ENCLOSURE D

CORPS ANALYSIS OF THE ADEQUACY OF THE INITIAL (DEC. 2000) MITIGATION PLAN

The overview and mitigation component summaries outlined below are from the Port's Natural Resource Mitigation Plan, Dec. 2000.

Mitigation for the project impacts would affect about 18.61 acres of wetland on-site near STIA, and generally convert farmed or emergent (lawns and golf course turf) wetland to shrub wetlands. Mitigation would also establish about 41.80 acres of upland forested or shrub buffers near STIA to protect wetland and stream functions. The off-site mitigation at Auburn will affect 23.39 acres of wetlands.

ON-SITE MITIGATION

VACCA FARMS AND LORA LAKE MITIGATION

Mitigation at the Vacca Farm site focuses on replacing the Miller Creek stream channel, replacing riverine habitat functions, replacing lost floodplain functions, improving water quality functions, improving organic matter export functions, and reducing the habitat value of the area to waterfowl and flocking birds.

Compensatory mitigation at the Vacca Farm site includes the following components:

- Relocation of 980 feet of a channelized portion of Miller Creek (to accommodate the embankment for the third runway, the RSA's, and the relocation of South 154th St.). The new stream channel will be approximately 1,080 feet long.
- Restoration of natural channel morphology and instream habitat to the relocated reach of Miller Creek.
- Restoration and enhancement of riverine buffers along Miller Creek (3.04 acres).
- Restoration of floodplain wetlands on the Vacca Farm site (6.60 acres of Prior Converted Cropland); 1.59 acres of enhancement in Wetlands A1, A1a, A2, A3, A4; and 0.73 acre of enhancement in farmed wetlands (1,2,3,9,10,11).
- Enhancement of upland buffers around the Vacca Farm site (1.54 acres along Des Moines Memorial Drive).
- Restoration and enhancement of wetland and upland buffers along the Lora Lake shoreline (0.32 acres of shoreline enhancement including removal of bulkheads and replanting a natural shoreline); 3.06 acres of indirect enhancement to the POW portion of Lora Lake; and 0.27 acres of upland buffer enhancement around Lora Lake).

The following is a summary of the wetland functions which the Corps believes will likely improve over baseline from converting farmland to palustrine shrub and forested wetland; replacing a portion of the Miller Creek channel; and enhancement of the Lora Lake shoreline.

Water Quality Functions

Removal of farming and residential land uses activities in this area would remove activities degrading water quality by reducing the amounts of sediments, nutrients, and chemicals entering wetlands, Lora Lake, and Miller Creek. In addition, the increase in vegetation density and diversity and greater connectivity between the creek and floodplain will increase the function of the site for removal of nutrients, sediments, and other pollutants.

Hydrologic Functions

The Vacca Farm mitigation site is designed to replace floodplain filled by the project (8,500 cubic yards) and provide a small net increase in flood storage capacity (by excavating 9,600 cubic yards of peat). The overall ability of the wetlands and farmland in providing this function should not change. Enhancement of the area by planting shrubs and trees is likely to increase the desynchronization function because high flows will be detained longer and velocities slowed because of the introduction of woody material to the floodplain, which is currently in farmland use with little woody vegetation.

No change to groundwater exchange functions is expected at the Vacca Farm mitigation site.

Habitat Suitability Functions

Fish Habitat - The relocation of Miller Creek will replace fish habitat lost by channel filling. The relocated Miller Creek channel will provide improved fish and other aquatic habitat because it is designed with a number of beneficial features lacking in the present stream. The primary characteristics provided by the design are large woody debris (LWD), woody riverine vegetation, and substrate variability. Each of these features will enhance fish and aquatic habitat. Increased amounts of woody riverine vegetation will result in increased shade, allochthonous inputs (food sources in the form of coarse particulate organic matter (CPOM) and terrestrial invertebrates), and sources of woody debris. Increased LWD generally provides habitat complexity including small plunge pools, fish cover, invertebrate substrates, and variable water depths and velocities. These conditions will provide nesting, resting, and forage habitat for fish and other aquatic life. Increased streambed variability in the form of gravel, wood, and CPOM will also increase the diversity of invertebrate habitat overtime.

The shallow water along the margin of Lora Lake would be improved aquatic habitat compared to existing conditions. The replacement of lawns and riprap with plantings of tree and shrub vegetation would improve aquatic habitat by providing shade, organic matter input (woody debris, leaf matter, and insects) that would support fish and other aquatic life.

Waterfowl and Passerine Bird Habitat - The function of the wetlands for birds will increase as poorly vegetated areas are converted to shrub dominated wetlands. Potential management of habitat (per the WHMP) may reduce habitat value for certain species, particularly waterfowl. As directed by FAA, waterfowl habitat functions are not

proposed at the Vacca Farm mitigation area. The current farmland will be planted with trees and shrubs to provide a complete canopy cover preventing ground foraging by waterfowl. Additionally, while portions of the site will flood during 1-year and greater storm events, the presence of standing water on the site will be for short duration and obscured by vegetation, deterring waterfowl use.

The pond margin along Lora Lake would be modified to reduce use by waterfowl. The replacement of lawns with planting of riverine tree and shrub vegetation would eliminate forage and resting areas used by waterfowl.

The planting of tall shrubs and trees on the Vacca Farm mitigation site will reduce the foraging by flocking birds. The native plant species to be planted do not provide direct food sources (e.g., fruits, nuts, seeds, berries, etc.) for avifauna. The vegetation would produce insects that a variety of passerine birds would forage upon. The combination of these elements will limit bird use, and shift use from flocking birds to forest species. Planting trees and shrubs around Lora Lake could increase forage opportunity for some birds such as kingfisher.

Amphibian Habitat - Converting farmland to shrub and forested wetlands and buffers will improve habitat conditions for amphibians. The restored floodplain wetlands would provide habitat for adult amphibians and breeding habitat (logs and forest soils) for species breeding in non-aquatic habitat (e.g., red-backed salamander, ensatina). The removal of bulkheads and riprap and converting lawn to vegetated buffer along the margin of Lora Lake would provide breeding habitat for amphibians requiring surface water for breeding. The mitigation site will also improve the amphibian dispersal because of the new South 154th Street bridge spanning the floodplain of Miller Creek, and removal of the existing bridge which prevents movement through riverine areas. The mitigation will also improve connections to upstream forested wetlands (Wetlands 1 through 9).

Invertebrate Habitat - Invertebrate habitat functions are expected to improve overall by converting farmland to shrub wetlands. Diversifying the wetland vegetation species and strata on the Vacca Farm site will, overtime, improve terrestrial, aquatic, and semi-aquatic invertebrate species numbers and richness. There is likely to be a decrease in species richness and numbers of invertebrates on a temporal scale as wetland soil processes develop and new food webs establish. As vegetation matures and production of a variety of detrital components ensues, diverse invertebrate communities will reestablish.

Small Mammal Habitat - Habitat functions of the area for small mammals would increase because of the greater diversity and density of vegetation cover and habitat types. Logs and woody vegetation added to the Vacca Farm site will increase the amount of denning habitat available to small mammals. In addition, human disturbances would be decreased, and habitat connectivity to other portions of the Miller Creek riverine area would increase as a result of the new 154th Street Bridge spanning

the creek and floodplain. The restoration also improves habitat connectivity to Wetlands 1 through 9 located north and east of the site.

Carbon Export - The increase in type and density of riverine vegetation, coupled with increased connectivity with the Miller Creek floodplain would increase the potential for carbon export functions in the Vacca Farm mitigation site. Removal of bulkheads along Lora Lake and converting lawn to vegetated buffer will increase the export of carbon from the shoreline (currently mowed lawn) to the lake. The relocated Miller Creek channel is designed to have overbank flow during 1-year storm events and higher. Smaller storms will flood portions of the floodplain through backwater flooding. As floodwaters recede, export of organic matter from the floodplain to the stream is likely once the enhancement activities stabilize and vegetation matures, and will occur at higher levels because greater amounts and types of organic matter will be on site and available for export. The replacement of grass dominated communities adjacent to the creek and Lora Lake with native woody vegetation will increase the amount and diversity of organic matter (e.g., readily decomposable leaves, woody debris that is slower to decompose) available to the creek and aquatic habitat of Lora Lake. The high productivity expected in forest and shrub wetlands will result in accumulations of organic matter in the saturated soils of the restored wetland. Groundwater movement through the site and flooding would transport dissolved organic matter to Miller Creek.

The placement of logs and development of a natural riverine zone in the relocated portion of Miller Creek will help trap organic debris in the stream channel where it will be available for processing by aquatic organisms, thus benefiting the food chain. This will be a vast improvement over the impacted portion of Miller Creek.

The removal of plowing and soil drainage systems at Vacca Farm will reduce the potential loss of peat soils through oxidation. Restoring natural hydrology and natural plant communities will provide a carbon cycle where greater amounts of organic matter decompose anaerobically, are exported from the site as dissolved organic carbon, or accumulate as organic soil. This process is likely to take decades.

MILLER CREEK BUFFER AND RIVERINE WETLAND MITIGATION (downstream of Vacca Farm)

Mitigation components include:

- Removal of existing development (e.g., removal of septic tanks, underground storage tanks, ornamental vegetation, invasive species, and water uses). In the Miller Creek basin, the Port has acquired residential, commercial, and agricultural properties, some of which have wells from which groundwater for domestic, commercial, and/or agricultural purposes was pumped. The wells on these acquired properties will be abandoned. This could have a positive effect on groundwater quantity in the area. However, removal of septic tanks and their associated leach fields in this same area may off-set some of the benefit gained from well abandonment.

- Establishment of buffers vegetated with native woody vegetation along about 6,500 linear feet (about 40 acres) of Miller Creek. The buffers include enhancement of approximately 7.40 acres of wetland in the Miller Creek buffer.
- Restoration of in-stream habitat at four locations in the Miller Creek channel.
- Installation of large woody debris along approximately 6,500 linear feet of the Miller Creek channel.
- Replacing approximately 1,390 linear feet of drainage channels near 12th Ave. (Waters A, B and W) to compensate for existing drainage channels being filled by the third runway embankment.

Additional in-basin mitigation would result from the establishment of a $150,000 Trust Fund specifically for enhanced aquatic and fisheries habitat in the lower reaches of Miller Creek.

The Corps has determined the implementation of this portion of the mitigation package would likely result in overall functional lift of the system as summarized below:

Water Quality Functions

Water quality functions of the buffer and riverine wetlands adjacent to Miller Creek should improve for several reasons. Many impacts to wetlands and the creek will be removed as a result of the project and mitigation activities including the removal of dozens of houses, buildings, lawns, and driveways, from the mitigation area. These activities will remove features and land uses contributing to the degradation of water quality. Several septic systems will be removed from the mitigation area, as well as one or more horse pastures, which also contribute to degradation of water quality.

Hydrologic Functions

Placement of LWD within the Miller Creek stream channel will likely reduce the erosive forces of flood events and desynchronize the flooding somewhat. Removal of hardened banks and enhancing riverine wetland areas along the creek will reconnect the floodplain of the creek to the surrounding landscape in some areas. This will allow flood waters to flow and recede with a more natural cycle then is currently occurring. Reintroducing buffer and wetland areas to the flood zone of Miller Creek is likely to have a beneficial indirect effect on food chain support functions.

Habitat Suitability Functions

Fish Habitat - As with the relocated channel, the Miller Creek instream enhancements would improve habitat for fish and other aquatic organisms because of the new beneficial features added to the stream that are currently lacking. The primary features are similar to those described above for the Miller Creek relocation. In addition, removal of the riprap will provide more natural channel banks improving invertebrate habitat and forage areas for fish. Buffer enhancement will increase the types and amounts (terrestrial insects, plant detritus, etc.) of organic matter inputs to the stream, thus increasing forage resources for fish and invertebrates. Placement of

LWD would create the opportunity to hold back detritus which would increase the organic carbon in the system.

Waterfowl and Passerine Bird Habitat - The proposed plantings in the Miller Creek buffer and riverine wetland areas will provide limited direct food sources (e.g., fruits, nuts, seeds, berries, etc.) for avifauna. However, this vegetation would produce insects that a variety of passerine birds would forage upon. The combination of these elements will limit bird use, and restrict use by flocking birds. While not a specific goal of the mitigation, the increased amounts of woody and forest vegetation would provide additional and improved habitat for forest dwelling bird species.

Amphibian Habitat - The wetland and buffer enhancements in Miller Creek replacing lawns and homes would improve conditions for amphibians by enhancing riverine wetlands. This enhancement would provide improved habitat for adult terrestrial amphibians. Improved habitat for terrestrial breeding amphibians (e.g., red-backed salamander, ensatina) would be provided by increased amounts of forest vegetation and woody debris in the Miller Creek buffer and riverine wetlands. The enhancement activities will also improve the amphibian dispersal because of improved connections to habitat at Vacca Farm, Lora Lake and other riverine wetlands.

Invertebrate Habitat - Increased streambed variability in the form of gravel, wood, and CPOM should increase the diversity of invertebrate habitat in the enhanced reaches of Miller Creek. Increasing and diversifying overhanging vegetation within the wetted stream perimeter provides the potential to increase the numbers and types of invertebrates being introduced to the creek.

Small Mammal Habitat - Enhancing riverine wetlands adjacent to Miller Creek and enhancement of the Miller Creek buffer will improve habitat for small mammals by creating a diversity of forage and cover habitat for them.

Carbon Export - The replacement of grass dominated riverine areas in the Miller Creek buffer area with native woody riverine vegetation will increase the export of organic matter to the creek. In many places lawn vegetation will be replaced with tree and shrub vegetation. The high productivity expected in the enhanced wetlands would result in an increase in the amount and diversity of organic matter (e.g. insects, leaves, branches, trees, etc.) reaching the stream. Accumulations of organic matter in the saturated soil and increased export to the creek as detritus and woody debris or as dissolved carbon are likely to occur over time. Where riverine vegetation consists of blackberry, its replacement with a multistoried forest and shrub canopy will also increase the type and diversity of organic matter reaching the stream.

The placement of LWD in the stream channel and the removal of residential land uses, as part of mitigation, will result in the restoration of natural patterns of organic matter storage and cycling in the stream channel. For example, under residential land use, many residents clear the riverine buffer of trees or shrubs, reducing delivery of organic matter to the stream channel. When trees or branches do fall into the creek, they are

typically removed by the landowner. The removal of these logs and branches prevents the trapping of organic matter in the channel, and promotes its conveyance downstream. Placement of logs in the creek as mitigation will promote the trapping and storage of organic matter in the creek and its riverine upland and wetland buffer areas, where its ultimate decomposition will benefit aquatic organisms. Because a good deal of the organic carbon sources will be eliminated by project construction, the opportunity for reestablishment of a complex wetland system which functions at a moderate to high level is likely to take decades.

Groundwater movement through the riverine wetlands would transport dissolved organic matter to Miller Creek. The removal of artificial bank armoring and the placement of in-channel woody debris will improve overbank flow in some sections. This overbank flow coupled with overhanging riverine vegetation will provide additional sources of organic matter export into the stream channel. Where riverine wetland vegetation is currently pasture or blackberry, planting to tree and shrub communities will increase the amount and diversity of organic matter available to the creek and wetlands. Again, this function is dependent upon vegetation survival and maturity.

TYEE GOLF COURSE/DES MOINES CREEK MITIGATION

The project entails filling 4.06 acres of wetland in the Des Moines Creek watershed.

Tyee Golf Course/Des Moines Creek Mitigation includes the following components:

- Enhance 5.5 acres of golf course wetland with native wetland shrub species (includes 4.5 acres of the golf course proper and 1.0 acre of wetland area on the left and right bank of the west branch of Des Moines Creek).
- Enhance approximately 1.7 acres of upland buffer within the Tyee Golf Course Mitigation Area.
- Enhance approximately 3.38 acres of buffer along both banks of an 870-foot section of Des Moines Creek. Buffers will be 100 feet wide on each bank of the creek and forested.

Mitigation in the Des Moines Creek watershed also includes establishment of a $150,000 trust fund for restoration projects located in the Des Moines Creek basin.

The Corps has determined the following functional lift will likely occur from performing the mitigation activities at the golf course and along a portion of Des Moines Creek:

Water Quality Functions

While the capacity of the wetland to perform this function will probably not increase, the ultimate removal of turf grass and golf course maintenance activities in the mitigation area will reduce the amounts of nutrients and chemicals entering the wetlands and Des Moines Creek which could result in a net increase in water quality. If golf course play is continued on a scaled down basis, as proposed to the Port by the Tyee Golf Course management, maintenance activities would adhere to an “environmentally friendly” turf management plan. Implementing this plan could result in improved Des Moines Creek

water quality. Planting of shrub and forest vegetation would provide the source for nutrient cycling when flooding occurs.

Hydrologic Functions

A slight change in flood storage function is anticipated. This mitigation project has been coordinated with the Des Moines Creek Basin Planning Committee (King County is lead), which has plans to improve flood control in the West Branch of Des Moines Creek by improving the Regional Detention Facility (RDF) at NW Ponds and Wetland 28. The objective of the RDF plan is to control erosive flows reaching Des Moines Creek and to improve salmon habitat. The proposal includes increasing storage capacity in the NW Ponds and some channel reconstruction in Des Moines Creek to deepen the channel south of the Port's wetland mitigation site. The golf course currently is inundated by overbank flow from Des Moines Creek to some extent during flood events. Water levels and the extent of inundation within the mitigation site for the 10-, 25-, and 100-year flood events are somewhat lower with the proposed RDF than under current conditions. Wetland hydrology on the site is not driven by flood events but rather by a high groundwater table. Therefore, a slight reduction in flooding of this area is not anticipated to affect the success of the wetland mitigation at this site.

As with Vacca Farm, the enhancement of the golf course from a turf dominated wetland to a shrub dominated wetland is likely to improve the flood desynchronization function by providing woody vegetation and material to slow down flood waters. This could aid in preventing or reducing downstream erosive flows during large storm events.

Habitat Suitability Functions

Fish Habitat - At the Tyee Valley Golf Course Mitigation site enhancement of floodplain wetlands and stream buffers should improve fish and aquatic habitat. Increased amounts of woody riverine vegetation planted in the wetland and buffer will result in increased shade, organic matter inputs to the stream, including food sources and woody debris that improves habitat. These conditions improve the quality of the stream for nesting, resting, and forage habitat for fish and other aquatic life. Restoration of floodplain wetlands (converting golf course vegetation to shrub wetland) would increase carbon production, some of which would be exported to the creek during flood events, rainy periods, or through movement in groundwater (in the form of dissolved organic carbon), thus providing foodchain support for fish.

Waterfowl and Passerine Bird Habitat - The waterfowl habitat functions of the wetland mitigation area will be eliminated by converting open areas to shrub dominated wetlands. Passerine bird habitat will increase as golf course areas are vegetated with shrub communities. Potential management of habitat (per the WHMP) may reduce habitat value for certain species. As with the Vacca Farm site, a waterfowl habitat function is not sought at the Tyee Valley Golf Course mitigation area either. The current turf grass will be planted with trees and shrubs to provide a complete canopy cover that prevent ground foraging by waterfowl. Additionally, while portions of the site will flood during 1-year and greater storm events, the presence of standing water on the

site will be for short duration, and obscured by vegetation. Thus, it would not attract waterfowl.

Amphibian Habitat - The wetland and buffer enhancements replacing golf course turf grass would improve conditions for amphibians by restoring floodplain wetlands that would provide habitat for terrestrial adult amphibians. Improved habitat for terrestrial breeding species (e.g., red-backed salamander, ensatina) would be provided by the increased amounts of shrub vegetation and woody debris. Decreases in human disturbances, reduced vegetation management, and greater habitat connectivity to other portions of Des Moines Creek and open water areas of Wetland 28 will improve amphibian dispersal functions.

Invertebrate Habitat - Species numbers and potentially species richness may increase due to increased vegetation cover and diversity and an increase in detrital materials reaching the creek. This, in turn, is likely to increase the aquatic food web function of Des Moines Creek.

Small Mammal Habitat - The function of this areas for small mammals would increase because of the greater diversity and density of vegetation cover and habitat types from converting turf grass to mostly shrub wetland. The decrease in human disturbances and greater connectivity to Des Moines Creek and other areas of Wetland 28 would also increase the function of the area for small mammals, by providing improved dispersal corridors.

Carbon Export - Organic matter export functions at the Tyee Golf Course mitigation site would increase because currently, organic matter is cut and removed from the floodplain as part of the golf course activities. After enhancement is in place, organics could be exported from the wetland and riverine buffer during flooding and rainy periods. New woody vegetation in the riverine zone will contribute leaf fall and insects directly to Des Moines Creek at levels higher than the current herbaceous vegetation provides.

OFF-SITE/OUT-OF-BASIN MITIGATION (Green River Basin)

Off-site mitigation in Auburn includes:

- 15.9 acres of buffer creation, 19.5 acres of wetland enhancement, and 29.98 acres of wetland creation or restoration.
- Conversion of about 21.64 acres of emergent wetland on abandoned farmland (this includes the 2.2 acres of seasonally saturated emergent wetland in the existing farm ditch which will be excavated to better connect the mitigation site to the Green River floodplain).
- Conversion of 29.98 acres of upland grassland to emergent, shrub, and forested wetlands and open water wetlands.
- Impacts to about 0.12 acres of emergent wetlands at Auburn would occur from placement of fill to construct an upland access road.

- Construction access to the mitigation site in Auburn would temporarily impact about 1.55 acres of emergent wetland. Staging areas for the mitigation would temporarily impact 5.11 acres of existing emergent wetlands.
- 15.9 acres of upland forest buffer would be established at Auburn to protect wetland habitats.

The Corps has determined the wetland mitigation activities in Auburn will provide the following functional lift:

Water Quality Functions

The wetland mitigation consists of creating/restoring depressional wetlands with a surface flow outlet. The large size of the wetland basins to be created and relatively small amount of discharge water expected during most conditions will result in high retention rates for sediment and nutrients. The site will have a surface water connection to the Green River during flow events exceeding 8,500 cfs. At these flow levels, the wetland area will flood as a result of backwater conditions from the Green River. During these flood events the wetland mitigation area will remove nutrients and sediments from floodwaters at a much higher level than occurs on the site currently.

Hydrologic Functions

The topographic variability of the mitigation area will provide areas of groundwater recharge throughout the year. The Auburn mitigation site design connects it hydrologically to the Green River floodplain via a series of ditches. The site is designed to store approximately 50-acre feet of floodwater during 100-year flood events. Hydrologic functions (storage of floodwaters and flood desynchronization) of the site will improve substantively over baseline conditions.

Habitat Suitability Functions

The specific wildlife species targeted for the Auburn mitigation site are listed in Table 7.2-6 of the Natural Resource Mitigation Plan (Port of Seattle, December 2000). This list includes 9 species of amphibians; 1 species of reptiles (common garter snake); 45 species of birds (5 species of waterfowl, 5 species of raptors and the remaining are passerine species); and 10 species of mammals, for a total of 65 species of wildlife which could potentially utilize the mitigation site once it is constructed and functioning. The proposed habitat conditions at this site, including the 100-foot buffers provide suitable habitat for all these species. This is a substantive increase over the wildlife observed on the site as it currently exists (approximately 13 species of birds along with coyote, mink, deer and raccoon have been observed on the site). Habitat structure and availability would change as vegetation matures over the next several decades, and the wildlife species utilizing the site are expected to change over time. While some species listed in Table 7.2-6 do not frequent the affected wetlands near STIA and may require buffers in excess of 100-feet for optimal habitat, the mitigation site may still accommodate their use. This is not to say the avian and wildlife species utilizing the wetlands and adjacent uplands in the project area will move to the Auburn site, because they will not. Species which cannot relocate to undisturbed areas around STIA because of lack of food or territories, will perish. The Auburn site will provide

habitat for the species, not individuals of the species who currently reside around STIA. On the Auburn site some of the targeted bird species would be expected to use the interior portions of the site that are most secluded (about 37 acres of interior habitat is more than 200 feet from the perimeter).

Fish habitat - The Auburn mitigation area is not designed to provide fish habitat. Some warm water fish may use the open water and flooded emergent portion of the wetland.

Waterfowl and Passerine bird habitat - The Auburn mitigation site will create open water, submergent aquatic bed vegetation, and seasonally flooded emergent vegetation. These areas will provide a diversity of cover and food sources that will provide habitat for waterfowl, including feeding, resting, and nesting habitat.

The Auburn mitigation site will create multi-canopied forested, shrub, emergent communities. The complex vegetation structure and plant communities (contain vertical diversity, snags, debris structures and food sources) provided by these communities will provide high quality habitat to a variety of forest and wetland bird species. These elements will provide resting, nesting, and foraging habitat for passerine birds.

Amphibian habitat - Creation of open water ponds with flooded emergent vegetation will provide breeding and rearing habitat for several amphibian species. The open water will provide habitat for the adult phases of aquatic species. Forested wetlands and upland buffers will provide habitat for terrestrial adult life phases. The mitigation includes placement of logs, other woody debris, and topographic diversity that would provide habitat structure for amphibians.

Invertebrate habitat - Although the unmowed condition of the site likely provides an array of invertebrate species (although no aquatic invertebrates would be present on the site except for in the ditches), species richness and numbers are likely to increase by introducing varied plant species and strata. During major storm events, these invertebrates could be transferred through the drainage system to the Green River. This is expected to be beneficial to fish and other aquatic life utilizing the Green River.

Small mammal habitat - The existing tall grasses on the site provide good habitat for a variety of small mammals. Conversion of the area to forest and shrub wetlands will improve habitat for forest and wetland-associated mammals. The increased vegetation structure will provide a greater variety of denning areas, a greater diversity of food sources, and greater cover.

Organic matter export - As the site drains during post storm events, fine particulate organic matter (FPOM) and dissolved organic matter will be exported to downstream systems via the ditch systems. The mitigation proposal at Auburn offers the opportunity to transport organic carbon sources directly to the Green River via connected surface flows, which is a functional improvement over baseline conditions. As the site vegetation matures, the opportunity to transport organic material directly to

the Green River will substantively increase from wind blown leaf litter and other detritus. The forested buffer edge, located approximately 100 feet west of the channel of the Green River, will ultimately provide organic carbon in LWD form to the river. This is likely to take up to 50 years for the forest to reach a stage of maturity that would provide this function directly. However, any native vegetated buffer adjacent to the west berm of the Green River is a vast improvement from baseline conditions (native river berms dominated by reed canarygrass and Himalayan blackberry).