Appendix F
BP Cherry Point Cogeneration Facility Wetland Mitigation and the Birch Bay Great Blue Heron Colony

1.0 Introduction

BP has proposed to construct and operate a Cogeneration Project adjacent to its Cherry Point refinery. The Cogeneration Project site is located approximately 1.3 miles from the Birch Bay Great Blue Heron Colony, and the associated wetland mitigation areas are located within 0.6 to 1.4 miles of the colony, with more than 90 percent of the mitigation area more than a mile from it. The colony itself is located on land owned by BP, which has been permanently protected by a conservation easement.

Whatcom County has designated the Great Blue Heron as a species of local importance, and has expressed concern about the potential effect of the wetland mitigation plan on heron. In response to the County's concerns, BP agreed to try to modify its wetland mitigation plan to reduce or avoid potential impacts to herons and make the mitigation area more "heron-friendly." However, both BP and Whatcom County acknowledged that BP had been working with federal, state and local agencies for more than a year in developing the wetland mitigation plan, and the basic framework and goals of the plan had been established and would not change. Prior to preparing the Final Wetland Mitigation Plan for the BP Cherry Point Cogeneration Project, BP staff and consultants met with Whatcom County staff and consultants to discuss possible modifications of the wetland mitigation plan. The wetland mitigation plan has been revised in light of those discussions, and those revisions have been incorporated and reflected in the body of the Final Wetland Mitigation Plan and in this appendix.

At the request of Whatcom County, BP has also prepared this appendix to address heron issues specifically. This appendix provides some background information regarding the Birch Bay heron colony, describes the potential impacts of the mitigation plan on herons, and describes the measures that have been included in the wetland mitigation plan to avoid or mitigate potential adverse impacts on the herons. At Whatcom County's request, this appendix and referenced portions of the Final Mitigation Plan provide the information identified in Whatcom County Code section 16.16.730(B)(1)-(3). As a result of the changes summarized in this appendix, the Final Wetland Mitigation Plan avoids or minimizes potential adverse effects on herons, and the Final Wetland Mitigation now includes several features that will increase the usefulness of the wetland mitigation areas for heron foraging.

BP also has another proposed project for which the permit process is nearly complete called the Brown Road Materials Storage Area. For that project, BP has developed a Habitat Management Plan to address the Great Blue Heron. In connection with the Brown Road project, BP has also committed to develop an overarching management plan for their lands north of Grandview Road. The overarching plan is being developed in conjunction with Western Washington University. The Brown Road Project Habitat Management Plan has articulated management goals and objectives for that project's wetland mitigation area, which is close to the Birch Bay heron colony. The overarching management plan has a broader scope, but will also

address goals and objectives for herons. This appendix is intended to fit within the developing goals in the other management plans.

2.0 Birch Bay Great Blue Heron Colony

The Birch Bay great blue heron colony is located north of Terrell Creek and west of Jackson Road (T39N, R1W S1NE/SE) in the Cherry Point area of Blaine, Washington. The colony's location is shown on Figure F-1 of this appendix.

The Birch Bay colony is the third largest heron colony in the region and currently includes more than 300 breeding pairs (Eissinger, 2004). In addition to breeding, the herons from the colony utilize habitats in the vicinity of the refinery for foraging and staging.

Herons do not occupy the colony year-round. Instead, they have a relatively predictable annual cycle of (a) staging, (b) mate selection, courtship and nest building, (c) egg laying and incubation, (d) hatching and rearing, and (e) fledging and dispersal. This cycle spans approximately six months. Herons return to congregate in fields near the colony beginning in February or March for staging. They reenter the colony and begin nesting by about April 1st. Hatching begins in May. Fledging occurs in July and August. Herons then disperse in September and do not begin congregating near the colony again until the following February or March.

2.1 Colony History

The following historical summary is based on the Birch Bay Great Blue Heron Colony Conservation and Stewardship Plan (Eissinger 1996) and subsequent information provided in BP's Birch Bay Great Blue Heron Annual Reports (Eissinger 1997-2003).

Prior to the mid 1980's little historical information is documented for the Birch Bay heronry. It is likely that there has been a thriving heron breeding population historically, given the upland forests, fields, marshes and extensive eelgrass throughout the Birch Bay area. No other heron colonies are known within the immediate area. The nearest known active heronry is a relatively new one located on the south side of Lummi Bay.

The first official record of the Birch Bay great blue heron colony is from 1983 Washington Department of Fish and Wildlife (WDFW) records. At that time, the colony location was described as south of Terrell Creek and north of Grandview Road approximately one quarter mile and west of Jackson Road. At that time 75 nests were recorded by a state biologist. Any subsequent visits to the heronry by the State for five years were unrecorded, and during that time the herons relocated. A study of aerial photos from 1986 reveal that the area to the south of Terrell Creek, approximately 20 acres, had been recently logged. It is evident the heronry had been located in the logged stand or immediately adjacent to it. Displacement of the heronry was not reported; however it is assumed.

In 1988, the heronry was reported to the north of Terrell Creek (Norman 1988) indicating that the colony had moved to its present location between 1983 and 1988. The colony was described as containing approximately 200 nests situated in cottonwood, alder, and conifers. The following year 1989, a survey of the Birch Bay heronry documented 230 nests in 158 trees

(Norman 1989). It was also estimated that the heronry was relatively undisturbed due to its location. A bald eagle nest located within a mile to the west was identified as a potential disturbance due to predation. It was recommended that the property be purchased by the State Parks to provide long-term preservation of the heronry. In addition, the excellent quality of Terrell Creek's riparian habitat was noted and it too was recommended for acquisition and protection.

In 1992 the Birch Bay heronry was visited by a WDFW biologist and the current heron monitoring biologist, Ann Eissinger. The colony was reported to contain an estimated 150 nests and located in cottonwood, alder, birch, Sitka spruce, Douglas fir, and grand fir. The site had been purchased by ARCO Inc. and had been maintained in its natural state. However, a road easement to an adjoining property within 100 feet of the colony was in review by the State and County.

In 1993 approximately 199+ nests were reported for the colony (Norman 1993). Herons at that time were described as more easily disturbed by human presence near the colony than at other sites. Partial clearing in the vicinity occurred in December 1993. Further impacts to the herons by development were abated by the acquisition of a private inholding near the colony by ARCO Products Company.

Between 1994 and 1995 little information is available for the colony. A survey of the colony in 1994 documented 212 nests (addendum to Norman 1993). No data is recorded for 1995.

In 1996 ARCO Products Company granted a conservation easement on 77 acres containing the heron colony and adjacent forest land. At that time ARCO contracted a wildlife biologist to develop the Birch Bay Great Blue Heron Colony Conservation and Stewardship Plan (Eissinger 1996). As a result of this plan, active stewardship and ongoing scientific monitoring and mapping of the heronry ensued.

From 1997, systematic monitoring of the colony was instituted. Systematic monitoring includes weekly or biweekly site visits from March through August, a summer productivity survey, and a fall nest count. During the weekly monitoring visits, the colony is observed for breeding chronology, predation, and general status. An annual productivity survey provides a measure of breeding success. The autumn nest count occurs following leaf drop and establishes the total number of active nests or breeding pairs for the year. For 1997, 335 nests were counted. In the fall of 1997, private property adjacent to the south of the colony was logged. The winter of 1997/1998 saw a loss of some nest trees via blow downs.

In 1998, a second major, unexplained disturbance occurred in the colony. Young fledged prematurely and numerous nests were blown out of trees. The fall nest count showed noteworthy increase (91) in the number of active nests from 335 to 426 nests. Once again the winter of 1998/1999 damaged trees in the colony. The heavy snowfall and strong winds of the La Nina weather pattern blew down more nests and trees.

The third and most recent disturbance transpired in 1999. At the peak of breeding season, with chicks and eggs in the nests, the adults suddenly abandoned the colony. The cause

of this abandonment was investigated; however, no explanation was unearthed. As a result, only 5 of the 317 active nests were known to fledge young. Also in 1999, ARCO granted a conservation easement on an additional 103 acres of field and forest near the heron colony, creating a 180-acre habitat preserve.

The herons returned to the colony in 2000 and resumed their normal nesting pattern. However, with the disturbances of the three previous years, the number of active nests once again decreased 40 percent from 1998. From 2000 to 2002 the total autumn counts averaged 260, which indicated stability. During the autumn of 2002, a bald eagle pair began building a nest to the southwest of the colony approximately 100 feet from the southern boundary of the colony. The nest had some activity in 2003, but appeared not to produce young to fledging age and may have failed earlier. Bald eagle predation in the heron colony fluctuates from year to year and in some years may be the source of disturbance and reduction of productivity.

Currently, the Birch Bay heron colony is active and continues to be stable, with solid growth in 2003 and 2004.

2.2 Monitoring and Study of the Birch Bay Herons

The Birch Bay heron colony is unique among heron colonies in the Pacific Northwest in the extent to which it has been monitored and studied. Since 1997, Ann Eissinger of Nakheeta Northwest Wildlife Services has been extensively monitoring the Birch Bay heron colony. From March to August each year, Eissigner makes weekly visits to the colony and foraging areas. Eissinger performs annual census counts and gathers observational information from volunteers. Based on the information gathered to date, Eissinger has prepared Figures F-1 and F-2 reflecting her observational data on heron staging and foraging activities.

Although Eissinger has gathered substantial information about the staging and foraging patterns of the Birch Bay heron colony, her efforts have focused primarily on the colony itself. URS biologists have spent considerable time in areas designated for wetland mitigation for the Cogeneration Project. In doing so, they have made incidental observations concerning heron use. However, no systematic study of heron use in the wetland mitigation areas has been performed.

In order to better understand and define heron use of all of the BP-owned lands surrounding the refinery, a year-long heron monitoring study is currently underway by Eissinger. The heron habitat study is surveying BP owned open spaces using a systematic fixed-point sample method. The study area includes eleven sample points, plus walk-in and drive-by areas for further coverage. The study area concentrates survey efforts within suitable habitat north of Grandview Road with additional areas to the west along Jackson Road and southeast of the refinery, north of Aldergrove Road (Figure F-3). The study began in March 2004 and will be completed in March 2005. Heron occurrence, behavior, and site conditions will be documented during systematic weekly observations.

2.3 Breeding Area

Great blue herons congregate each spring at breeding areas for annual nesting. Herons are colonial breeders and the nests are concentrated and relatively isolated. Herons nest in trees, usually in near-shore forests in close proximity to productive food sources. The Birch Bay heron colony is situated in the forest north of Terrell Creek, northwest of the Cherry Point refinery. The forested area is isolated and is generally inaccessible. The colony location gives the herons direct access to productive foraging areas including marine, fresh water, and upland fallow fields. There are also areas of roosting nearby along Terrell Creek. No other heron colony is known within the Birch Bay area.

The heronry is situated in a 50-70 year old forest composed of both coniferous and deciduous trees. Most or all of this area is forested wetland and contains saturated soil and shallow inundation for long durations during the wet season and extending into the growing season. The trees in which the Birch Bay herons are nesting are primarily western paper birch (*Betula papyrifera*) 64% and red alder (*Alnus rubra*) 29%, with conifer species such as grand fir (*Abies grandis*) and Douglas fir (*Pseudotsuga menziesii*) utilized to a lesser extent, 7%. Most heron colonies nest in mixed species forests, however each colony has a different species preference for nesting.

Heron nesting colonies are very sensitive to disturbance and, as a result, most sites are isolated and difficult to detect. The primary disturbance to colonies is typically human related, either through direct access or habitat alteration. As a result, management plans for heron colonies include peripheral buffers to separate the colony from potential human intrusion, noise or other disturbance. The Birch Bay heron colony is well protected by a forested buffer. The nesting colony itself occupies approximately two acres. It is surrounded by a 180-acre block of forested land that is owned by BP and protected by a conservation easement.

2.4 Staging Areas

The Birch Bay heron colony stages in the fallow fields along Terrell Creek northwest of the Cherry Point Refinery. Staging is an important part of a heron's lifecycle. It is defined as a gathering of adult herons in fields, other open space, or sometimes trees, prior to entering the colony area for nesting. Staging is considered a vital part of the breeding cycle and social structure of the colony. Herons generally concentrate in specific areas for staging that are used each year.

Since 1997 the staging for the Birch Bay colony has occurred in the fallow fields directly east of the colony. The area most frequently used is immediately east of Jackson Road. Some herons stage in scattered groups to the south of the colony and further east of the main staging area. The staging areas used by the herons are identified on Figure F-1 by yellow crosses depicting the common area of concentration and by a broken green line illustrating the areas of use by individuals and smaller or loose aggregations.

2.5 Foraging Areas

Herons forage in a variety of habitats. Foraging areas include marine shorelines, the intertidal zone, wetlands, streams, riparian areas, and upland fallow fields. Prey sought by

herons include fish (marine and freshwater), crustaceans (marine and freshwater), amphibians (freshwater and upland), and small mammals (upland). The primary prey species of great blue herons identified by regional researchers include: marine: crescent gunnel (*Pholis laeta*), saddleback gunnel (*Pholis oranta*), marine sculpins (various species), shiner perch (*Cymatogaster* aggregate), and smelt (*Hypomesus* spp., *Thaleichtys* spp.); freshwater: sculpins, frogs (*Hyla* spp., *Rana* spp.), and crayfish; and upland: Townsend's vole (*Microtus townsendii*). The most concentrated foraging during the nesting season occurs in the intertidal areas near the colony.

The primary feeding locations for the Birch Bay colony are Birch Bay, Drayton Harbor, Semiahmoo Bay and Lummi Bay (Figure F-2). Herons travel from their colonies to the foraging areas along common flight paths or flyways. The distance between the colony and these areas are: Colony to Birch Bay – 1.88 miles; Colony to Lummi Bay – 8.13 miles; Colony to Drayton Harbor/Semiahmoo Bay – 5.5 miles. Drayton Harbor and Semiahmoo Bay have the largest concentrations of foraging herons and are considered the foraging areas where the Birch Bay Colony concentrates its foraging activities. These foraging areas are extremely important, particularly to breeding herons and young due to high seasonal prey availability and easy access by large concentrations of herons at one time. The most important of these foraging areas are the intertidal eelgrass meadows, which harbor high densities of prey.

Additional feeding areas are utilized by individuals or small aggregations of herons. These areas are utilized year-round, particularly during unfavorable tides, and do not necessarily support large concentrations during the breeding season. These additional feeding areas associated with the Birch Bay colony include Lake Terrell, the Terrell Creek Corridor, and the fallow fields adjacent to the heron colony. These areas provide foraging habitat for the herons during high tide when intertidal foraging is limited to the shoreline and during the winter when low tides are generally nocturnal. The Cherry Point shorelines also are used by individuals and small aggregations when conditions are favorable. Lake Terrell and fallow fields north of the refinery have limited use by the herons during the fall and early winter when the activities of upland bird and waterfowl hunting season causes the herons to avoid these areas due to disturbance from dogs and hunters. Although these additional foraging areas are not utilized by large concentrations of herons, they are important, particularly fallow fields, for winter survival and access to food during unfavorable tide cycles. Individuals may range widely to use these habitats over a large part of the county and adjoining areas, particularly outside the nesting season.

3.0 Wetland Mitigation Plan

3.1 General Description of the Proposed Cogeneration Project and Wetland Mitigation Plan

BP's proposed Cherry Point Cogeneration Project will be located at the corner of Grandview Road and Blaine Road (T39N R1E S8NW), adjacent to the BP Refinery in the Cherry Point Heavy Industrial Area of Whatcom County, Washington. Wetland mitigation for the Cogeneration Project will occur in the open fields directly north of the construction site, north of Grandview Road, on both the east and west sides of Blaine Road. Figure 1 of the

mitigation plan illustrates the locations of the construction and wetland mitigation areas, the heron colony, and local landscape features.

The wetland mitigation plan includes two compensatory mitigation areas (CMAs), which together occupy approximately 110 acres. CMA 1 will be located across Grandview Road from the cogeneration facility, east of Blaine Road, and south of Terrell Creek, and is approximately 50 acres in size. CMA 2 will be located on about 60 acres across Grandview Road from the cogeneration laydown area, west of Blaine Road, and south of Terrell Creek. Both CMA 1 and CMA 2 are currently primarily open fields with a mosaic of wetland and upland conditions (see Figures 5A and 5B of the Cogeneration Project Wetland Mitigation Plan to which this appendix is attached). Modifications to CMA 1 and CMA 2 are planned to compensate for permanent wetland impacts associated with the Cogeneration Project, primarily by changing hydrology and enhancing existing wetlands and plant communities. Invasive weedy species will be removed and replaced by native species. Habitat diversity and structure will be restored by planting a variety of native meadow grasses, shrubs and trees. Historical hydrologic pathways and functions will be restored by plugging existing ditches, spreading treated stormwater across CMA 2 and creating several small seasonal ponds. As part of the mitigation, the farming lease on the CMAs would be terminated.

3.2 Mitigation Area Existing Conditions

CMA 1 and CMA 2 are currently primarily open fields with a mixture of wetland and upland habitats. Approximately 80 acres of the combined 110 acres of the CMAs has been determined to be jurisdictional wetlands. Approximately one-third of the wetlands (or 24 acres) are seasonally inundated. Figures 6A and 6B in the Final Mitigation Plan show the wetlands (both seasonally saturated and seasonally inundated) and upland areas. Several ditches remaining from former active farming continue to function in draining the sites, although they have not been maintained for years and typically are overgrown by weeds, shrubs, and trees. While some of the wetlands are inundated with shallow water during the wet season, there are no permanent open water features in the CMAs. Topography of the CMAs is shown in Figures 5A and 5B of the Mitigation Plan, and the ditch flow paths are shown in Figures 6A and 6B

The CMAs consist primarily of open-field habitat. Forested vegetation can be easily distinguished from open field habitat in the aerial photographs used as the background of Figures 6A and 6B.

Both CMA1 and CMA2 have been leased to a cattle farmer for several years. Under the lease, CMA 1 has been utilized as pasture for grazing cattle and a large part of CMA 2 has been mowed for hay annually.

Current vegetation cover in the CMAs as distributed between uplands, seasonally inundated wetlands, and seasonally saturated wetlands is given in Table 1 and Table 2 below.

Table 1 Vegetation Cover in Acres in CMA 1

Cover Type	Upland	Seasonally Inundated	Seasonally Saturated	Total
Forest/Shrub	1.5	.5	0	2.0
Dominated by Reed Canarygrass	2.5	9	14	25.5
Dominated by Other Herbaceous Species	8	2.5	12	22.5
Total	12	12	26	50

CMA 1 is now grazed by cattle under the farm lease covering the parcel. Therefore the habitat of CMA 1 is not conducive to production of voles that might attract herons to the parcel. If grazing were not occurring, then about 8 acres of upland would potentially be attractive to voles and herons. About 14.5 acres of wetland that is not dominated by reed canarygrass would be potentially available, but would be less productive of voles. Also, no seasonal ponds or open water suitable for amphibian reproduction exist within CMA 1.

Table 2 Vegetation Cover in Acres in CMA 2

Cover Type	Upland	Seasonally Inundated	Seasonally Saturated	Total
Forest/Shrub	3	.5	.5	4.0
Dominated by Reed Canarygrass	2.5	9	11	22.5
Dominated by Other Herbaceous Species	12.5	2.5	18.5	33.5
Total	18	12	30	60

Under the current farm lease, about 35 acres of CMA 2 is typically mowed for hay. The area is not necessarily identical every year. The mowed area occupies most of the east and north sections of CMA 2 and is spread across uplands, seasonally saturated wetlands, and seasonally inundated wetlands. With most of the vegetative cover removed, these areas become less

attractive for voles and therefore for herons. If the mowing did not occur, the 12 acres of upland field not dominated by reed canarygrass would be the most attractive to herons for feeding. About 21 acres of wetland not dominated by reed canarygrass would potentially be available, but would be less attractive to voles. Also, no open water suitable for amphibian reproduction exists in CMA 2.

3.3 Current and Potential Heron Use of Mitigation Areas

As explained in section 2.2 above, no systematic study of heron usage in the CMAs has been conducted. Based on the best information that is available, however, heron use of the CMAs is believed to be minimal. Neither breeding nor staging occurs in the CMAs. Eissinger has observed occasional foraging by individuals or small groups of herons in the western panhandle of CMA2, but has not observed foraging in CMA1. URS wetland biologists have been on the ground in the CMAs many times in all seasons since the fall of 2001 and in other parts of BP's land north of Grandview Road repeatedly since 1999. During those visits, herons have frequently been seen to the west of the CMAs, close to the heronry, along the permanent ponds, and in fields closer to Jackson Road. Herons have been infrequently seen in the western part of CMA 2 in the northwestern "panhandle", but no herons have been seen in CMA 1 or the eastern 90 percent of CMA 2.

Nonetheless, some consider any open field area within 4 miles of the heron colony to be potential heron habitat (Stenberg 2003). Herons could forage for prey in open fields near the colony as a supplement to prey found in the marine tidal areas or as a substitute when the tides and other conditions make the marine tidal areas unavailable, or at times when it is important for herons or their young to remain close to the colony. (Stenberg 2003). In addition, individual herons may feed in open field habitats at any time, but are seen in such situations particularly during the winter when days are short and tides are unfavorable for intertidal foraging.

Potential prey species that may be available for herons in the CMAs include voles and native amphibians. Herons are known to use open fields with fallow grass cover to hunt for voles. Ideal conditions for herons to find voles is habitat with dense grass cover that is not tall enough to completely obscure the voles from the herons' view. Voles make runways in the grass where they travel over the surface of the ground. Where the grass is too sparse to provide cover (such as in mowed or heavily grazed areas) use by voles is limited. The predominant species of vole in the Cherry Point area is one that tends to choose drier substrate rather than wetland areas.

The vegetation cover of the CMAs, while recognized as primarily open-field habitat, includes extensive patches of cover that is less than ideal for heron foraging. Of the 110 acres in the CMAs, about 6 acres is occupied by scattered trees and dense shrubs like hardhack and blackberries, which makes those areas inaccessible to herons for foraging. In addition, about 45 to 50 acres is dominated by dense reed canarygrass that, if not mowed, is tall and dense enough to obscure the voles from sight by the herons and reduce the effectiveness of their hunting. Therefore, under current land use patterns by the lessee, only about 20 acres of the CMAs might qualify as attractive foraging habitat for herons. If the lease activities were not occurring, about 55 acres would be suitable in terms of ground cover, but only about 20 of those acres would be

upland. The rest would be wetland that would not be ideal for voles during the winter when voles are most important to herons.

Likewise, the CMAs currently provide less than ideal habitat for preying on native amphibians. None of the wetlands on the CMAs currently provide breeding habitat for amphibians. In addition, the CMAs do not provide the forested or shrub habitat required for the terrestrial stages of the amphibians' life cycle. The distance from such breeding habitat across less than ideal habitat conditions for adult amphibians suggests that the expected level of amphibian occurrence on the CMAs is too low to make the CMAs attractive for herons to forage on amphibians. This corresponds with on-the-ground observations by wetland biologists. Amphibians have been encountered much less here than in other parts of BP's property north of Grandview Road where native amphibian habitat is more prevalent.

3.4 Potential Impacts to Herons & Measures to Avoid and Mitigate Impacts

Herons are not expected to be adversely affected by the creation and maintenance of the wetland mitigation areas associated with the Cogeneration Project. Nonetheless, several potential impacts to herons and their potential habitat were considered and measures were developed to avoid or minimize those potential impacts. Features have also been added to improve the habitat for heron foraging. The potential impacts and the measures to offset them, as well as the added beneficial features, are addressed below.

- **Disruption due to initial creation of mitigation areas.**

A major component of the Wetland Mitigation Plan is the eradication of invasive plant species such as reed canary grass and blackberry bushes. The current distribution of reed canary grass in the CMAs is shown on Figures 7A and 7B of the Wetland Mitigation Plan. The initial removal of reed canary grass, blackberry bushes and other invasive species will involve tilling and the application of herbicides in these areas. The tilling and herbicide application activities will occur over a period of approximately two months. On any given patch, these activities will occur intermittently, a few days total spread over the treatment period. Tilling will be accomplished using motorized equipment such as tractors. The tilling is performed in order to disrupt vigorous spring growth, break up the rhizomes, and encourage sprouting of dormant seeds and rhizome pieces so that they can be killed by herbicide treatment. It is important to break up the rhizomes in order to get the herbicide into all parts. The herbicide application occurs after vigorous regrowth is underway and therefore follows the tilling a few weeks later. These actions must occur during the spring and early summer when growth is most vigorous in order to be effective and to prevent a new crop of seeds from setting. Herbicides will be applied using motorized equipment for the initial treatment. Follow-up treatment for persistent patches and new sprouts will be done by hand, even after other plantings have been installed.

The initial creation of the mitigation areas will also involve some limited excavation and earth movement to fill existing ditches and restore historic hydrology. This excavation and earth movement will be accomplished using motorized equipment such as bulldozers. The earthwork is expected to take two months or less and will be conducted during the dry months of late

summer and early fall (therefore will not occur outside of the WDFW heron management guidelines of July 31 to Feburary 15).

After invasive species are eradicated, native species will be planted in the mitigation areas according to the planting plan provided in Figures 11A and 11B. Initial planting of herbaceous species is expected to occur in early fall (perhaps a 2-week duration) and woody species in late fall and early winter (about a 2-month duration), with a few species likely to be installed in early spring. Initial planting will be done in phases and the phases are likely to extend over a period of 3 years (see Section 10 of the Cogeneration Project Wetland Mitigation Plan). Initial planting will involve small motorized equipment and hand labor. The intent will be to complete planting between July 31 and February 15. However, if conditions or circumstances require planting outside that window, then Whatcom County Planning and Development Services will be notified and appropriate monitoring and protective measures will be agreed upon before planting proceeds.

CMA 1 and CMA 2 are located a sufficient distance from the heron colony and staging areas so that the activities associated with creating the mitigation areas are not expected to disturb heron nesting and staging. However, it is possible that the activities associated with the initial creation of the mitigation areas could discourage foraging in CMA 1 and CMA 2.

The scheduling of most of the initial work to create the wetland mitigation areas should minimize disturbance of herons. The earthwork can best be done during the dry season, which coincides with the end of the fledging and the dispersal of the herons from the colony and therefore should be considered advantageous timing. Most of the planting will occur in fall and winter when the herons are widely dispersed and not concentrated at the colony. However, the activities required to eradicate invasive species, reed canarygrass in particular, must occur during the spring and early summer to be effective. Construction timing is discussed in more detail in Section 10.0 of the Mitigation Plan.

- **Disruption during on-going maintenance activities.**

In years following the initial creation of the wetland mitigation areas, on-going maintenance will be required in the wetland mitigation areas. The Final Mitigation Plan contains specific performance standards and requires monitoring and contingency measures to be taken if those standards are not met (see Section 9.0 of the Mitigation Plan). During the first several years, additional invasive species (reed canarygrass and blackberry) eradication efforts will be necessary, and additional native species will be planted to replace plants that do not survive. These activities will include hand work or small motorized equipment. These activities will occur for only a few days at a time over the spring, summer, and fall of the 10-year monitoring period. The timing of the activities is based on the effects of weather patterns of the year and the most effective time for the particular activity. For example, the timing of some weed control activities may vary by weeks from year to year depending on the late winter and spring weather pattern. However, if conditions or circumstances require maintenance activities to occur more than 5 days in 30 days between February 15 and July 31, then Whatcom County Planning and Development Services will be notified and appropriate monitoring and protective measures will be agreed upon before maintenance activity proceeds.

Due to the distance from the heron colony, these activities are not expected to affect heron nesting or staging. These activities could temporarily discourage heron foraging in the mitigation areas. However, these maintenance activities are essential to the overall success of the wetland mitigation plan. The federal wetlands permit will impose strict performance standards for reed canary grass removal, and on-going maintenance must be performed at the time when it will be effective in order for those federal requirements to be met.

- **Reduction of open field foraging area and improvement in habitat quality.**

CMA 1 and CMA 2 currently provide 110 acres of potential heron foraging habitat. However, as discussed above in section 3.2 of this appendix, only about 20 acres currently provide habitat that is likely to be attractive for heron foraging. Even without the activities of the farmer who currently leases the land, only about 20 acres would be attractive to the herons during a large part of the year because of the dense stands of reed canarygrass and the amount of wetland.

The mitigation plan activities include converting a substantial part of the CMAs from open field habitat to tree or shrub habitat, thus reducing the amount of open-field habitat available for herons to use in foraging. As a result of concerns expressed by Whatcom County, changes have been made to wetland mitigation plan. The planting plan now maintains at least 23 acres in open field habitat for the herons. As agreed upon with the County's staff and consultant, emphasis has been placed on locating the open field habitat in CMA2, which is closer to the heron colony and more likely to be used in the future by herons for foraging. In addition, several features have been designed to improve the quality of that habitat for heron foraging.

According to the planting plan (Figures 11A and 11B), the mitigation areas would be planted to contain a variety of habitat types. The mitigation areas would consist of approximately 23 acres of open field, 7 acres of shrub, 79 acres of forest and 1 acre of seasonal ponds. Although the planned planting would reduce the total amount of open field within the CMAs, the habitat most suitable for heron foraging would be not be decreased , and the usefulness of the remaining habitat for heron foraging will be improved significantly.

The effects of the changes in CMA 1 and CMA 2 that would occur as a result of the wetland mitigation actions have been evaluated with respect to current and potential heron use of the CMAs. The wetland mitigation plan has been modified to specifically address the effects on potential heron habitat and use. Tables 3 and 4 summarize the expected habitat conditions for herons in each of the CMAs.

Table 3 Proposed Vegetation Cover in Acres in CMA 1

Cover Type	Upland	Seasonally Inundated	Seasonally Saturated	Total

Forest/Shrub	11	11.5	21	43.5
Dominated by Reed Canarygrass[1]	0	0	0	0
Dominated by Other Herbaceous Species	1	1	4	6
Seasonal Pond	0	.5	0	.5
Total	12	13	25	50

1. Cumulative Reed Canarygrass cover could be as high as 10% to 20% during the early years of the mitigation, but by the end of the monitoring period there will be no more than 10%. No area as large as an acre will be dominated by Reed Canarygrass.

Table 4 Proposed Vegetation Cover in Acres in CMA 2

Cover Type	Upland	Seasonally Inundated	Seasonally Saturated	Total
Forest/Shrub	10	22	11	43
Dominated by Reed Canarygrass[1]	0	0	0	0
Dominated by Other Herbaceous Species	7	2.5	7	16.5
Seasonal Pond	0	.5	0	.5
Total	17	25	18	60

1. Cumulative Reed Canarygrass cover could be as high as 10% to 20% during the early years of the mitigation, but by the end of the monitoring period there will be no more than 10%. No area as large as an acre will be dominated by Reed Canarygrass.

Open areas have been designed to be large enough to accommodate easy entry and exit by birds as large as the great blue heron. The longest dimension of the patches ranges from more than 400 feet long to more than 1100 feet long, and the patches range from 3 acres to over 6 acres in area. Three of the open areas have been located in such a way that they will connect with adjacent open field areas located outside the CMAs to further enhance the likely use by herons. Two of those areas link with similarly designed open areas on the Brown Road Mitigation Area, as illustrated by aligning Figure 10A in the Brown Road Material Storage Area Final Mitigation Plan with Figure 11B of the Cogeneration Wetland Mitigation Plan. The third area is along the east edge of CMA 1 and links to open field habitat to the east.

The quality of the open field habitat that remains will be improved in several ways by the mitigation plan. Large and small woody debris will be distributed in meadow areas to promote small mammal concentrations, which herons may utilize as prey (see section 5.6.4 of the Cogeneration Wetland Mitigation Plan). Twelve small seasonally inundated ponds and emergent wetlands will be strategically located to increase breeding of native amphibians, which herons also may use as prey (see Figures 11A and 11B of the Cogeneration Wetland Mitigation Plan). Reed canarygrass and blackberry-occupied open fields will be replaced with meadow grass fields that are more accessible and which herons are expected to favor for foraging. Shrubs will be added in small clumps to provide windbreaks, which herons have been observed to prefer when foraging in fields near the colony (Eissinger 2004).

- **Impacts to prey species from hydrologic modifications.**

A major component of the wetland mitigation plan is the restoration of historic hydrology in the mitigation areas. Changes in the hydrology could adversely affect available prey species if it made areas too wet to support small mammals such as voles, or if it created habitat for bull frogs that could reduce the number of native amphibian prey species. The mitigation plan has been designed to avoid these potential problems.

Small portions of the mitigation areas that are currently upland are likely to become seasonally inundated wetlands (perhaps as much as 3 acres total). These areas would not support small mammals such as voles when inundated, but would be repopulated during the dry months. In order to compensate for this temporal effect, the mitigation plan will enhance other open meadow habitat by replacing reed canary grass and blackberries with meadow grasses in which small mammals thrive year round. In addition, woody debris placed in the meadows will improve utilization by voles.

Measures will be taken to prevent any portions of the wetland mitigation areas from becoming bullfrog habitat. The bullfrog lifecycle requires year-round open water habitat. The mitigation areas will not contain any year-round open water. Twelve seasonally inundated ponds will be created, cumulatively occupying approximately about one acre (see Cogeneration Wetland Mitigation Plan Figures 11A NS 11b). These ponds will encourage native amphibian growth, making more prey species available, but will not provide bullfrog habitat because they will not contain water year-round. The seasonal ponds have been strategically located to favor access to most of them by herons. Even ponds not accessible to herons will produce amphibians that may be available in other parts of the vicinity. The planting of forest and shrub habitat is also important, because the adult phases of native amphibians require such habitat accessible from the breeding ponds. The seasonal ponds will be monitored and contingency actions will be taken, if necessary, to ensure that they remain seasonal in nature (see Section .8 of the Cogeneration Wetland Mitigation Plan).

- **Creation of connected forested areas.**

The wetland mitigation plan includes the creation of approximately 79 acres of forested wetland and upland habitat. These forested areas are shown on Figures 11A and 11B. The forest plantings will connect existing forest areas along Terrell Creek with seasonal ponds within the CMAs. This connectivity is considered desirable because herons from the Birch Bay colony

have been observed preferentially flying along tree lines to reach foraging areas. In addition, the connections with other habitat patches will benefit other wildlife species.

3.5 Expected Outcomes

Overall, the proposed mitigation will maintain an area equivalent to or greater than the currently effective potential foraging area for herons in the CMAs. A comparison of existing and expected habitats from several ways of looking at it is provided in Table 5. The quality of the open field habitat will be improved in several ways to produce more potential heron prey and be more accessible for heron use. Therefore, the end result is expected to be a net improvement for herons over existing conditions.

Table 5 Comparison of Existing and Expected Heron Habitat in Acres

Habitat Type	Existing Area	Existing Effective Foraging Area	Planned Area	Expected Effective Foraging Area
Overall Habitat:				
Open field	104	20.5	22.5	22.5
Tree-shrub	6	0	86.5	0
Seasonal pond	0	0	1	1
Subtotal	110	20.5	110	23.5
Wetland Habitats:				
Seasonally inundated herbaceous wetland	24	0	3.5	3.5
Seasonally saturated herbaceous wetland	56	0	11	11
Seasonally inundated forested/shrub wetland	1	0	33.5	0
Seasonally saturated forested/shrub wetland	0	0	32	0
Seasonal pond	0	0	1	0.5

Subtotal	81	0	81	15
Degraded Habitat:				
Open field grazed by cattle	50	0	0	0
Open field mowed	35	0	0	0
Subtotal	85	0	0	0

In the long term, the forest planted in the CMAs has the potential to become attractive as a site for the heron nesting colony. This may be important, as natural succession and weather events can combine to make the current nesting colony site cease to function. However, natural succession also has the potential to fill in meadow areas with trees, thus reducing the open field foraging area available to the herons. No active elimination of trees is planned to ensure that areas planted with herbaceous vegetation remain open fields in perpetuity. However, trees that try to establish in areas planted as herbaceous habitat in the initial plantings will be treated as weeds and removed during the ten-year monitoring and maintenance phase (see Section 8 of the Cogeneration Wetland Mitigation Plan).

4.0 Adaptive Management

The Final Wetland Mitigation Plan has been developed based upon the best information available at this time. Additional information regarding heron habitat utilization and hydrology is expected to be available prior to the implementation of the wetland mitigation plan. The mitigation plan will be adapted as appropriate when that additional information becomes available.

In particular, the year-long heron monitoring study discussed above will be completed in March 2005, prior to the implementation of the wetland mitigation plan. This study should provide additional more detailed information regarding heron utilization of the wetland mitigation areas. The mitigation plan will be adjusted as appropriate to minimize temporary and permanent impacts to herons and to increase the benefits to the local heron population. Such adjustments may include altering the planned planting schemes, planned hydrologic patterns, and proposed habitat features. For example, if the heron monitoring results showed that herons are spending significant time foraging in wetlands with amphibians, then more seasonal ponds could be added.

In addition, the monitoring of the mitigation areas in the first 10 years after establishment will generate information that will point out any differences in what is achieved compared with what was planned. Analysis of the causes of the differences may result in the need for contingency measures to be implemented. The effects of the contingency measures on herons

will be considered as part of the analysis and implementation of the measures. For example, if plantings in a certain area are not successful as planned, the location of area to be replanted could be shifted, but the potential effects on the amount of effective heron habitat would be considered in determining the adaptation. The overall goal of maintaining the planned level of effective heron habitat will be one of the guiding principles in meeting the performance standards of the wetland mitigation plan as adaptive management is applied to the mitigation area.

5.0 References

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