
Mud Slough Wetland Mitigation Bank

1875 N. Greenwood Road
Rickreall, Oregon

Mitigation Bank Final Instrument

August, 2000

PREAMBLE

PURPOSE

The Mud Slough Wetland Mitigation Bank (Bank) is a wetland mitigation bank established to serve the mitigation needs of any source, public or private. The Bank has been established in accordance with the Oregon Administration Rules for Compensatory Wetland Mitigation Banking (OAR 141-85-400 thru 141-85-445) and the Federal Interagency Guidelines for Mitigation Banking (20 November 1995).

The purpose of the Bank is to provide compensatory wetland mitigation for anticipated losses in wetland function and values, when on-site mitigation is not possible or when off-site mitigation would prove to be environmentally preferable. Potential buyers must explore alternatives in addition to avoidance and minimization prior to mitigating in the Bank. The creation of this Bank does not allow DSL or ACOE to permit wetland losses through a Joint Removal-Fill Permit in excess of losses that would have been permitted regardless.

SERVICE AREA

The Bank's service area is within the Willamette Valley Basin in an area centering around Dallas, Monmouth and Independence as well as Salem (See Service Area Map - Figure 2). The service area also includes a secondary service area extending up to 20 miles from the Bank site, subject to the discretion of the Corps and DSL permit evaluators, provided that the proposed wetland fill meets the following requirements:

1. The proposed fill site is located within an elevation range of 80 feet to 280 feet msl, and
2. The proposed fill is either associated with a linear transportation projects (such as a road, railroad, pipeline or cable line), or is located in or near a community not yet served by a mitigation bank.

Although the service area is delineated on a map, this is only a guide for regulatory agencies and perspective Bank purchasers. The final decision for use of this Bank will be made on a case-by-case basis by the DSL Resource Coordinator and the ACOE Regulatory Specialist.

WETLAND TYPES SERVED

The Bank will provide compensatory mitigation for impacts to palustrine emergent, forested, scrub-shrub, semi-permanently flooded and flooded wetland within the service area with a hydrogeomorphic classification of slope/flat.

CREDIT PURCHASE PROCEDURE

In order to use the Bank, approval of the wetland delineation of the property where the wetland impact will occur must be obtained from the Division of State Lands (DSL) and the U.S. Army

corps of Engineers (ACOE). A Joint Application for a Removal/Fill Permit from DSL and a Section 404 permit from the ACOE will be required indicating that you wish to purchase credits from the sponsors of the Bank and outlining why mitigation is not feasible or desirable on the project site, and what efforts were taken to locate nearby offsite mitigation opportunities other than the Bank. Credit sales and purchases for future anticipated impacts not part of Removal-Fill Permit applications are prohibited. The impact area is subject to the service area criteria described in the Service Area section above. The cost of the credits is negotiated between the sponsors of the Bank and purchaser. After obtaining permission from DSL and the ACOE, the credits are actually purchased from the sponsors of the Bank. When DSL and the ACOE are given proof of credit purchase, the impact project is permitted to proceed.

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MUD SLOUGH WETLAND MITIGATION BANK FINAL INSTRUMENT

1.0 INTRODUCTION

The Mud Slough Wetland Mitigation Bank (Bank) is located on the 1100 acre Knaupp family farm, approximately one and one-half miles north of Highway 22 and four miles west of Salem, Oregon in T7S, R4W, Sec. 17, Tax Lot 100 (Figure 1). The Bank will consist of approximately 56.25 acres of the 100.22 acre tax lot. The site is located in the heart of the Willamette Valley agricultural area, just three miles east of Basket Slough National Wildlife Refuge. It is bordered on all sides by either agricultural lands or wetlands. Mud Slough runs along the site's east side. The site is currently in agricultural use for tall fescue seed production. The site address is 1875 N. Greenwood Road, Rickreall, Oregon and is owned by Mark and Debora Knaupp. Adjoining the 56.25 acre mitigation bank are 320 acres of restored wetlands also owned and managed by Mark and Debora Knaupp.

The Mud Slough Wetland Mitigation Bank is a unique chance to continue a process begun by the Knaupp family over five years ago. The 56.25 acre Bank will join the 320 contiguous acres of wetland already restored and enhanced by the Knaupps. The 320 acres of wetland reserve was created through a combination of processes including the Wetland Reserve Program administered by the Natural Resources Conservation Service (NRCS), Oregon Department of Fish and Wildlife (ODFW), and Ducks Unlimited. The proposed Mud Slough Bank has all of the key attributes for a successful mitigation bank: a willing landowner, proper site conditions that allow a wetland to be enhanced, restored, or created, the need for mitigation within the service area, a cohesiveness with adjoining and nearby natural areas, and no negative impacts to adjacent properties.

The location of this Bank is nearly ideal. One on-site and several areas adjoining the Bank are classified as jurisdictional wetland on the National Wetlands Inventory (NWI) map. The soils of the Bank are 100 percent Bashaw clay. The entire Bank site has received a determination by the NRCS of farmed wetland. The Knaupp's currently farm the site for tall fescue seed production. As farmland, it is poor due to the high water table. As wetland, in its current condition it is also poor, due to the agricultural manipulations that have occurred including drainage ditches and mono-culture of cultivated tall fescue. All 56.25 acres of the Bank will be enhanced, in much the same manner that has proven so successful on the adjacent 320 acres. Natural high groundwater levels surround the area which assure that wetland hydrology will be fairly easy to enhance on the site through building low, wide dikes. The Bank is located within close proximity to Salem, Dallas, Monmouth and Independence.

The long term ecological goals of the Bank are to restore wetlands as close as possible to near historical levels of quantity, quality and diversity; to restore the highest quality and diversity of habitat for the indigenous wildlife of the area; to work toward controlling the levels of non native/invasive vegetation to levels of the surrounding wetlands; and to maintain these levels for the long term. The long term social and economic goals of the Bank are to provide a model of wetland restoration that will allow the public to visualize the importance of restoring and maintaining our wetland resources, as well as the economic incentives that are available for natural resources restoration.

The landowners' long term goal for the site is well underway with the current enhancement and restoration of 320 acre WRP project. The addition of the 56.25 acre Bank will create an even larger contiguous wetland that will provide an extremely high quality wetland with superb wildlife habitat and additional floodwater storage in the Rickreall watershed.

The Mud Slough Mitigation Bank is solely owned by Mark and Debora Knaupp. Each of the conditions of this Instrument will terminate five years after the last credit of the Bank is sold, except the restrictive covenant which is perpetual in nature. Additionally, each condition of this Instrument will be carried out barring catastrophic acts of nature, such as but not limited to earthquakes, drought, volcanic activity, etc. which could prevent meeting the performance standards. In such a case the owners will have an assessment of the Bank completed to determine the extent of damage. A report will be generated detailing the problems and probable causes(s). The owner along with his assessment team will then meet with the MBRT to determine the remediation strategies.

2.0 DEMONSTRATED NEED AND SERVICE AREA

The Service Area Map (Figure 2) delineates the primary service area which is within the same major drainage basin as the site, the Middle Willamette. This service area is composed primarily of Willamette Valley agricultural lands with a mixture of large to small cities within Polk and Marion Counties, the most notable of which are Salem, Dallas, Monmouth, and Independence.

The primary service area was chosen for a variety of reasons. It is similar to the mitigation site in climatic conditions, soils, stream morphology, wetland types, topography and eco-region. It is limited to a ten mile radius within three drainage sub-basins, and the present and ten year anticipated urban growth boundary (UGB) for the city of Salem. The ten year anticipated UGB for Salem is only a forecast at this point. The City of Salem is currently developing possible new UGB areas, but the plans are preliminary. It is our intent to include within the service area any portions of the UGB adopted by Salem until 2010.

The three drainage basin areas included within the primary service area are:

- Rickreall Creek - The Bank is located within this basin,
- Glen Creek and several very small drainages directly into the Willamette River,
- Ash Creek and several small drainages flowing directly into the Willamette River.

Both Polk and Marion Counties have grown significantly in the last ten years, faster than the state average. Both counties rank in the top seven counties in the state for population growth between 1990 and 1997. According to Portland State University, the 1997 population estimate for Polk County is 57,400 which is a 15.9 percent increase since 1990. The population estimate for the year 2000 is 61,710 and for the year 2010, 71,604. Over the next eleven years Polk County's population is projected to grow by 19.8%. The 1997 population estimate for Marion County is 267,700. The population estimate for the year 2000 is 280,438 and for the year 2010, 319,729. Over the next eleven years Marion County's population is projected to grow by 19.4%.

The growth in population is also documented in the building permit departments for Polk and Marion Counties and the Cities of Dallas and Salem. Table 1 indicates the number of new residential and commercial structures for each over the past several years. Note, that not all localities had the same information available for the same time periods.

Table 1 - Service Area New Residential and Commercial Construction

Year	Residential						Commercial-Industrial					
	1993-94	1994-95	1995-96	1996-97	1997-98	1999-	1993-94	1994-95	1995-96	1996-97	1997-98	1999-
Polk Co.	58	54	42	70	60	49					1	1
Marion Co.	99	82	76	78			195	168	185	188		
Dallas	61	98	149	125*	125*	125*	5	5	12	7	6	4
Salem		67	803	671	598	372		103	131	176	161	42

*A building permit moratorium went into effect in Dallas in 1996 due to lack of sufficient infrastructure.

In the past, there has been relatively little compensatory mitigation within Polk County and somewhat more in Marion County. This is evidenced by a review of the Division of State Land's "Summary of Activities in the Removal-Fill Program for Waters of the State for the 1995-1997 Biennium" which lists four removal-fill permits requiring compensatory mitigation in Polk County and 21 in Marion County. In discussions with several communities it is apparent that within the next five years additional wetlands will be impacted. As all the available non-wetland land within the urban growth boundaries is developed and additional growth occurs, in-filling of the properties with wetlands is projected to occur at a greater pace.

The city of Salem's draft local wetland inventory was recently completed. The inventory suggests that there are approximately 1400 acres of wetland within the urban growth boundary and some potential UGB expansion areas in the Salem area. Of these 1400 acres between 500 and 600 acres may be under pressure for development. This potential for development pressure is based on the types of wetland. The local wetland inventory also found 34 acres of mitigated wetlands within the same area. This inventory is currently being reviewed by DSL. No other communities within the proposed service area have local wetland inventories.

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

1. The proposed fill site is located within an elevation range of 80 feet to 280 feet msl, and
2. The proposed fill is either associated with a linear transportation projects (such as a road, railroad, pipeline or cable line), or is located in or near a community not yet served by a mitigation bank.

The secondary service area was added to provide a high quality mitigation alternative for lineal transportation projects which are often small impacts that are difficult to provide adequate mitigation for. The secondary service area also provides mitigation for communities which are not within the primary service area of a mitigation bank.

3.0 ADJACENT PROPERTY OWNERS

Attachment 1 includes the surrounding property owners names and addresses.

4.0 PROOF OF OWNERSHIP

Attachment 2 contains the current deed and ownership record for the Bank. The Bank is located on T7S, R4W, Sec. 17, Tax Lot 100. The owners of this property are Mark and Debora Knaupp.

5.0 MITIGATION BANK SITE PLAN

A 1999 aerial photograph of the Bank is included as Figure 3. The site plan for the Bank is included as Figure 4. This plan was devised through the combined efforts of the owners Mark and Debora Knaupp, Pat Thompson of Patrick S. Thompson, Consulting (PSTC), and Carla Cudmore of Ridgeline Resource Planning.

Development of the Bank is exclusively through the restoration/enhancement of the existing Wet PC farm wetlands (Wet PC). In the past, efforts were made to drain the property with drainage ditches diverting water past and through the site. These drainage attempts however, were not successful enough to create upland. The wetland characteristics that occur today include seasonal flooding and hydric soils. The Wet PC farm lands that occur on-site today are only marginal wetlands compared to what the site historically held (see Section 6.0).

The entire 56.25 acre Bank will be created all at one time, rather than in phases. The site will be restored to a wetland system consisting of seasonal swales spreading out and passing through a wet marshy area with shallow seasonal open water and interspersed, slightly higher wetland prairie. The slight variations in topography within the system will facilitate direction of water movement, provide additional areas for the palustrine forested and scrub/shrub vegetation, and allow for more diversity for wildlife habitat. The side slopes will be very gradual (5:1) to provide additional areas for facultative and wetter herbaceous vegetation to become established.

The restored wetland will include semi-permanently and seasonally flooded, and saturated palustrine emergent, scrub-shrub and forest wetland areas, and may include approximately one to two acres of open water during wet years. The hydrogeomorphic classification will consist of a slope/flat geomorphic setting. The water sources will consist of groundwater and precipitation, and the hydrodynamics will be vertical movement.

The restoration of this wetland will allow the system to function naturally and create an even larger intact system that will be less susceptible to minor environmental fluctuations. The restoration will also include increasing the number and diversity of native plant species, and by removing invasive non-native species. Upon completion of the dike building, the wetland will be planted with native wetland vegetation as shown on the planting plan and cross-section. The species, sizes, and density of the plants are indicated in the planting plan (See Attachment 3).

5.1 Design Assumptions

Successful implementation of this Bank plan is based on the following assumptions which are necessary for the surface and seasonally high ground water to serve as the primary hydrologic connection.

- Normal rainfall will occur over the establishment and monitoring periods (normal rainfall being consistent with historic precipitation amount, form, and seasonality)
- Evaporation is less than precipitation or input
- Normal flooding pulses, and normal groundwater table levels persist
- Planting zones are correct, soils are of the proper types to support the vegetation planted, and sufficient plant material will be available to execute the plan. Suppliers have been identified in *Hortus West*, 1999 Volume 10, Issue 1, for each species proposed. However, they have not been specifically contacted as of this report, for verification of particular plant material stock on hand. In the event that the prescribed species are unavailable, other native wetland plants capable of providing similar functions will be substituted. All deviations from the approved plans will be reported to the MBRT with the as-built plans.

5.2 Design Details

The Bank plan (Figure 4) shows the site and grading plan for the Bank. The following sections detail the measures to be taken regarding water sources, grading and erosion control, vegetation establishment, and the operational schedule.

5.2.1 Water Sources

The hydrologic source for the restored/enhanced wetlands is already in place, however, it is degraded and impacted by agricultural practices. Captured seasonal high groundwater and surface water will be used to increase the hydrology of the site. The surface water runoff from the hills surrounding the site on three sides in addition to a seasonal high water table normally inundate the site during the winter months. Constructed drainage systems and Mud Slough currently drain the site at rates higher than historically indicated. The runoff enters Rickreall Creek about two miles south of the Bank. The seasonal water, which is currently drained from the

site as quickly as possible, will instead remain on-site, as was historically the case. The wetland system will be accomplished by retaining high surface water flows using low earthen dikes to retain the water rather than quickly diverting high flows through the existing drainage ditches. A minor amount of excavation will be conducted during the construction of the dikes. The 3900 feet of diking will have a natural appearance, with irregular boundaries and shape mimicking natural features. The berms will have an average height of 1½ to 2 ½ feet, 20 feet width and side slopes of approximately 5:1. The dike elevation will be set at 102 feet (msl). The approximate maximum high water in areas where no excavation will occur will be two feet in depth. In those areas excavated to obtain material for the dikes, the approximate maximum water depth will be 2½ feet. The excavation areas will cover approximately five acres of the total project.

There will be one adjustable water control outfall structure located on the south berm of the Bank. The structure will consist of a 24 inch outfall with a three feet wide riser. On the west berm, in the southwest corner of the Bank will be a 30 feet wide emergency flood spillway, with 10:1 high water outslopes, with outflow elevation at 101.5 feet. The water level control spillway will consist of a grassed spillway protected with large rocks. The emergency spillway will be constructed of a combination of rocked geo-grid where it crosses the dike along with a grassed spillway with underlying erosion cloth on a 10:1 outslope. The water control structure will provide management options for both encouragement of native wetland plants and discouragement of invasive plants.

The high water flows (100-year flood elevation) emanates from Rickreall Creek with input from Mud Slough and Holmes Gap ditch. During such an event the low dikes would cause only minor blockage of upstream moving water until it goes around or over a dike.

Due to the similarity of the existing 320 acres of adjacent wetlands to the Bank and the wealth of information they provide regarding groundwater levels, no additional hydrological monitoring is planned prior to construction of the wetland.

5.2.2 Vegetation

In the fall of 2000, the Bank will be seeded with a mulch-seed mixture planted in a zone planting for individual species. At least three species of grasses ranging from 1 lb/ac to 4 lbs/ac for each species, three species of sedges and rushes, five species of other herbaceous vegetation and 2 to 3 species of overstory and scrub/shrub seed will be planted. In the spring of 2000, at least two species of bareroot trees and four species of scrub/shrub will be planted. The level of planned planting for this site is less than most mitigation sites due to the success Mr. Knaupp has experienced with natural wetland species recruitment at the adjoining 320 acre restoration site.

Mr. Knaupp graded the adjoining wetlands in the fall of 1996. The tall fescue fields of the proposed Bank, mimics the plant cover in the original 320 acre restoration area. The only plantings done on the 320 acres included seeding water plantain and planting willow cuttings. During July and September 1999, a limited vegetation evaluation of the 320 acre site was conducted. During this evaluation we identified over 30 facultative or wetter species on-site. Due to the overwhelming success of the plant diversity and cover on the 320 acres, the same approach to re-vegetation of the site will be done for the Bank. If after planting the Bank, monitoring indicates a potential problem with vegetation, the need for additional planting will be evaluated.

The Bank will be planted with the species and the quantities indicated on the planting plan (See Attachment 3).

5.2.3 Grading and Erosion Control

The dike work done at the Bank will be conducted by 15 cubic yard capacity scraper. The owner will also have a large farm tractor with all farming implements available for back-blading, seeding, and cultivation as needed.

The only excavation work done on-site will be to construct the dikes, islands, install the pipe water control structures and vegetated earthen/rock spillways. The dike building will occur during the summer months when the site is dry with no discharge. Immediately after the dike work is completed the Bank will be seeded with a native grass mixture to assure a full cover prior to the rainy season. Due to a combination of the soil type (Bashaw clay), topography, and runoff potential the possibility of sedimentation and erosion from the site, even with an unseasonal rain storm during the summer construction season, is highly unlikely. In the event unseasonal conditions persist during this period, silt fencing, straw bales and other forms of erosion control will be used to stop any off-site sedimentation problems.

5.2.4 Operations Schedule

Construction of the Bank began in the fall of 1999 when the tall fescue crop was sprayed with *Rodeo* to eliminate the non-native agricultural crop. The site was then sprayed again in the spring of 2000. The dikes will be built in the summer of 2000 and initial seeding of the Bank conducted in the fall of 2000. The Bank will be surveyed after the construction phase is completed, and as-built drawings prepared.

We anticipate moving approximately 6,600 cubic yards of material for construction of the dikes. The dike work should be accomplished in approximately one week.

The planting operation will be overseen by a wetland specialist, horticulturalist, or biologist selected by the Bank owners. After planting, the Bank will be periodically checked by the selected individual for early detection of any potential problems.

5.2.5 Affect on Neighboring Properties

The Bank is being developed so that the neighboring property owners will not be affected by increased flooding or have the drainage of their field tile adversely affected. Contrary, the creation of additional storage in the Bank should reduce frequent peak flow levels downstream helping to moderate downstream flooding.

Two separate sources were consulted regarding the hydrologic affect of the Bank on adjacent properties. One opinion was obtained from Randy Van Hoy, PE, regional engineer with Ducks Unlimited, Inc. and the second from Richard Novitski, RPH, owner of R.P. Novitski & Associated, Inc. Copies are included as Attachment 3.1. According to Mr. Richard Novitski, the water levels within the Bank will be raised, but this will only extend to the boundaries of the local ground water flow system, which in this case are Mud Slough and Holmes Gap Ditch.

If an adjacent property owner has a concern regarding a possible impact of the Bank on their property the following process should be followed:

- a. Adjacent property owner notifies either the ACOE, DSL or the Knaupps of the potential problem. It is the notified party's responsibility to coordinate with the other two parties.
- b. Knaupps, DSL, and Corps establish mutual meeting time and place.
- c. Above meet to determine merits of complaint, nature of problem and resolve, if possible.
- d. DSL/Corps inform adjacent property owner's of proposal to resolve or why no action will be taken or why no action is needed.
- e. Action taken to correct problem or address concern, if possible.
- f. DSL/Corps/Knaupp inspect to verify that action has been taken correctly, if determined to be necessary.
- g. DSL, ACOE or the Knaupps will notify the adjacent property owner of the status of the alleged problem.
- h. If the Knaupps, DSL and the Corps do not all agree that the concerns were caused by the Bank, it is the burden of the adjacent property owner to prove otherwise.

5.2.6 Wildlife Enhancements and Concerns

The Bank will be a natural home for many wildlife species including birds, mammals, fish, reptiles and amphibians. The creation of the various wetland regimes will offer a wide range of habitat for both nesting and foraging possibilities.

The Bank will conduct specific habitat enhancements for the Western pond turtle. Steve Smith, Fish and Wildlife Habitat Biologist with ODFW has made several recommendations to increase turtle habitat along with other reptile and amphibians.

The islands within the Bank will have slopes no greater than 6:1 with a southwest facing aspect. A clay layer in the upper one foot of the island is also recommended which will be easy to achieve with the site soils. Large woody debris including logs or logs with root wads will be placed in the wetland using the specific siting conditions outlined by Mr. Smith. A copy of his letter is included as Attachment 3.2.

An item of concern with the location of the Bank within the flood plain of the adjacent ditches is possible fish entrapment following flood events. In order to alleviate fish entrapment to the extent possible the Bank has incorporated into its design the recommendations from ODFW. The basic design concerns include a water control structure that will allow full draw down of the impoundment area; wide spillways with 10:1 outside slopes, and generalized impoundment depths of less than one foot. These recommendations are also included in Attachment 3.2.

Restricted hunting will be allowed on the Bank. Hunting will comply with all State and Federal regulations. In addition, a maximum of four hunters will be allowed on site at any one time. Hunting will be allowed a maximum of 16 hours in any week. The hunting season varies year to year based upon the health of the waterfowl populations and is Federally determined. The season generally lasts between 50 to 100 days between mid-October through early January.

5.2.7 Environmental Quality Discussion

The Mitigation Bank is located within the Rickreall Watershed. Rickreall Creek is a water quality limited stream under the Clean Water Act, Section "303D Listing". It is included due to flow modification and temperature parameters. The Bank will help to address these parameters of concern in several ways.

The flow modification parameter indicates that for a combination of reasons the flow levels of Rickreall Creek are of concern. The Bank, as do all wetlands, help with stream flows by retaining flood waters, decreasing flow velocities and allowing runoff to leave the wetland over a prolonged period of time. During high flow events, the Bank will hold the water, then release it at a slower rate to the receiving stream which keeps the flows higher during periods of traditionally lower flows.

The temperature of Rickreall Creek is also a parameter of concern. The Bank will help with water temperatures in two ways. As the riparian buffer of the wetland matures it will provide shade for the water, which helps to reduce water temperatures. Secondly, and probably more important is that the Bank, through decreased flow velocities helps to reduce the sediment load in the water, which decreases the water temperature. There is a positive relationship between sediment load and temperature. Suspended particles in the water intercept more solar radiation, thereby heating the water quicker. When the water leaves the Bank, due to a decreased runoff velocity, it will have deposited much of its sediment load in the

wetland. As a result, Rickreall Creek receives less sediment which in turn keeps the water temperatures down.

In addition to addressing flow modification and temperature concerns, the Bank will reduce herbicide and pesticide input to Rickreall Creek. Fifty-six acres of agricultural land that is currently receiving herbicide applications two or three times a year will be replaced with a high value wetland. The only herbicide applications that will occur within the Bank boundaries are highly controlled spot applications of individual noxious invasive species. All herbicide applications will be done by an appropriately certified herbicide applicator.

Off site impact from agricultural herbicide or pesticides or other possible contaminants will be kept to a minimum as the Bank receives no direct runoff from adjacent properties. Runoff from adjacent properties instead is directed through an existing ditch system that drains the site. An unnamed cutoff ditch on the north side of the Bank (highest elevation) in combination with Holmes Gap Ditch on the west and Mud Slough on the east effectively intercept any runoff from adjacent properties and funnels it past the Bank. Only during extreme flood events do these ditches overflow into the Bank. It should also be noted that during the construction of the Bank, all drain tiles will be removed from the site which will increase runoff time, thereby decreasing flow rates and subsequent turbidity.

6.0 PAST AND PRESENT USES OF SITE

According to the General Land Office Township Plat Map, 1852 for T7S, R4W Sections 17 and 20, this area was a wide marshy area with a poorly defined channel passing through the middle with wet prairie on both sides. The survey notes indicated that the site is fed by a watershed of over 1000 acres and significant areas of shallow water were likely present late into the summer. The surveyor also noted that the low areas on the site were covered with camas (*Camassia quamash*) and there was little timber on-site. He noted that the camas was utilized by the Indians. It is probable that the Indians managed the area with fire for camas. This resulted in a predominately wet prairie wetland with a minimum of woody species.

It is not known exactly when the area was first cultivated for agricultural use. According to Mr. Knaupp, the current owner, the site has been cultivated for at least 30 years. Prior to that, the site was used for grazing cattle. Reconnaissance of the site and landowner records indicated no evidence of any type of hazardous materials on-site. The site was examined for evidence of areas of stressed or voided vegetation, drums, fill pipes, dump sites, stained soils, unusual odors, etc. No buildings have ever been known to occur on-site.

7.0 MITIGATION BANK WETLAND FUNCTIONS

This bank holds tremendous potential for performing a variety of wetland functions, foremost being wildlife habitat. This site will be a refuge in a landscape dominated by large scale

agricultural concerns that are decreasing the existence of fence rows, natural areas, wildlife corridors, and habitat. The landowners, Mark and Debora Knaupp are extremely dedicated to restoring and enhancing the Wet PC farm land and creating a large connected wetland system. The Bank will strive to provide a variety of habitats for both resident and migratory waterfowl as well as upland species in the areas surrounding the Bank. The site will likely create suitable habitat for non-game vertebrate animals as well, including species of special concern. The combined acreage of this Bank, the Knaupps existing 320 acres of wetland and the nearby acreage of Basket Slough National Wildlife Refuge will create one of the Willamette Valley's finest large scale wetland areas.

The Bank will also function to provide on-site storage of precipitation. The wetlands will capture and retain precipitation, off-setting the effects of the existing manmade drainage surrounding the area that promotes fast drainage which contributes to the flood conditions on Rickreall Creek and decreases groundwater recharge.

Precipitation, groundwater, and site surface water flows will be allowed to remain on-site within the enhanced wetland areas where they will accumulate and create a seasonally ponded and inundated wetland. These areas will hold water, increasing the retention time thereby allowing the vegetation and soils to interact with any possible nutrients they might contain in order to act as a filtration system.

8.0 EFFECTS OF ADJACENT LAND USES

The Bank is located within an agricultural area that is zoned EFU (exclusive farm use) as are all of the adjacent properties. The zoning and comprehensive plan for this area provides for the necessary buffer and long term hydrologic protection that is vital to a wetland mitigation bank, particularly to one of this size.

9.0 WETLAND CREDITS OFFERED

The Bank will be developed in one phase. The restoration/enhancement work to be done, will restore the original hydrology to the site. The original hydrology was disturbed by partially successful attempts to drain the property with drainage ditches. Due to these partially successful efforts the wetland hydrology was however, significantly deteriorated. The site qualifies as wet prior converted cropland (Wet PC) and is, therefore, eligible for a mitigation ratio of 2:1 (See Section 10.3 - Wetland Determination).

<u>Acres</u>	<u>Mitigation Type</u>	<u>Credit Ratio</u>	<u>Credits Earned</u>
56.25	Restoration/Enhancement of Wet PC	2:1	28.125

These wetland credits will be offered in the approximate ratios of 75% - palustrine emergent, 15% - palustrine forested, 7% - palustrine shrub/shrub, and 3% open water, with a hydrogeomorphic (HGM) classification of slope/flat-precipitation-lateral.

10.0 SITE ASSESSMENT

10.1 Cowardin and Hydrogeomorphic Wetland Classes

There are several areas of existing wetlands (Figure 5) which are listed on the Rickreall Quadrangle, National Wetlands Inventory map either adjoining or in the Bank. The listed wetlands include:

Cowardin Classifications

- **PFOC - Palustrine/ Forested/Seasonally Flooded (adjacent)**
This wetland area runs along the northeast corner of Bank site (See NWI Map Figure 5). The dominant tree species is Oregon ash (*Fraxinus latifolia*), the scrub/shrub is dominated by nootka rose (*Rosa nutkana*), and the herbaceous vegetation is dominated by tall fescue (*Festuca arundinacea*) and meadow foxtail (*Alopecurus pratensis*). This area could be a candidate for further enhancement credit due to the lack of hydrologic connection and native plant species diversity.
- **PEMC - Palustrine/Emergent/Seasonally Flooded (adjacent)**
This wetland area also lies along the east side of the Bank, and is dominated by nootka rose (*Rosa nutkana*), tall fescue (*Festuca arundinacea*) and meadow foxtail (*Alopecurus pratensis*). This site is also a likely candidate for enhancement due to the same reasons as stated above.
- **PEMCx - Palustrine/Emergent/Seasonally Flooded/excavated**
This is a previously excavated seasonally ponded area that lies within the boundaries of the Bank. This area was created for duck hunting pond prior to the Knaupp's ownership and has since been farmed. This area has the potential to be restored and enhanced.

These wetlands Hydrogeomorphic (HGM) Classifications include:

- Slope/Flat-Precipitation-Lateral

Although not listed as wetlands on the NWI map, the remainder of the Bank also qualifies as wetland, with the classification of Wet PC with the HGM Classification of slope/flat-precipitation-lateral (See Section 10.3).

10.2 Ecological Baseline

10.2.1 Vegetation

The entire site is currently used for agricultural purposes for the production of tall fescue. Surrounding the site to the east is an area of mixed vegetation including Oregon ash (*Fraxinus latifolia*), nootka rose (*Rosa nutkana*), meadow foxtail (*Alopecurus pratensis*), and hawthorn (*Crataegus douglasii*).

10.2.2 Soils

According to the Polk County Soil Survey the entire site is composed of Bashaw Clay (7) (See Figure 6- Soils Map).

The Bashaw clay consists of poorly drained and very poorly drained soils that have formed in alluvium. They occur in backwater areas of floodplains and in drainage channels of silty alluvial terraces. The permeability is very slow and runoff is "very slow" to "ponded". The Bashaw soil series is listed as hydric by the NRCS, *Hydric Soils of Oregon*.

10.2.3 Hydrology

The Bank is located in the broad lowland alluvial terrace of Rickreall Creek, one of the principal tributaries of the Willamette River. The topography of the surrounding areas consists of lowland plains separated by rolling hills. Movement of unconfined ground water moves from the topographically higher hill areas toward the lowlands where the water is discharged as seeps, springs or to surface water bodies. According to the U.S. Geological Survey publication, *Groundwater Resources of the Dallas-Monmouth Area*, the older alluvium in the area of the Bank contain no sand or gravel layers, primarily just silt and clays. This absence of sand and gravel deposits results in few wells being drilled into this area. This also partially explains the ponding and lack of infiltration in the area of the Bank. With no underlying gravel and sand deposits, the tighter silts and clay (ie. Bashaw soil) holds the moisture for a longer period of time than would otherwise be expected, if sand and gravel layers underlaid the area.

The site is drained by Mud Slough on the east and Homes Gap Ditch on the west. Mud Slough is a natural drainage flowing into Baskett Slough. Baskett Slough is a tributary to Rickreall Creek. Homes Gap Ditch, which drains into Mud Slough, is a manmade drainage ditch that is estimated to have been constructed in the 1930's. Holmes Gap Ditch was re-excavated in 1981, with the spoils placed along its banks. Rickreall Creek is a tributary to the Willamette River.

Most of the stream flow in this area occurs during the winter and spring coinciding with the majority of the area's precipitation. The groundwater in the alluvial deposits of this area is recharged seasonally, directly or indirectly by precipitation, where the soil adsorbs the water and it percolates downward to the underlying saturated zones.

10.2.4 Wildlife

Extensive formal avian studies have been completed on the adjacent 320 acres of restored wetlands by Barry Schreiber of *Fauna and Flora* for the Oregon Department of Fish and Wildlife. Phase 1 of the study was completed in 1997, only one year after the site was diked (September 1996). Phase 2 of the study monitored the avian species observed over a full year, from February 1999 through February 2000. According to Mr. Schreiber the number of avian species and their abundance was remarkable and had exceeded most expectations for the site. According to Mr. Schreiber, "Tens of thousands of birds representing 85 species were observed, including most of the wetland associated species which occur in the Willamette Valley. In addition, the appearance and high numbers of field associates and other species suggest that the created wetlands are of superior nesting and foraging habitat for many other species as well."

In a second study being conducted by Mr. Schreiber, pre- and post-enhancement surveys were completed for a site in Halsey, Oregon, which is very similar to the Mud Slough site, with ryegrass (90%) and fescue (10%) covering the site. Surveys were conducted in the spring of 1997 prior to the restoration which was done in the fall of 1997 and a second set of surveys was conducted in the spring of 1998. The results of this study showed immediate and dramatic changes in both species diversity and bird abundance. Even though no pre-restoration survey was conducted on the Mud Slough site, it is assumed that the species diversity was quite similar to that of the Halsey study and that the diversity and abundance of bird species is in fact due to the restoration on-site.

Mr. Schreiber who is also conducting monitoring for ODFW at two other Willamette Valley Restoration sites, has compared the survey results of the different restoration sites and has suggested that "... a very large area (hundreds of acres), may be necessary to support the extremely large, highly mobile flocks of certain shorebird species", such as those found on the Mud Slough site. Mr. Schreiber's current theory supports the enlargement of the Mud Slough wetland area from 320 to 376 acres.

Copies of the wildlife surveys completed in 1997 and 2000 are included in Attachment 4. Table 2 includes the bird species observed by Mr. Schreiber on the 320 acre restoration site adjacent to the Bank site between February and June 1999.

Table 2 - Avian Species Observed February - June 1999
Mud Slough Wetland Restoration Site

Shorebirds	Bufflehead	Cliff Swallow
Semi-palmated Plover	Ruddy Duck	Violet-green Swallow
Killdeer	Wood Duck	Tree Swallow
Black-bellied Plover		Stellar's Jay
Greater/Lesser Yellowlegs	Other Wetland	Common Raven
Spotted Sandpiper	Associates	American Crow
Dowitcher Species	Great Blue Heron	Black-capped
Common Snipe	Bittern	Chickadee
Dunlin	Water Pipit	American Robin
Western/Least Sandpiper	Marsh Wren	Western Bluebird
Wilson's Phalarope		European Starling
Black-necked Stilt	Other Species	Orange-crowned Warbler
American Avocet	Turkey Vulture	Common Yellowthroat
	Bald Eagle	Red-winged Blackbird
Waterfowl	Black-shouldered Kite	Brewer's Blackbird
American Coot	Northern Harrier	American Goldfinch
White-fronted Goose	Red-tailed Hawk	Rufous-sided Towhee
Canada Goose	Rough-legged Hawk	Savannah Sparrow
Mallard	American Kestrel	White-crowned Sparrow
Northern Pintail	Short-eared Owl	Golden-crowned Sparrow
American Wigeon	Ring-necked Pheasant	Song Sparrow
Northern Shoveler	Northern Flicker	Band-tailed Pigeon
Blue-winged Teal	Western Meadowlark	Mourning Dove
Cinnamon Teal	Horned Lark	Rufous Hummingbird
Green-wing Teal	Barn Swallow	
Ring-necked Duck		

The following mammal species have been noted by the Knaupp family.

Raccoon	River otter	Bats
Opossum	Mink	California ground squirrel
Coyote	Least weasel	Pocket gopher
Black-tailed deer	Beaver	Meadow vole
Nutria	Moles	Wood rat
Red fox	Shrews	Deer mice
Striped skunk	Brush rabbit	Elk

10.3 Wetland Determination/Delineation

In September, 1998, Kris Homma with the Natural Resources Conservation Service conducted a wetland determination of the property now proposed for the mitigation bank. The entire parcel was determined to be farmed wetland. An on-site meeting with Pat Thompson and Janet Morlan, Wetland Program Leader for DSL was conducted on November 3, 1999. As a result of the site visit Ms. Morlan made the finding that the site qualified as Wet PC (Wet Det #99-0492). Copies of both the NRCS determination and DSL confirmation letter area included as Attachment 5.

11.0 FUNCTION AND VALUE ASSESSMENT

The hydrology of the Bank has been altered which corresponds to faster runoff, less detention and quicker drying out time for the Wet PC. The vegetation on-site is exclusively cultivated tall fescue.

Table 3 indicates the pre-construction function and values as noted during site inspections for the Bank. Following the table is an explanation of the ranking of each of the functions and values.

Table 3 - Wetland Function and Value Assessment

FUNCTIONS & VALUES	Pre-Construction	Post-Construction
1. Hydrologic Control	Moderate	High
2. Water Quality	Moderate	High
3. Wildlife Habitat	Low	High
4. Fish Habitat	N/A	N/A
5. Recreation	Low	Moderate
6. Education	N/A	Moderate
7. Aesthetics	Low	High
8. Enhancement Potential	High	N/A

The following explains the ranking of low, moderate, high, or not applicable (NA) for each of the functions and value categories of the wetlands and uplands, both pre- and post-construction.

1. Hydrologic Control

PRE- Due to the ditch system surrounding the site, the existing hydrology is contained in ditches and is transported directly to Rickreall Creek via Mud Slough at higher than normal velocities.

POST- Precipitation, groundwater, and site surface water flows will be allowed to remain on-site within the enhanced wetland areas where they will accumulate and create a seasonally ponded and inundated wetland. These areas will hold water, increasing the retention time thereby allowing the vegetation and soils to interact with

any possible nutrients they might contain in order to act as a filtration system. The restored wetlands will also slow the rate of runoff and increase the retention time, thereby facilitating additional groundwater recharge.

2. Water Quality

PRE- Existing precipitation and other hydrology is diverted as quickly as possible to an existing ditch system to promote rapid drainage of the site. This does not allow for treatment opportunities, other than what might occur in the existing ditches.

POST - Precipitation will enter the wetlands where the swale system will retain the water, providing treatment through retention, attenuation by vegetation, and soil interaction, rather than promoting rapid drainage and runoff via the site drainage ditch system.

3. Wildlife Habitat

PRE - Due to present farming practices there is little structure in place to attract wildlife other than the open agricultural fields. Migratory waterfowl and other species have been observed using the agricultural fields for feeding.

POST - Wildlife habitat will be vastly improved due to the change in land use from farming to wetland with a plant community that will provide opportunities for both nesting and feeding.

4. Fish Habitat

PRE - There is no opportunity for fish habitat on the existing Bank property.

POST - There will be no opportunity to increase fish habitat as no permanent ponds are planned for this site.

5. Recreation

PRE - The wetland areas have been historically closed to public access due to farming of the site.

POST - The habitat area and planting scheme will improve access and provide opportunity for non intrusive forms of recreation such as viewing and study.

6. Education

PRE - The wetland areas have been historically closed to public access due to farming of the site.

POST - Habitat areas and planting schemes will provide schools with an invaluable tool to educate students on the importance of intact natural resources, the value of restoring resources, and the role they play in overall watershed health.

7. Aesthetics

PRE - The existing wetland aesthetics are limited due to farming practices.

POST - Wildlife, vegetation diversity and wetland restoration/enhancement will improve the natural resource aesthetics of the entire area.

8. Enhancement Potential

PRE - The restoration/enhancement potential of this property is high due to the number of degraded functions and values caused by past farming practices.

POST - Once the restoration has taken place, there will be little opportunity to additionally enhance the site, other than adding even more wetland acreage in the surrounding area or adjacent upland buffers.

In summary, we believe the successful execution of this Bank plan will result primarily in a net increase to society of wildlife habitat, functional wetlands, and an increase in hydrologic control and water quality. There will be some recreational and educational opportunities but these are not major functions of the Bank.

12.0 MONITORING PLAN

12.1 As-Built Survey

An as-built survey will be submitted to DSL within sixty days of final grading to verify topography and hydrology. The as-built survey will include site topography, wetland boundary, water control structures and any other data deemed pertinent. Photos will be taken throughout the spring at designated photo stations to help verify that the hydrology will be adequate. An initial vegetation survival survey will be completed in the spring, following planting and again the following fall to document planting success and to initiate any remedial action in order to meet the applicable performance standards.

12.2 Reference Sites

Two reference sites have been identified to establish target conditions, for background monitoring, and be used for comparison to judge whether problems are locally site specific or reflective of a widespread problem. An on-site reference site is located adjacent to the Bank on the Knaupp farm. See Figure 3 - Aerial Photo for the reference site location. Jackson-Frazier wetland just north of Corvallis was selected as an off-site, HGM reference site.

12.2.1 On-Site Reference

The on-site location was chosen as the existing wetlands have exceptional plant diversity and are a good example of the same Cowardin and Hydrogeomorphic

classifications as those being restored. In addition the Bank and the on-site reference area have the same soils types, topographic position, hydrologic connection, and provides assured access.

An initial assessment of this reference site reveals it contains many of the attributes we hope to achieve within the Bank. A preliminary survey of the reference site was conducted to establish the plant species present. The reference site will also be monitored the first year to confirm the preliminary survey. This monitoring will measure the diversity of the herbaceous, scrub/shrub and overstory species for the reference site. This information will be used to assure that the Bank meets or exceeds 80% of the species richness as found at the reference site. This is more fully discussed in the Section 13 - Objectives, Goals and Performance Standards.

The reference site will also be used to compare seasonal water level fluctuations. In the event there is a problem with the hydrology of the Bank, the reference site will be used to determine if the hydrological problem is site-specific, a widespread occurrence such as drought. The HGM site will also be used in the event of a widespread problem throughout the Willamette Valley, should the Bank experience problems such as extended drought conditions, or possible outside hydrologic interference due to changes in surrounding land use.

12.2.2 Jackson-Frazier HGM Off-Site Reference

The Jackson-Frazier wetland is an example of a more mature wetland with the same HGM classification as the Bank, flat/slope. Jackson-Frazier also has the same vegetation components of palustrine forested, emergent and shrub/scrub as does the Bank. This site is being used to help define the Banks long term goals and objectives. This is applicable as the Bank and HGM site have a similar percentage of plant diversity, although the individual plant species does vary.

During a survey of the HGM site, some of the potential problems a more mature site could experience became apparent (both invasive non-native species such as reed canary grass and the mono-culture possibilities of the more pervasive native wetland species). Analyzing the HGM reference site helped to define the exact planting plan and outline the general associations of the shrub/scrub and forested areas for the Bank. It also more firmly validated the need to keep the highly invasive non-native plant species under control in the early stages of the Bank. One change to the plant species list that we made as a result of reviewing the species at the HGM site is the inclusion of Oregon crabapple (*Malus fusca* - FACW) in association with the ash forested areas. Inclusion will be dependent on plant availability.

The Bank and this site are different in that the wet meadow/prairie and emergent wetland plant communities more intermixed at Jackson-Frazier than anticipated at

the Bank. This is due to the hydrologic and slight topographic differences of the two sites. The Bank will also have more annual plant species due to the planned management in an effort to set back some of the natural succession of the Bank, such as mowing of some grass species, or the cultivation of cattails to discourage mono-cultures in order to provide room for annual species propagation.

The HGM site will also be used in the event of a widespread problem throughout the Willamette Valley. If the Bank experience problems from extended drought conditions for example, the HGM site can be used as a comparison for similar changes. However the HGM site may respond differently than the Bank, especially during the early years, due to the more mature vegetation.

The hydrology of the sites are similar in that they area both flat with slight slope allowing for the regional runoff affect. There are some differences however. Jackson-Frazier has an intermittent stream source which channelizes the water on site and provides a longer period of surface water input into the system. The Bank, due to the channelization, berms and intensive drainage control is segregated from the once historic water flows to the site. Due to the Bank's soil (Bashaw clay) this only slightly affects the historic function of the site as a wetland. What it does do, however, is provide a barrier to off site invasive non-native species such as reed canary grass. The HGM site has a seasonal influx of off-site water and consequently undesirable seed source that the Bank does not have.

12.3 Annual Report

Annual reports for the Bank will be filed with the ACOE and DSL by each November 30th. Full Monitoring Reports be submitted until two consecutive monitoring reports indicate complete compliance with all the established performance standards. A full monitoring report will consist of site photos, grading updates (if needed), hydrology monitoring, vegetation monitoring, progress towards performance standards, remedial actions taken to correct deficiencies that occurred in meeting the standards, and summary of credits sold and available. Particular attention will be given to monitoring the status of the wetland species (FAC, FACW, and OBL) to insure they are becoming stable at the levels necessary to meet the hydrophytic vegetation criteria. Yearly photographs will be taken from established photo points providing representative perspectives of the mitigation area. These photo points will be set, surveyed, and shown on the as-built survey.

Once the two monitoring reports showing complete compliance have been completed, an Annual Report will replace the Full Monitoring Report. The Annual Report will consist of site photos, update on plant succession and wildlife usage, any actions taken to remain consistent with the Restrictive Covenant, and a summary of credits sold and available.

Full Monitoring Reports can be re-instated by DSL and the ACOE, if during the MBRT's annual inspection of the Bank significant problems are noted.

12.4 Monitoring Plan Supervision

The planting of the Bank will be supervised by a wetland specialist or biologist who will be hired and paid through a fund set up from a portion of the sale of credits or the Bank's sponsors. The monitoring program will be conducted either by the owner under the direction of a Certified Wetland Delineator or a Certified Wetland Delineator hired and paid for by the Bank sponsors. As contracts and relationships tend to change overtime, the specific individuals conducting the monitoring are not available at this time. However, PSTC is currently contracted by the Bank sponsors. If this relationship should change, the Bank sponsor will notify the MBRT of the change and identify the replacement firm.

12.5 Annual Review

The Bank's annual review by the MBRT will be conducted each January, beginning in 2002. This will allow time for the annual monitoring report (due by November 30th) to be prepared and disseminated prior to the MBRT meeting. Any remediation measures that might become necessary will be reviewed with the MBRT as they become necessary and will be summarized at the annual review meeting.

13.0 GOALS, OBJECTIVES AND PERFORMANCE STANDARDS

The primary goal of the Bank is to restore 56.25 acres of Wet PC to seasonally flooded saturated, inundated or ponded areas with only limited topographic relief. This will be accomplished by constructing low wide berms to contain a seasonal high water table and surface water flows during the wet season (November - April). This will become a system of seasonal surface flows spreading out and passing through a wet marshy area with shallow seasonal open water and interspersed, slightly higher wetland prairie as the wet season dissipates.

The upper areas of the Bank around the perimeter, on the dikes and on the islands will be a mixture of palustrine scrub/shrub and palustrine emergent wetland. The majority of the Bank at the lower elevations will be a palustrine emergent seasonally flooded wetland (hydrogeomorphic classification depressional/precipitation-groundwater/vertical). The seasonal ponded areas will be a palustrine emergent, semi-permanently flooded wetland (hydrogeomorphic classification riverine/lateral/unidirectional). This goal will provide intact hydrologic control, an increase in surface water retention and infiltration, wildlife habitat, enhanced aesthetics, functions, and values similar to those found at the reference site.

13.1 Vegetation Objective

The vegetation objective is to establish predominantly native wetland plant communities similar to those documented at the reference sites, to establish a combination of palustrine emergent, scrub/shrub, and forested plant communities.

13.1.1 Performance Standard

Initial fall and spring planting of the Bank will include the planting of at least 15 species. The Bank will also rely in part on recruitment from the existing site seed bank and the adjacent 320 acre wetland. By the end of the second growing season, the wetland will meet or exceed 60% of the species richness of the reference site (excluding non-native invasive species) and 80% by year five. Wetland vegetation, facultative or wetter, will cover a minimum of 75% of the non-inundated water areas by year two and a minimum of 80% cover by year five. These ratios will be maintained throughout the monitoring period. No more than 15% of individuals will be non-native invasive species* and no more than 50% of individuals will be of any one plant species.

*Non-native species to be included: reed canary grass (*Phalaris arundinacea*), purple loosestrife (*Lythrum salicaria*), Canadian thistle (*Cirsium arvense*), Scots broom (*Cytisus scoparius*), Himalayan blackberry (*Rubus discolor*), and tansy ragwort (*Senecio jacobaea*).

Open Water: In open water areas there will be no more than a total of 15% cover of non-native invasive species.

13.1.2 Methodology

A stratified systematic plot method for sampling points within the Bank and reference site will be used. Both the transects and sample plot locations will be laid out in a stratified arrangement with equal distance between each transect and sample plot.

Twenty-eight sample plots each, for the Bank and reference site will be assessed according to the performance standards. The sample plots will be located on four transect lines which will be placed in a systematic pattern across the entire wetland, generally perpendicular to the topography. The sampling plots for the Bank and reference site will be predetermined and systematically plotted on the transects at equal distance from each other. The starting point of the sample plots will be staggered in order to cover a broader area.

Prior to monitoring the sampling plots at each site, the number of sample plots will be evaluated to determine if this number of plots is sufficient, using a species area curve. The species area curve will be used to check not only the number of sampling plots, but also the radius of the sampling plots for each of the major plant communities - herbaceous, scrub/shrub and overstory. If the species area curve indicates that more sampling plots are needed they will be added. However, no fewer than 28 sampling plots for each site will be examined.

Each sample point is the center of a circular plot, the diameter of which will be a minimum of ten feet for the herbaceous layer and 30 feet for the scrub/shrub and overstory layers. If it is determined that a larger sampling plot size is needed, the larger distance will be used, but in no case will sampling radii of less than ten feet (herbaceous) and 30 feet (scrub/shrub and overstory) be used. Each sample plot in the Bank and reference site, will be evaluated for species, indicator status, the percent cover of each species present and where applicable, survival rates.

After the second growing season and for the following monitoring years, the Bank will be monitored for areas with less than 25% cover. While walking the vegetation transects, 50 to 60 feet on either side of the transect will be examined looking for areas 10 feet by 10 feet or greater in size with less than 25% cover. Each area noted will be mapped and included in the monitoring report. If these areas persist, and are observed during the next monitoring, the areas will be replanted. This excludes ponded areas. The non-inundated and ponded areas will be defined by year two vegetation monitoring using a visual assessment of the fac or wetter vegetation.

Established site photo stations will be used in each of the monitoring years to provide a visual record of the overall health and diversity of the wetland vegetation. Photo station locations are included on the Site Plan (Figure 4).

If the percent of vegetation cover, diversity and survival rates are within the specified design goals, then the wetland will meet the standard.

13.2 Hydrology Objective

The hydrology objective is to create areas that will be below the average high water table, that will hold precipitation to create seasonal surface flows spreading out and passing through a wet marshy area. As the wet season dissipates there will be shallow, seasonal open water and interspersed, slightly higher wetland prairie.

We will monitor to determine the approximate areas of various water levels during the wet season (November - April).

<u>Water Level</u>	<u>Acres (anticipated)</u>
Saturated	15 - 25
0 - 18"	25 - 40
18 - 36"	4 - 5

It is our assumption that as the hydrology dissipates from May through June these areas will become a combination of palustrine emergent wetland and saturated wet meadow. The hydrology of the Bank and reference site will be compared during high and low water periods to evaluate similarities and differences in the water levels of both sites. In the

event there is a problem with the hydrology of the Bank, the reference site will be used to determine if the hydrological problem is site-specific or a widespread occurrence such as drought conditions or possible outside hydrologic interference due to changes in surrounding land use.

13.3 Habitat Objective

The overall objective is to establish habitat for migratory birds, mammals, waterfowl, amphibian, and reptile species within the overstory, scrub/shrub, ponded and emergent areas.

No performance standards for wildlife habitat are being developed at this time. If the hydrology objective and the vegetation performance standards are met, wildlife will begin using the area. As the Bank matures this use will increase and change over time.

Mr. Knaupp is talking with ODFW regarding the possibility of extending the avian study that is currently being conducted on the adjacent 320 acre wetland site. If the study is extended, the newly created 56.25 acre site could be included. This would provide a rare opportunity to study the effects of wetland size (320 -vs- 376 of acres) on species diversity and abundance.

14.0 CONTINGENCY PLANS

If during monitoring inspections and surveys, a failure to meet one or more performance standards is probable, an analysis will be conducted to determine the cause or causes of the possible failure. This determination will be made by the mitigation bank staff which will include a wetland specialist, hydrologist, horticulturalist, and the owners. This team will then recommend to the MBRT, an immediate action plan that can be implemented to bring the Bank effort back on track to meet the performance standards. Additionally, if as a result of the annual monitoring it is the consensus of the MBRT that the Bank is becoming too monocultured the owner will take steps through intense management of the species (cultivation, flooding, limited herbicide application, repeated mowing to prevent seed generation, etc.) to reduce the population and promote growth of other suitable species.

If in the future one or more of the mitigation bank staff should leave the project, it will be the owners responsibility to see that they are replaced to the satisfaction of DSL and ACOE. The owners of the Bank will be ultimately responsible for completing the necessary action to assure success of the remediation plan. Prior to the sale of credits in the Bank, a \$68,000 letter of credit will be posted to provide for the implementation of any remediation that may become necessary, or until such time that success is ensured and DSL and the ACOE agree that the bond release is warranted.

14.1 Funding

The owners of the proposed Bank will guarantee that the necessary finances will be made available to successfully execute this mitigation plan and any contingencies which might arise through the development of a letter of credit, as described in Section 18.0. In addition a letter from Bob Zell, KeyBank, Agricultural Banking KeyCenter attesting to the financial arrangements made by the Knaupp's is included as Attachment 5.1.

14.2 Responsible Parties

The responsible parties who will implement and provide for monitoring the success of the corrective actions are indicated below:

<u>Name</u>	<u>Address</u>	<u>Phone</u>
Mark and Debora Knaupp	1875 N. Greenwood Road Rickreall, OR 97371	503-623-0768

15.0 CONSISTENCY WITH LOCAL COMPREHENSIVE PLAN

Polk County Planning Department has approved the conditional use permit for the Mud Slough Mitigation Bank. A copy of the conditional use approval is included as Attachment 6.

16.0 WATER RIGHTS APPLICATION

Mr. Knaupp is currently working with the Oregon Water Resources Department (OWRD) regarding the permit to hold water for the Bank site as well as water rights to hold water for wetland restoration and enhancement purposes. The Knaupps currently have a permit to hold 75 acre-feet of water for the purpose of wetland restoration/enhancement and wildlife for portions of their adjoining 320 acres of wetlands. Mr. Knaupp has submitted the "Application for a Permit to Store Water" for the Bank site as well. A receipt from OWRD for the submitted application along is included as Attachment 7.

17.0 CREDIT BANKING SYSTEM

The credit banking system for the Mud Slough Mitigation Bank site is based on DSL's mitigation ratios as specified in OAR 141-85-135. A mitigation credit is the unit of measurement describing wetland impact compensation requirements. For each acre of wetland impact, one mitigation credit is required and can be purchased from the Bank to satisfy the impact requirement.

The site has been delineated as "Wet PC" which is eligible for a mitigation ratio of 2:1.

<u>Acres</u>	<u>Mitigation Type</u>	<u>Credit Ratio</u>	<u>Credits Earned</u>
56.25	Restoration/Enhancement of Wet PC	2:1	28.125

These wetland credits will be offered in the approximate percentages of 75% - palustrine emergent, 15% - palustrine forested, 7% - palustrine shrub/shrub, and 3% open water.

Upon completion of the grading and earthwork, up to 30 percent of the available credits could be made available for sale (to be determined by the ACOE and DSL with the advice of the MBRT). After the second growing season, the site will be monitored to determine if the Bank meets the applicable second year vegetation performance standards. If the standards are met, the ACOE and DSL with the advice of the MBRT, could certify the final 70 percent of the credits for sale or a percentage thereof. A copy of a typical spreadsheet credit tracking system to be used is included as Attachment 8.

An Annual Report will be submitted to DSL and ACOE comprised of the monitoring report documenting the performance of the mitigation progress, accounting of credits earned and sold and other data the MBRT may request throughout the year.

18.0 PROJECT COSTS & FINANCIAL RESOURCES

One of the most prohibitive cost components of the project is already in place. There is no land acquisition involved as the owner of the land is the owner of the Bank. Additionally, there is very little excavation work that needs to occur on-site. The combination of these two factors alone, make the initial financial investment for mitigation relatively minor.

An irrevocable letter of credit will be posted prior to any credits being sold in the Bank. A copy of the letter of credit for the Bank is included as Attachment 9. The amount of the letter of credit is based upon an evaluation of the mitigation site and the likelihood that an individual or a combination of factors influencing the Bank could fail. This evaluation was based on the three main types of work to be completed on-site: 1) excavation and hydrological connection 2) planting plan and 3) monitoring.

Initial earth movement on-site, consisting of moving approximately 6,600 cubic yards of material at \$3.00 per yard (\$19,800) will have occurred prior to posting of the letter of credit or selling any credits in the Bank. Thus, we have not included the costs for initial excavation in the letter of credit. The volume of water available for this project makes the likelihood of hydrologic connection failure slight. If the hydrologic connection is not intact after the initial excavation, the bank will not be allowed to sell any credits. If, however, during the monitoring period the hydrologic connection should need additional work, \$5,000 will be available through the letter of credit.

The next major hurdle in wetland development is complying with the planting plan and ensuring plant survival rates. In light of the success the Knaupps have had in restoring the adjacent 320 acres of wetland with little to no planting in a situation the same as the Bank (tall fescue fields), planting in the Bank will be conducted on a limited basis, instead allowing the native wetland vegetation to re-establish itself. We have estimated that the initial costs for planting the entire 56.25 acres of the Bank to be \$28,000 (approximately \$500 per acre). This is approximately 1/4

the normally-budgeted vegetation cost. However, if this plan does not prove to be successful by the second growing season, a revised planting plan will be submitted to the MBRT for approval and planting will take place as part of the remedial effort.

The monitoring cost for the Bank and reference site, for the five monitoring years required under the letter of credit is estimated to be approximately \$7,000.00 for each full monitoring report (somewhat less for an annual monitoring report) for a total cost of \$35,000.00. It should be noted that depending on the condition of the Bank and the timing of the release of credits, the five years of monitoring may not occur in five contiguous years with the approval of the DSL and ACOE.

The amount of the letter of credit for the Bank we are suggesting is a total of \$68,000. This covers \$5,000.00 if additional dike work becomes necessary, \$28,000.00 for the revegetation, and \$35,000.00 for the initial five years of monitoring.

The letter of credit will be released in three phases based upon completion of various phases in the development of the Bank, compliance with the Memorandum of Agreement (MOA) and approval of DSL and ACOE in consultation with the MBRT.

19.0 LONG TERM PROTECTION

The Bank will be protected through a restrictive covenant that has been written to DSL's and the ACOE's satisfaction. The covenant is based upon the restrictive covenant language provided by DSL. Mr. Knaupp is currently talking with various governmental and private agencies, familiar with his restoration efforts regarding possibly holding a long-term conservation easement for the Bank. A copy of the restrictive covenant is included as Attachment 10.

20.0 MITIGATION BANKING TEAM

The Mud Slough Mitigation Bank Design Team consists of the following individuals. Attachment 11 includes resumes of the key individuals.

Pat Thompson - Wetland Specialist

Mr. Thompson is a wetland specialist and is the project manager. He has overseen the establishment of the mitigation banking team and creation of the Prospectus document. He also conducted the on-site vegetative surveys and developed the site design and planting plan. Mr. Thompson will oversee all future site activities.

Carla Cudmore - Regulatory Specialist

Ms. Cudmore has worked within the environmental field for 15 years in both the regulatory field and consulting arena by obtaining permits and reporting for an extensive array of projects. Ms. Cudmore has been instrumental in all phases of the Bank's creation and developed the Prospectus document.

Mark and Debora Knaupp - Owners

The Knaupps have owned the 56.25 acre Bank site for the last three years and were familiar with the site prior to their ownership. Mr. Knaupp has extensive knowledge of the land and understands its soils and hydrology. Mr. Knaupp, a valley grass seed farmer, has a B.S. degree in wildlife ecology and is a long time advocate of wetland restoration. He has conducted extensive research on the wetland restoration and ecology and has put this research into action on the 320 acres of wetland restoration adjacent to the Bank. Mr. Knaupp was the first Polk County farmer to take advantage of the NRCS Wetland Reserve Program. The Knaupp family was honored by the Polk County Soil and Water Conservation District as the *1993 Conservationist of the Year*. The Knaupps bring to the group the vision, proven success in wetland restoration, financial resources and cooperation required to create a mitigation bank of this stature and quality.

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