction, his developed research proposals to 1) compare ground water quality impacts of conventional and conservation tillage practices and 2) construct wetlands to treat landfill leachate and describe the processes that occur in the root zone. The tillage proposal ranked number

one in National Research Merit competition in 1986 and the wetland proposal ranked number four in 1987. Mr. Novitzki was a visiting scientist at Cornell University from 1984-1988 and taught ground water hydrology seminars at Cornell University, Syracuse University, and SUNY Binghamton. He conducted a conference and published proceedings on Impact of Waste Storage and Disposal on Ground-Water Resources in 1982.

TECHNICAL EXPERIENCE AND ACCOMPLISHMENTS:

Wetland Restoration

Mr. Novitzki developed the hydrologic design for wetland restoration or creation at the Champoeg State Park, at several mitigation sites in the Portland and Salem vicinities, and near Grant's Pass in Oregon. He also developed the hydrologic design for the first private wetland mitigation bank in Wisconsin and for one of the first private mitigation banks in Oregon.

Stream Restoration

Mr. Novitzki has provided the hydrologic design for several stream restorations in Portland and Lake Oswego, Oregon. These were primarily streams receiving increased runoff as a result of urbanization and exhibiting degraded habitat and excessive erosion. He also participated in developing long-term stream habitat improvement and stream management plans for Tryon Creek State Park, Lake Oswego, Oregon and for the City of Corvallis, Oregon.

Research providing an ecosystem perspective for salmon conservation

Mr. Novitzki and his ManTech staff assessed available literature to provide a framework for salmon conservation efforts based on knowledge of aquatic habitat characteristics, watershed practices that affect aquatic habitats, and current regulations.

Research to describe wetland function and condition

Mr. Novitzki and his ManTech staff participated in research to identify indicators of wetland condition and function, developing indices and techniques for using indicator measurements to describe wetland condition, and developing protocols for assessing condition of wetlands relative to reference wetlands in the region.

Research to describe wetland hydrology

Mr. Novitzki's early research conducted in Wisconsin provided a basic understanding of the hydrologic characteristics of different wetland classes and publication of a hydrologic wetland classification system. Subsequent research expanded application of these basic hydrologic concepts to wetlands in selected states in the east, the northeast, and the northwest. Mr. Novitzki's hydrologic classification and hydrologic functional relations have been incorporated into hydrogeomorphic (HGM) techniques, being developed by several federal agencies under the leadership of the US Army Corps of Engineers, to provide nationally consistent analysis of wetland function, condition, and mitigation success. Mr. Novitzki has applied his understanding of wetland hydrology in designing wetland restorations, creations, and wetland mitigation banks in Oregon and Wisconsin.

Modeling ground water flow

Mr. Novitzki has had experience developing and applying ground water flow models and solute transport models. However, much of that experience occurred before moving into management in 1979.

Water resource monitoring

Mr. Novitzki has designed surface water, ground water, and water quality monitoring networks for small research projects of a few hundred acres, for local regions within states, and for entire states. These networks supported ground water or surface water modeling projects, regional resource assessments, flood warning programs for multi-county regions, and multi-state water quality assessment such as represented by USGS's NAWQA program. He has instituted long-term hydrologic monitoring programs in several wetlands in Oregon.

PROFESSIONAL REGISTRATIONS:

Registered Professional Wetland Scientist
Registered Professional Hydrologist

PROFESSIONAL AFFILIATIONS:

National Wetland Technical Council
American Institute of Hydrology
American Water Resources Association
Association of State Wetland Managers
Society of Wetland Scientists

PUBLICATIONS:

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Company Description

Pacific Habitat Services, Inc. (PHS) is a multidisciplinary environmental consulting firm. It was founded in 1993 and has quickly established itself as one of the most diversified in the Northwest. We offer professional expertise in wetland science, wildlife biology, hydrology, soil science, environmental toxicology, botany, environmental design and planning, and construction.

Clients benefit from our depth of experience, and enjoy the added value of project efficiencies that result from thorough, integrated planning. Our environmental experts include **John van Staveren**, one of the top wetland scientists in the Northwest, **Richard P. Novitzki**, a nationally recognized wetland hydrologist, and **Greg Linder, Ph.D.**, one of the Northwest's leading toxicologists and ecologists.

The PHS natural resources division offers a broad range of services from natural resource site assessment through planning, design, permit processing, and construction. We are one of the few Northwest environmental consulting firms that is also a licensed general contractor, with expertise in design and construction, excavation and grading, and plant installation for wetland mitigation and stream restoration projects.

We also have a growing communication division which manages a broad range of specialty publishing and education programs. The firm publishes *Hortus West* magazine (formerly *Hortus Northwest*), the leading native plant directory and journal in western North America.

PHS clients include fish and wildlife departments, parks, public works departments, municipalities, real estate developers, engineering firms, and private property owners throughout the Pacific Northwest.

Wetlands

From the assessment of property to determine if it includes wetland to designing a project and guiding it through the regulatory process, wetland services are diverse and complex.

Many firms provide some of the services you'll need. Few provide the comprehensive range of wetland services, the depth of experience, and the resulting economies that PHS offers. Whether you need a specific service or a complete package of wetland services, from initial assessment through design, construction and monitoring of your project, the PHS wetland experts are ideally equipped to help you get the most for your budget.

Our team is headed by one of the Northwest's most experienced wetland scientists, **John van Staveren,** who has successfully managed more than 600 wetland projects. Our wealth of experience enables us to effectively tailor strategies to help you complete your projects within the limits of regulations and site requirements—on time and on budget.

- Preliminary site assessment
- Wetland determination and delineation
- Mitigation design and planning
- Wetland removal/fill permit processing
- Construction
- Monitoring

Stream Restoration

Across America, more and more cities and towns are discovering the advantages of clean waterways. Healthy streams contribute to civic pride. They enhance property values and water quality. Often, they open up new recreational opportunities. And healthy waterways can survive the damaging effects of floods much more successfully than degraded streams.

At PHS we specialize in finding practical, workable ways to help our clients restore streams within the highly variable project limits imposed by community priorities, schedules and budgets. We don't just fix the symptoms—our solutions begin with understanding the causes behind the problem and how they can be effectively remediated.

- Watershed characteristic assessment
- Hydrological assessment
- Water quality assessment
- Fish and wildlife inventories
- Riparian inventories
- Streambed and soils analysis
- Bioengineering design and construction
- In-stream modifications for fish habitat enhancement
- Riparian revegetation with native plants
- Erosion control on banks and slopes
- Interpretive programs and signage for school and community education

Environmental Construction & Design

Successful construction of sensitive projects involving wetlands, streams, wildlife habitat and bioengineering requires professionals who understand both physical construction technology *and* the environmental issues.

PHS provides site assessments, delineations, project design, permit approval *and* project construction. Our experienced construction and design team includes topnotch wetland scientists and ecologists.

Wetlands

- Wetland design and mitigation
- Excavation and grading
- Planting and fertilizing
- Groundwater monitoring wells
- Weed removal and maintenance

Stream Restoration

- Streambank armoring
- Erosion control treatment
- Check dams, gabions, and large boulders
- Riparian revegetation
- Fish habitat enhancement structures

Wildlife Habitat

- Revegetation for wildlife food and shelter
- Nest boxes for birds, bats and small mammals

Wet Meadow Restoration Plan for Champoeg State Park

Location: St. Paul, Oregon
Client: Oregon Parks and Recreation Department

PHS created a plan to restore to a meadow the historic wetland conditions that were likely present 100 years ago when Champoeg Village was a thriving community. The site had been drained with open ditches. The focus of the project was on hydrological investigation. PHS installed 20 monitoring wells to determine groundwater characteristics across the meadow, analyzed the soil for plant nutrients, conducted a vegetation survey, and created a hydrological model for new zones of saturation that would be created by damming the ditches.

Benefit: We created a clear and detailed restoration plan that could be implemented within the project budget. We provided construction specifications and schedules, planting plans, native species lists, weed maintenance guidelines, and hydrological and vegetative monitoring protocols. After implementing our recommendations, additional wetland was created as modeled.

Wetland Delineation & Section 422 Wildlife Habitat Assessment for the Arlington Heights Subdivision

Location: Washington County, Oregon
Client: MNWR Partnership

PHS conducted a wetland delineation and a Section 422 wildlife habitat assessment for the Arlington Heights subdivision in Washington County, Oregon. The 30-acre development site contains two drainages with forested riparian areas. A portion of the drainages and the riparian areas are mapped as significant natural resources by Washington County. PHS delineated the limits of Waters of the State within the property and defined the boundaries of significant natural resources.

Benefits: Our analysis allowed the client to maximize the portion of the property that can be developed, while not impacting the sensitive features of the site. The balance between resource protection and development won the approval of the county.

Wetland Determination & Delineation for a 65-Acre residential subdivision

Location: Sandy, Oregon
Client: Hacienda Community Development Corporation

PHS delineated jurisdictional wetlands and characterized existing conditions on a 65-acre site within the City of Sandy's Urban Growth Boundary which is a combination of open pastures and coniferous forest in the Tickle Creek watershed. Jurisdictional wetlands included palustrine scrub-shrub and palustrine forested. Our report documented site topography, hydrology, plant communities and wetland boundaries, which was presented to the regulatory agencies for review.

Benefits: We delineated and flagged jurisdictional wetland boundaries and produced a concise report for the regulatory agencies and local planning department.

Wetland Mitigation Design & Permitting for Murray North Residential Development and the TRI-MET Murray West Park-&-Ride Facility.

Location: Beaverton, Oregon
Client: Trammell Crow Residential, Pacific Northwest

PHS designed a wetland mitigation area and prepared a joint permit application, with supporting documentation, to compensate for 0.5 acres of wetland impact associated with the construction of the Murray North residential development and TRI-MET's Murray West Park and Ride facility. The 26-acre development site is adjacent to the light rail line and station. The construction of the site requires permits from the Oregon Division of State Lands and the US Army Corps of Engineers.

Benefits: The documentation prepared by PHS will help Trammell Crow Residential, Pacific Northwest, and TRI-MET obtain permits from the Oregon Division of State Lands and the US Army Corps of Engineers. The timely preparation and submittal of the application package will allow development in the 1996 construction season.

Wetland Permitting for an 6.5-Acre light-industrial development site
Location: Portland, Oregon
Client: PacTrust

PHS delineated jurisdictional wetlands and prepared a wetland mitigation plan and permit application for a proposed development site in the Columbia South Shore area of north Portland. PHS prepared a document which discussed the location and the quality of the wetland areas, the proposed development plan, the proposed impacts to the wetlands, and a conceptual wetland mitigation plan. Wetland functions and conditions were assessed using the *Oregon Freshwater Wetland Assessment Methodology.* Submittal of the Joint Permit Application required coordination between the client, the City of Portland, the Division of State Lands and the U.S. Army Corps of Engineers. Mitigation was proposed off-site at the Columbia South Shore wetland mitigation bank.

Benefits: Delineated and assessed the function and conditions of a jurisdictional wetland in the Columbia South Shore area of north Portland. PHS produced a concise report documenting existing conditions, location and quality of the wetland areas, and conceptual wetland mitigation. This document and a Joint Permit Application was presented to the regulatory agencies.

Wetland & Natural Resource Determination and Delineation for the proposed Starpointe development
Location: Portland, Oregon
Client: Pacific Land Management

PHS delineated jurisdictional wetlands/waters of the state and assessed the natural resources on an approximately 70-acre site located in the Johnson Creek watershed in southeast Portland. The site is protected by the Johnson Creek Basin Protection Plan and an Environmental Conservation overlay zone. PHS coordinated the natural resource assessment and proposed development plans in order to minimize impacts yet meet development and water quality needs.

Benefits: The planners and developers received up-front information about the site's natural resources, which let them minimize impacts and meet the goals of the Johnson Creek Basin Protection Plan.

Permit extension for the in-water period associated with a hydraulic dredging project in the Columbia River, Oregon.

Location: Gresham, Oregon
Client: Gresham Sand and Gravel

PHS summarized fisheries concerns associated with a hydraulic dredging operation in the Columbia River. Because the major flood of February 1996 forced Gresham Sand and Gravel to halt dredging for several weeks, they did not have enough time to complete it before running into the deadline stipulated in their permit with the Oregon Division of State Lands. We conducted an analysis of fish migration times and the potential for endangered fish species to use the dredging area. Our findings, along with a summary of the dredging operations, was submitted for review to the Oregon Department of Fish and Wildlife and the National Marine Fisheries Service.

Benefits: The PHS investigation found that extending the work period will not pose a danger to any rare, threatened, or endangered fish species. Presented with our findings, the Oregon Division of State Lands granted Gresham Sand & Gravel a 30-day extension to their dredging period.

Stream Restoration on Blue Heron Creek

Location: Lake Oswego, Oregon
Client: City of Lake Oswego

The focus of the project was to stop bank failure and streambed headcutting on a section of Blue Heron Creek, a flashy perennial stream. PHS studied the stream morphology and designed structures to protect two critical areas. We installed in-channel deflector logs, modified biologs, modified live crib walls, coir erosion control fabric, and native plants.

Benefits: During the large flood in early February, 1996 (possibly a 100-year event), our upstream deflection structure incurred some damage but remained in place and contributed to keeping the channel from seriously eroding the bank. The downstream deflection structures and crib wall worked exactly as designed and incurred no damage; they completely protected the bank.

Dixon Creek Enhancement Demonstration Project Plan & Design

Location: Corvallis, Oregon
Client: City of Corvallis

PHS created a plan the City used to demonstrate stream enhancement techniques that are viable throughout its other urban streams. Our plan identified relatively inexpensive ways to improve wildlife habitat and fish habitat, increase the diversity of native plant species, reduce damaging erosion, and provide opportunities for public education. The focus of the project was on hydrological investigation of stream reach and upstream watershed conditions. Site assessment included soils analysis, erosion potential, flooding potential, vegetation, wildlife habitat, and fish habitat.

Benefit: We created a clear and detailed restoration plan that was used by the city and a large group of community volunteers. We provided construction specifications and schedules, planting plans, native species lists, weed maintenance guidelines, and hydrological and vegetative monitoring protocols.

Riparian Restoration Plan for Fairview Creek
Location: Fairview Village; Fairview, Oregon
Client: Holt & Haugh, Inc.

PHS created a riparian restoration planting plan and vegetation management plan for Fairview Creek and Clear Creek within the Fairview Village site. The firm conducted a vegetation survey, soil survey, groundwater survey, and shade assessment. Our herbicide consultant wrote specifications for herbicide applications to kill reed canarygrass and Himalayan blackberry.

Benefits: We created a restoration plan which significantly reduced the risk of project failure. This was accomplished by thoroughly investigating the varied soil and water characteristics of the site. We identified 37 plant habitat zones along the stream reach, and created specific planting plans for each. These zones differed by hydrology, soil composition, soil nutrients, landscape position, or shade.

Revegetation of Fairview Creek Riparian Area
Location: Fairview Village, Oregon
Client: Holt & Haugh, Inc., Portland, Oregon

PHS construction crew installed the native plants in the 37 zones identified in the restoration plan. Our herbicide consultant directed the application of herbicide to kill the reed canarygrass and Himalayan blackberry. Our crews removed debris and dead weeds and blackberries from the riparian area. PHS identified appropriate locations within Fairview Creek for the placement of large boulders and large woody debris. This was to create a more diverse in-stream habitat for fish and to reduce bank erosion by floods.

Benefits: By thoroughly understanding the ideas behind the design, and by knowing the requirements of the regulatory agencies, we made in-field planting decisions that reduced the risk of plant loss. The stream structures were in place at the time of the large flood in February 1996 (possibly a 100-year event), and they performed as designed.

Design of Native Plant Demonstration Garden
Location: Portland, Oregon
Client: Oregon Dept. of Fish and Wildlife

PHS designed a small garden at the headquarters building of the Oregon Department of Fish and Wildlife to represent several native plant communities found throughout the state: dry forest, riparian wetland, grassland, and open meadow.

Benefits: We produced a detailed plan that took into consideration the client's objectives and the physical limitations of the site. The plan was implemented on time and within budget, and the demonstration garden is thriving.

Mitigation Wetland Grading & Plant Installation
Location: Hillsboro, Oregon
Client: Fred Meyer, Inc.

PHS installed wetland plants into a mitigation wetland. As-built grades did not provide adequate hydrology for the required plant species, so we excavated and graded the wetland to enlarge the areas of inundation and saturation. We built an earthen berm to impound surface runoff, thereby maintaining wetland hydrologic conditions longer into the growing season. We installed live willow cuttings into the berm, and placed wire netting on the surface of the berm to prevent nutria from burrowing through.

Benefits: We identified potential design problems which, if not dealt with immediately, would have put the client at risk of having to later make extensive modifications to comply with the mandatory monitoring requirements. By understanding the ecological objectives of the project, and by having in-house construction capabilities to correct the problems, we significantly improved the wetland system.

Related Services

- **Agrichemical Toxicity Assessment**
- **Bioengineering Design & Construction**
- **Botanical Surveys**
- **Ecological Risk Assessment**
- **Erosion Control**
- **Herbicide Consulting**
- **Plant Procurement**
- **Rare, Threatened, & Endangered Species Surveys**
- **Seedbank Preservation**
- **Soil Amendment**
- **Soil Chemistry Assessment**
- **Surface & Groundwater Hydrology**
- **Wastewater Treatment Wetlands**
- **Water Chemistry Assessment**
- **Wildlife Surveys**

John van Staveren

Principal; Vice President of the Natural Resources Division
Senior Scientist

Mr. van Staveren is one of the leading wetland scientists in the Northwest. As senior scientist, he directs the firm's environmental and regulatory compliance activities. His experience includes biological assessment, design, planning, and permit acquisition in freshwater, estuarine, and marine ecosystems.

Professional Credential

Professional Wetland Scientist, Society of Wetland Scientists

Experience

- Managed over 600 wetland projects and conducted over 750 wetland delineations.
- Prepared & coordinated dozens of Section 404 & Removal-Fill applications.
- Designed over 30 freshwater and estuarine wetland mitigation projects.
- Served on two Oregon Division of State Land's Technical Advisory Committees responsible for developing state policy on wetlands.
- Provided analysis of the Oregon Freshwater Assessment Methodology as a Wetland Expert team member.
- Drafted a local land use ordinance regulating development activities within natural resource areas.
- Testified at numerous public hearings, & provided expert witness testimony.
- Managed 6 large-scale Local Wetland Inventory/Wetland Conservation Plan Inventories
- Conducted Goals 5 & 17 resource inventories.

Education

B.S. Marine biology and limnology, 1987
San Francisco State University, magna cum laude

Professional Affiliations

Society of Wetland Scientists
Portland Audubon Society
The Wetlands Conservancy, Board Member
The Nature Conservancy

Dale Shank

President
Restoration Ecologist

Restoration ecologist Mr. Shank manages construction and restoration projects. He conducts wetland riparian and stream surveys, and creates wetland and stream restoration designs.

Experience

- Extensive experience managing construction and restoration projects.
- Design experience including wet meadow restorations, wetland creation and enhancement, riparian revegetation plans, erosion control treatment for streambanks, bioengineering structures to stabilize stream channels, and in-stream fish habitat enhancement structures.
- Founder and editor of *Hortus West* magazine (formerly *Hortus Northwest*), the leading native plant directory and journal in western North America.

Education

A.S., 1981, Portland Community College

Courses, workshops and seminars in bioengineering, stream restoration, botany, systematic plant taxonomy, erosion control, landscape construction, land surveying, plant material, and horticulture.

Professional Affiliations

International Erosion Control Association
Society for Ecological Restoration
Society of Wetland Scientists
National Association of Professional Environmental Communicators
Society of Environmental Journalists

Patricia Farrell

Wetland Scientist/Landscape Architect

Ms. Farrell heads the Pacific Habitat Services environmental design and construction team. Her training in biology and landscape architecture, and her extensive experience in wetland science and environmental regulation, position her as a leader in site assessment, design, and project management.

Professional Credential

Registered Landscape Architect, State of Oregon (Registration # 356)

Experience

- Wetland determinations, delineations and Joint Permit applications.
- Local Wetland and Riparian Inventories.
- Statewide Planning Goals 5 & 17 resource inventories.
- Natural resource assessment and planning.
- Mitigation wetland, stream restorations, and riparian enhancement design and installation.
- Construction, excavation, grading and planting specifications.
- Wetland functions and conditions assessment.
- Project and construction management.
- Technical report writing.
- Computer graphics and AutoCAD designs.

Education

M.L.A. Landscape Architecture, 1987
University of Virginia

B.A. Biology, 1981
University of Virginia

Professional Affiliations

Society of Wetland Scientists
Society for Ecological Restoration
The Wetlands Conservancy
The Nature Conservancy
Yamhill Basin Council, Board Member

Gregory Linder, Ph.D.

Toxicologist; Ecologist

Dr. Linder is an adjunct professor in the Department of Fisheries and Wildlife at Oregon State University. His expertise includes wildlife habitat assessment; ecological risk assessment; site contamination; and methods to deal with contaminated or disturbed habitats.

Experience

- Comprehensive ecological risk assessments for uplands, wetlands, and river habitat impacted by mining wastes.
- Fish and wildlife population and habitat surveys.
- Phase I baseline ecological assessments for waste disposal sites.
- Characterization of sediments and non-point source runoff.
- Human health risk assessments.
- Evaluation and remediation methodology for contaminated soils.
- Revegetation strategies on disturbed sites.

Education

Ph.D. Applied Ecology and Environmental Toxicology, 1982
University of Wyoming

M.S. Vertebrate Zoology/Field Biology and Microbiology, 1977
University of Nebraska

B.S. Clinical Pathology and Analytical Chemistry, 1975
University of Nebraska Medical Center

B.S. Botany/Plant Science and Zoology, 1972
University of Nebraska

Professional Affiliations

American Society of Mammalogists
American Statistical Association
Ecological Society of America (Section affiliations with Applied Ecology and Statistical Ecology)
Society of Environmental Toxicology and Chemistry
Soil and Water Conservation Society

Dale Groff

Restoration Horticulturist

Mr. Groff is a restoration expert who provides technical support on wetland mitigation, constructed wetlands for wastewater treatment, erosion control, and stream restoration projects.

Professional Licenses

Oregon Pesticide Consultant License #125980
Oregon Commercial Applicator License #126549

Experience

- Analyzes soil and water chemistry on restoration sites.
- Developed operations and maintenance troubleshooting guidelines for a constructed wetland designed to treat landfill leachate.
- Designs and installs erosion control treatments to stabilize streambanks and riparian slopes.
- Designs and installs deflector logs, fascines, and crib walls on stream restoration projects.

Training Courses

- Streambank and shoreline erosion control using soil bioengineering.
- Practical approaches for effective erosion and sediment control.
- Design considerations for channel protection and streambank stabilization.
- Bioengineering techniques for streambank and lakeshore erosion control.
- Wetland soil geomorphology.
- Constructed wetlands for wastewater treatment.

Professional Affiliations

Society of Wetland Scientists
American Society of Surface Mining and Reclamation
Society for Ecological Restoration
Soil Scientists of Oregon
International Erosion Control Association

Fred Small

Wetland Scientist/Botanist

Mr. Small provides support for the Pacific Habitat Services Natural Resources Division. He has extensive training and experience in plant ecology, wetland science and natural resource assessment, as well as the design and monitoring of wetland mitigation projects.

Experience

- Wetland determinations, delineations, and permitting.
- Local Wetland Inventories.
- Natural resource assessment and planning.
- Mitigation wetlands and stream restoration designs, and riparian habitat enhancements.
- Technical report writing.
- Plant community assessments
- Rare, threatened, endangered plant surveys
- Nuisance plant surveys

Education

B.S. Biology, 1990
Portland State University

B.S. General Studies, 1976
Portland State University

Professional Affiliations

Society of Wetland Scientists
The Nature Conservancy
Native Plant Society of Oregon

PATRICK S. THOMPSON
Owner, Patrick S. Thompson Consulting
40240 Mohawk River Road
Marcola, OR 97454
Phone: 541-933-3318 Fax: 541-933-3319 E-mail: Pstcon@aol.com

EDUCATION

Wetland Technician Certification Program
Oregon State University/Chemeketa Community College

Wetland Delineation Certification Program
U.S. Army Corps of Engineers

PROFESSIONAL CERTIFICATIONS

Certified Wetland Technician, Oregon Division of State Lands
Wetland Delineation - Federal Interagency Method, U.S. Army Corps of Engineers

PROFESSIONAL AFFILIATIONS AND ACCOMPLISHMENT

Chair, McKenzie River Watershed Council
Member of the Executive Committee of the McKenzie River Watershed Council
Task Group Leader for the Human Habitat Action Plan
Member of American Heritage River Program Over site Committee
Developed a Coordinated Resources Management Plan for the Mohawk Valley, Lane County, Oregon, with the Natural Resources Conservation Service to form the Mohawk Watershed Partnership
East Lane Soil and Water Conservation District - Restoration, Riparian Enhancement, Stream Surveys and Water Quality Monitoring
Secured EPA Grant Funding for Natural Resources Curriculum for the Marcola School District and helped initiate a Natural Resource curriculum for the Mohawk High School
Executive Board member of the Mohawk Community Council
Member of the stakeholders committee for the Marcola Road Project
Native Plant Society

RELATED EXPERIENCE

Oregon Division of State Lands, Salem, Oregon. Performed wetland determination/delineations; reviewed wetland mitigation proposals and permit applications; conducted enforcement actions when necessary in cooperation with U.S. Army Corps of Engineers.

Abiqua Engineering, Inc. Salem, Oregon. Performed wetland determinations/delineations; wrote removal-fill applications/planting plans/mitigation plans; mitigation plan design; monitoring plans; contingency plans; construction management; created wetland mitigation bank; water quality monitoring of NPDES permits; riparian restoration plans; in stream fish habitat and flood control design.

Harley Weathers, Don Causey, Keizer, Oregon. Performed work necessary to formally propose a 94-acre site as a wetland mitigation bank. Prepared accepted "prospectus" and represented clients in Mitigation Banking Review Team (MBRT) meetings. Assisted in the preparation of the final banking instrument for the first private mitigation bank in the State of Oregon under the new mitigation banking guidelines.

Trademark Construction, Salem, Oregon. Conducted wetland delineation, prepared removal-fill permit application and mitigation plan to obtain development approval for two subdivision projects. Prospectus for Phase 1 of the Mill Creek Mitigation Bank. Conducted a wetland delineation, function and value assessment, and participated in the

preparation of the prospectus to establish the bank.

Excel Construction, Sheridan, Oregon. Prepared wetland delineation and permit application for 55 acre commercial and residential development. Off-site mitigation was conducted at Chapman School and the site serves as an outdoor classroom. Currently conducting yearly monitoring for the site.

Plan Tech Management, Inc., Albany, Oregon. Wetland determination, delineation, removal-fill permit and Mitigation Plan for 275 acre development. Includes conceptual design for a wetland ecological park.

Grande Ronde Community Water Assoc., Grande Ronde, Oregon. Assisted in an endangered species bioassessment for a water system improvement project funded by the Farmers' Home Administration.

Coburg Hills RV Resort, Coburg, Oregon. Performed wetland delineation and prepared required removal-fill permit to allow upgrade of wastewater treatment facility and expansion of the RV Resort.

Nehalem Bay Wastewater Agency, Nehalem, Oregon. Conducted wetland delineation to determine the feasibility of a proposed expansion project to provide tertiary treatment of wastewater using created wetlands. Created conceptual design of tertiary treatment ponds and mitigation for constructed wetlands for wastewater treatment.

City of Silverton, Silverton, Oregon. Wetland mitigation plan involving a jurisdictional intermittent drainage ditch.

Battle Creek Investments, Salem, Oregon. Conducted wetland delineation, prepared required removal-fill permit application and mitigation plan to obtain development approval for a commercial development project.

Icabod Street Subdivision, Salem, Oregon. Performed wetland delineation and prepared required removal-fill permit application for bridge and street construction to gain access to subdivision.

Freres Lumber Company, Lyons, Oregon. Successfully designed and set up an experimental proto-type for treating log deck runoff with constructed wetlands which now has a patent pending.

Mountain Fir Village, Independence, Oregon. Conducted wetland delineation on approximately 100 acres prior to subdivision design, and prepared removal-fill permit and mitigation plan for Phases I and II.

Larry Epping Building Co., Salem, Oregon. Conducted wetland delineation, and prepared removal-fill permit applications and mitigation plans for 4 subdivision projects. Now evaluating five separate properties for wetlands in the Albany area.

MacHugh Mitigation Site, Benton County, Oregon. Wetland delineation for an approximately 137-acre parcel and developed and orchestrated removal/fill permits and mitigation plans for four separate projects to be mitigated on site. Master plan design for wildlife habitat for entire parcel.

Eugene Springfield Metro Partnership Lane County, Oregon. Wetland delineation on 596-acre parcel proposed for bio-solids treatment for the Eugene, Springfield Metro Waste Water treatment plant.

Lane County Public Works Lane County Oregon. Wetland delineation of. 6 miles of Marcola Road for a county road widening project, and reconnaissance for mitigation sites for wetland impacts involved.

Appendix I
City of Lebanon and Linn County Letters

CITY OF LEBANON
925 MAIN STREET
LEBANON, OREGON 97355-3200
FAX: (541) 451-1260

July 30, 1998

R.P. Novitzki & Associates
4853 NW Bruno Place
Corvallis, OR 97330

RE: Wetland Mitigation Bank Proposal

Dear Dick,

The City of Lebanon has reviewed your proposal to establish a wetland mitigation bank in proximity of the area where Oak Creek crosses Rock Hill Drive which is adjacent to the Lebanon Urban Growth Boundary (UGB). As we discussed last year, the City's draft Parks Master Plan indicates a bike/pedestrian trail in this vicinity along the Oak Creek corridor. Based upon your conversations with Jim Ruef, Public Works Director and myself as well as the submitted Banking Instrument information, **the City of Lebanon supports this project as long as the City's recreational and future Oak Creek maintenance needs are provided for.** The City has concluded that this project should result in decreased flood water elevations along Oak Creek (primarily downstream) and will provide space in the Lebanon area to consolidate wetland mitigation for more effective and longer lasting habitat enhancement. You understand that the City is interested in establishing a trail through this area and we look forward to working with you to secure necessary easements and/or trailway dedications for this section of the future trail network.

Good luck on this project, do not hesitate to contact the City should you need additional information. Please contact me at your earliest convenience so we can begin work on formalizing the trail easement/dedication mentioned above.

Sincerely,

Douglas S. Parker by SR

Douglas S. Parker
Lebanon City Planner

/sr

LINN COUNTY PLANNING AND BUILDING DEPARTMENT
Steve Michaels, Director

100 Room 114, Linn County Courthouse

PO Box, Albany, Oregon 97321
Phone 541-967-3816, 1-800-319-3816 Fax 541-926-2060

July 17, 1998

Richard Nivitzki
R.P. Nivitski & Associates, Inc.
4853 NW Bruno Place
Corvallis OR 97330

Dear Dick:

I have reviewed the executive summary for the Oak Creek Mitigation Bank in Lebanon. The property proposed for the wetland bank is identified as T12, R2W, Section 26, Tax Lot 800. The property is located on Rock Hill Road, south of Lebanon and is zoned Farm/Forest (F/F). Linn County Code 928.610 (15) permits the creation, restoration or enhancement of a wetlands as a use permitted outright. This means your wetland bank proposal is not subject to a Linn County land use review.

As we discussed, I suggest you review the proposal with Bob Netter, Linn County Building Official for compliance with the Floodplain Management Ordinance. The wetland enhancement must be designed and developed in a manner that will not create drainage problems off site.

I look forward to seeing the wetland enhancement take shape. If you have any questions or need additional information, please contact me.

Sincerely,

Steve Michaels
Director

c: Doug Parker
Bob Netter

Appendix J
Purchase Contract

MEMORANDUM OF CONTRACT

KNOW ALL MEN BY THESE PRESENTS THAT JAMES W. JENKS, JR., have by contract dated the 23rd day of July, 1997, sold to OAK CREEK MITIGATION BANK LLC, the following described property situated in Linn County, Oregon:

See Exhibit "A" attached hereto.

That the said OAK CREEK MITIGATION BANK LLC is the equitable owner of said real property subject to the terms and conditions of said contract dated the 23rd day of July, 1997, made and entered into by the parties for the sale and purchase of said real property.

The true and actual consideration for this transfer is ONE HUNDRED SIXTY-FIVE THOUSAND AND NO/100 DOLLARS ($165,000.00).

This Memorandum of Contract must be recorded in the County Recorder's Records immediately by the Vendor.

This instrument will not allow use of the property described in this instrument in violation of applicable land use laws and regulations. Before signing or accepting this instrument, the person acquiring fee title to the property should check with the appropriate City or County Planning Department to verify approved uses and to determine any limits on lawsuits against farming or forest practices as defined in ORS 30.930.

Until a change is requested, all tax statement shall be sent to the following name and address: OAK CREEK MITIGATION BANK
2601 20th AVE SE
Albany OR 97321

After recording return this instrument to: James W. Jenks
PO Box 5217
Salem OR 97304

IN WITNESS WHEREOF, we have hereunto set our hands and seals to this agreement, this 23rd day of July, 1997.

James W. Jenks, Jr.

Richard C. Hunt

STATE OF OREGON)
) ss.
County of Linn)

Personally appeared the above named JAMES W. JENKS, JR. and acknowledged the foregoing instrument to be his voluntary act and deed.

DATED this 23rd day of July, 1997.

OFFICIAL SEAL
BARBE BASS
NOTARY PUBLIC - OREGON
COMMISSION NO. 030543
MY COMMISSION EXPIRES DEC. 29, 1997

Notary Public for Oregon
My Commission Expires: 12-29-97

STATE OF OREGON)
) ss.
County of Linn)

Personally appeared the above named DUANE C. SMITH, who being duly sworn did say that he is the Managing Agent of OAK CREEK MITIGATION BANK LLC, and he acknowledged he executed the foregoing instrument on behalf of said MILL CREEK MITIGATION BANK LLC.

DATED this 23rd day of July, 1997.

OFFICIAL SEAL
BARBE BASS
NOTARY PUBLIC - OREGON
COMMISSION NO. 030543
MY COMMISSION EXPIRES DEC. 29, 1997

Notary Public for Oregon
My Commission Expires: 12-29-97

LEGAL DESCRIPTION

Beginning at the Northwest corner of the Donation Land Claim of Reuben S. Coyle and wife, Notification No. 2338, Claim No. 63 in Township 12 South, Range 2 West of the Willamette Meridian, said corner being on the South boundary line of the Donation Land Claim of Samiel Carroll, being Claim No. 64 in said Township and Range; running thence South along the West boundary line of said Claim No. 63, 17.56 chains to the center of the County Road leading from Rock Hill to Sodaville, OR; thence North 82° East along the center line of said road 37.04 chains; thence North 59°49' East 16.96 chains; thence North 68 1/2° East 8 chains to the East line of said Claim No. 63; thence North 21.95 chains to a point on said East boundary line which is 36.38 chains South of the Northeast corner of said Claim No. 63; thence West 30.69 chains to the West boundary of said Claim No. 63; thence South 18° West along said West boundary line to an interior angle of said Claim No. 63 and being the Southeast corner of Claim No. 64; thence West 21.87 chains to the point of beginning.

SAVE AND EXCEPT: Beginning at the Northwest corner of the R. S. Coyle Donation Land Claim No. 63, Township 12 South, Range 2 West, Willamette Meridian, in Linn County, Oregon; thence South 1158.12 feet to the center line of a County Road; thence North 82° East 1804.00 feet along said center line; thence North 907.06 feet; thence West 1787.1 feet to the place of beginning.

Exhibit "A"