

APPENDIX C
WETLANDS

C. WETLANDS

The Surface Transportation Board (STB) independently verified the wetland identification and classifications and found them to be acceptable for the purposes of this analysis. For purposes of the wetlands evaluation, the proposed Port MacKenzie Rail Extension project area is defined as the area within 500 feet on either side of the segments for a total width of 1,000 feet (HDR, 2008; HDR, 2010). The project area is about 20 percent wetlands. About 25 percent of the project area wetlands are forested, most of which are needleleaf forested wetlands, with broadleaf and mixed forested wetlands making approximately 2 percent of the project area. More than half the wetlands in the project area are scrub/shrub wetlands (59 percent), of which 41 percent are broadleaf scrub/shrub wetlands, 10 percent are needleleaf scrub/shrub wetlands, and 49 percent are mixed and other scrub/shrub wetlands. Emergent wetlands are less common in the project area, comprising about 11 percent. Four percent of the project area wetlands are classified as other waters, of which 28 percent are riverine waters and 22 percent are palustrine waters. This appendix describes the wetland classifications or the vegetation communities, soils, and hydrology patterns for wetlands in the project area; functional capacities identified for project area wetland classes; and wetlands within the rail line footprint of segments and associated facilities.

C.1 Wetland Classifications

C.1.1 Forested Wetlands

Broadleaf forested wetlands are uncommon in the project area, occurring at only a single field point (Figure C-1). This wetland type is dominated by an overstory of paper birch (*Betula papyrifera*) and black spruce (*Picea mariana*) with a mixed understory of thin-leaf alder (*Alnus tenuifolia*), Greenland Labrador tea (*Rhododendron groenlandicum*), and prickly rose (*Rosa acicularis*). Wetland hydrology indicators observed include water marks, saturation, and hydrogen sulfide odor within the soil profile. The soil at the site consists of a histosol (soils composed primarily of organic material).

Needleleaf evergreen forested wetlands are one of the most abundant wetland types mapped in the project area, occurring across broad flat areas and in low-lying depressions (Figure C-2). Plant community characteristics include an overstory dominated by black spruce (*Picea mariana*), with an understory of Greenland Labrador tea, mountain cranberry (*Vaccinium vitis-idaea*), field horsetail (*Equisetum arvense*), thin-leaf alder, black crowberry (*Empetrum nigrum*), narrow-leaf Labrador tea (*Rhododendron subarcticum* Harmaja), and tundra dwarf birch (*Betula glandulosa*). Most needleleaf forested wetlands are either on histosols or on mineral soils with histic epipedons. Some soil test pits exhibit a strong sulfidic odor, indicating anaerobic conditions, and all of these sites have saturated soils within the top 12 inches. Other wetland hydrology indicators include presence of a high water table, micro-topographic relief, stunted or stressed plants, and surface water.



Figure C-1. Example of a Broadleaf Forested Wetland (left) and an Aerial Plan View of Broadleaf Forested Wetland (PF01, right) in the Project Area (HDR, 2008)



Figure C-2. Example of a Needleleaf Forested Wetland (left) and an Aerial Plan View of Needleleaf Forested Wetland (PF04, right) in the Project Area (HDR, 2008)

C.1.2 Scrub/Shrub Wetlands

Broadleaf scrub/shrub wetlands are the most common wetland type in the project area, generally occurring across broad flat areas (Figure C-3). These wetlands are dominated by a canopy of swamp birch (*Betula nana*), sweetgale (*Myrica gale*), bluejoint reedgrass (*Calamagrostis canadensis*), water horsetail (*Equisetum fluviatile*), marsh cinquefoil (*Potentilla palustris*), water sedge (*Carex aquatilis*), and buckbean (*Menyanthes trifoliata*). Some areas appeared seasonally flooded or semi-permanently flooded and had a dense canopy dominated by thin-leaf alder.

All the broadleaf scrub/shrub wetlands sampled had either histosols or histic epipedons. Common wetland hydrology indicators include saturated soils, a high water table, surface water, microtopographic relief, iron deposits, watermarks, reduced iron, stunted or stressed plants, and drainage patterns. Areas of inundation are easily seen on aerial photography at many locations.

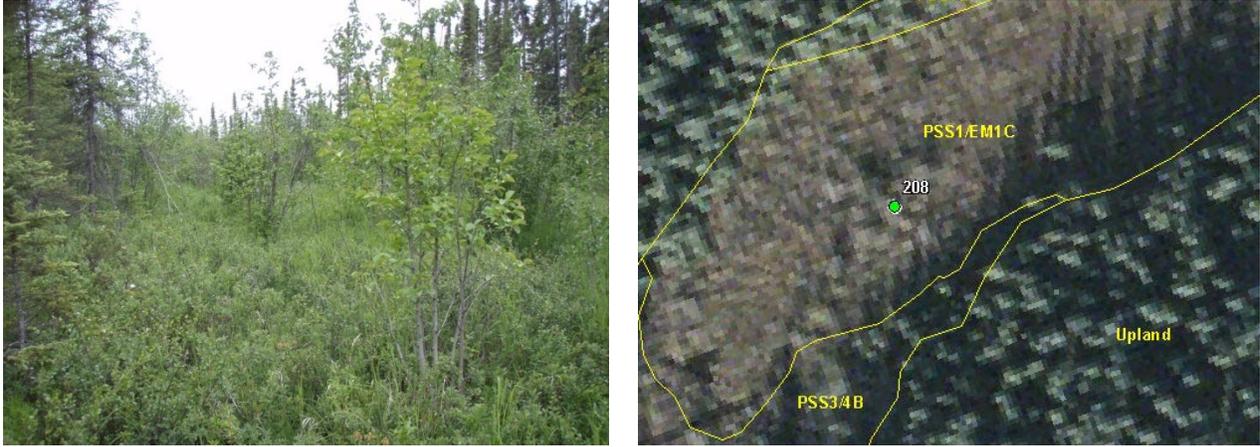


Figure C-3. Example of a Bog-type Broadleaf Scrub/Shrub Wetland (left) and an Aerial Plan View of Bog-type Broadleaf Scrub/Shrub Wetland (PSS1, right) in the Project Area (HDR, 2008)

Needleleaf scrub/shrub wetlands are common in the project area and generally occur on broad flat expanses (Figure C-4). This wetland type includes an open or closed canopy of shrub-height stunted black spruce (less than 20 feet tall), narrow-leaf Labrador tea, cloudberry (*Rubus chamaemorus*), Scheuchzer's cotton-grass (*Eriophorum scheuchzeri*), few-flower sedge (*Carex pauciflora*), and round-fruit sedge (*Carex rotundata*). All needleleaf scrub/shrub wetlands sampled had histosols, saturated soils, and a high water table.

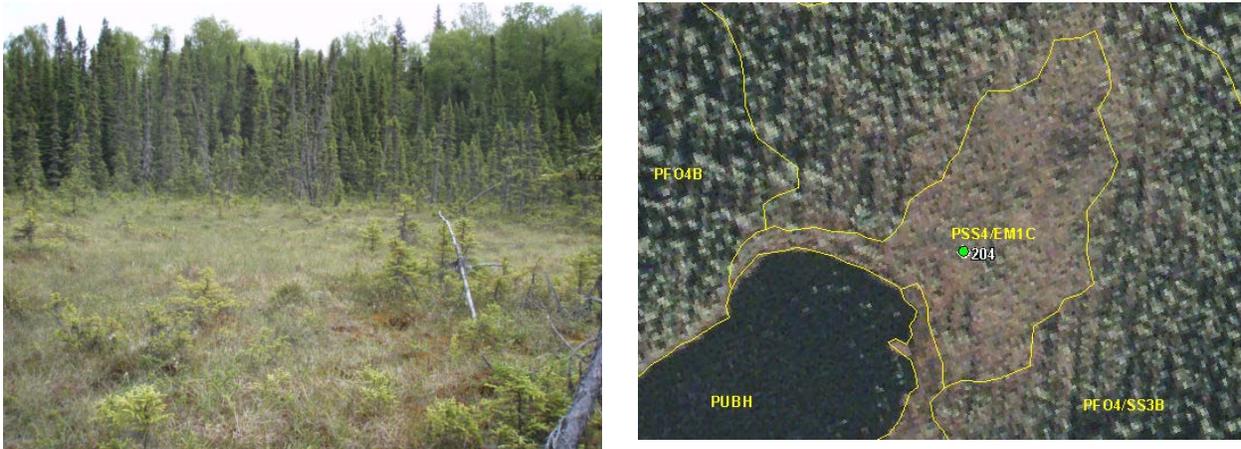


Figure C-4. Example of a Needleleaf Scrub/Shrub Wetland (left) and an Aerial Plan View of Needleleaf Scrub/Shrub Wetland (PSS4, right) in the Project Area (HDR, 2008)

Mixed scrub/shrub wetlands are common in the project area and occur generally on large flat expanses (Figure C-5). Dominant plant species in this wetland type include stunted black spruce, narrow-leaf Labrador-tea, field horsetail, few-flower sedge, and water sedge. Histosols were encountered at all sites visited within this wetland type. Hydrogen sulfide odor, an indicator of anaerobic soil conditions, and saturated soils were observed at half of the sites sampled. Other commonly observed wetland hydrology indicators include a high water table, microtopographic relief, stunted or stressed plants, water marks, the presence of surface water, and iron deposits.

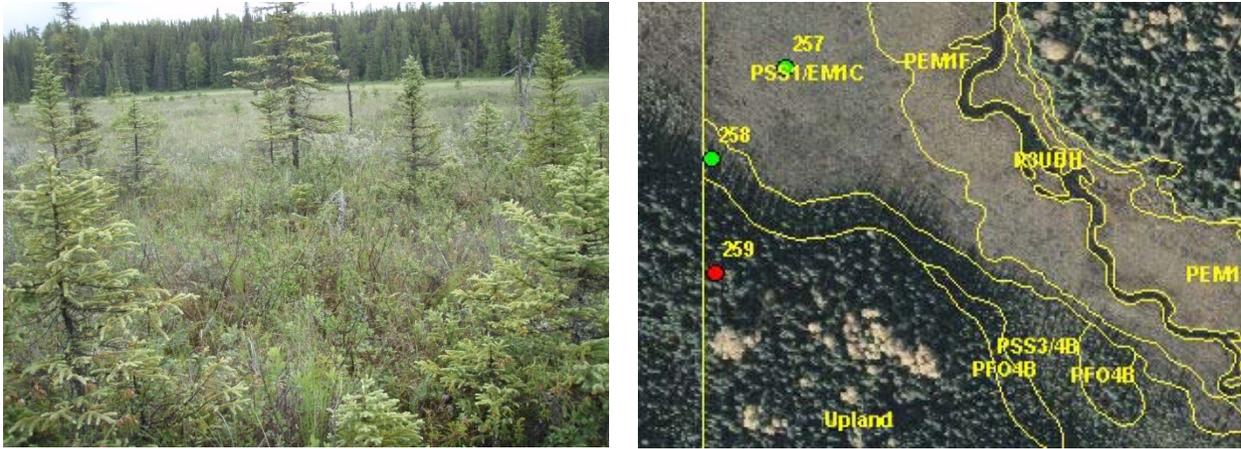


Figure C-5. Example of a Mixed Broadleaf-Needleleaf Scrub/Shrub Wetland (left) and Aerial Plan View of Mixed Broadleaf-Needleleaf Scrub/Shrub Wetland (PSS1, right) in the Project Area (HDR, 2008)

C.1.3 Emergent Wetlands

Emergent wetlands are common throughout the project area and extend across broad, flat areas, low-lying depressions, and riverine corridors (Figure C-6). Most of these wetlands are dominated only by graminoids and forbs; however, some patterned bogs that contained higher mounds of shrubby vegetation were included in this wetland type when emergent vegetation dominated the wetland complex. Common plant species were creeping sedge (*Carex chordorrhiza*), water sedge, bluejoint reedgrass, livid sedge (*Carex livida*), bog cranberry (*Vaccinium oxycoccos*), and sweetgale. Histosols or histic epipedons are seen in most mapped emergent wetlands. Hydrogen sulfide odor, saturated soils, a high water table, and areas of surface water were also frequently observed. Drainage patterns and inundation are visible on aerial photography in many areas mapped as emergent wetlands. Extensive areas of patterned bog, characterized by a series of alternating low ridges and shallow inundated areas, are a dominant landscape feature across many of the larger emergent wetland complexes.



Figure C-6. Example of an Emergent Wetland (left) and Aerial Plan View of Emergent Wetland (PEM1C, right) in the Project Area (HDR, 2008)

C.1.4 Other Wetlands and Waters

Other wetlands and waters of the United States present in the project area include ponds, lakes, and streams (Figure C-7). Pond designation includes all open water habitats in the study area smaller than 20 acres (Cowardin *et al.*, 1979). Ponds with aquatic beds are generally shallower than unvegetated ponds and also were included in this category. Lakes designation includes all open water habitats in the study area larger than 20 acres (Cowardin *et al.*, 1979). There are 5 major streams in the project area – the Susitna River, the Little Susitna River, Willow Creek, Fish Creek, and an unnamed creek. Streams and their unvegetated floodplains were mapped in the project area (Figure C-7). Both intermittent streams and perennial streams were identified. Some perennial and all intermittent streams are mapped as linear features because they are too narrow to map effectively using polygonal regions.

C.2 Wetland Functions and Values

Table C-1 lists the functional values of each vegetated wetland type within the proposed rail line footprint. Functional capacities are evaluated on a scale of 0 to 1, with 0 equivalent to providing no function and 1 providing full function. The functional capacity values were calculated for a portion of the field sites, and extrapolated for the remaining wetlands. The values were grouped into categories based on their functional capacity value. Low includes functional capacity values 0.33 and lower, moderate includes functional capacity values above 0.33 and below 0.66, and high includes functional capacity values of 0.66 or higher. If a mapped wetland type did not have corresponding field data, the functional capacity was extrapolated from known functional capacity values. The 8 functions for wetlands in the project area that would most likely be affected by proposed rail line construction and operation are:

- High functional capacity of all wetlands to modify groundwater discharge
- Moderate to low functional capacity of permanently and semi-permanently flooded emergent wetlands to perform groundwater recharge



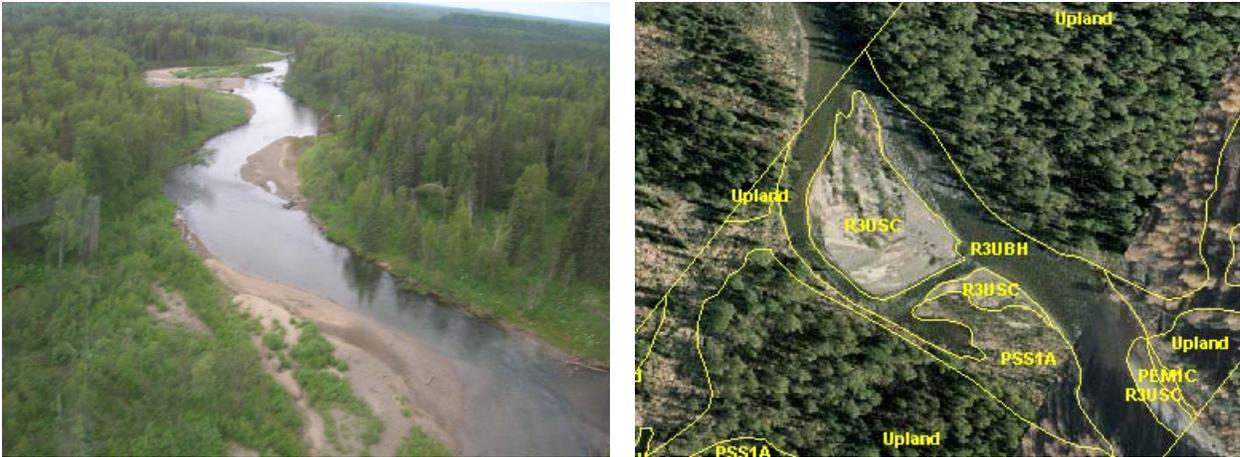


Figure C-7. Examples of Pond Wetland (top left), Aerial Plan of Pond Wetland (PSS4, top right), Stream Wetland (above left), and Stream Wetland Distribution (R3UBH, above right) in the Project Area (HDR, 2008)

- Moderate functional capacity of wetlands with an outlet to store storm and flood waters
- Moderate functional capacity of wetlands with an outlet to modify stream flow
- High functional capacity of all wetlands to contribute to the abundance and diversity of wetland fauna
- High functional capacity of all wetlands to modify water quality
- High functional capacity of wetlands with an outlet to export detritus
- High functional capacity of all wetlands to contribute to the abundance and diversity of wetland vegetation

C.3 Wetland Assessment Methodology

From July 7 through 11, 2008, ARRC used the U.S. Army Corps of Engineers (USACE) wetlands jurisdictional determination methodology to identify wetland types and areas within 500 feet of the segments (HDR, 2008). The USACE Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Regional Supplement to the USACE Wetland Delineation Manual Alaska Region (USACE, 2007) provide the methodology for establishing wetland boundaries and types. The USACE is reviewing and would have to approve the wetland boundaries and types described herein before initiating a wetland permit process for the project.

OEA used Geographic Information System analysis of delineated wetland areas within the rail line footprint to calculate the aerial extent of wetlands the proposed rail line would directly affect. Tables C-2 and C-3 list the results of this analysis for the southern and northern segments by individual wetland class. Section 4.5 of the EIS summarizes wetland classification data by categories of needleleaf forested wetlands, broadleaf forested wetlands, mixed forested wetlands, broadleaf scrub/shrub wetlands, needleleaf scrub/shrub wetlands, mixed and other scrub/shrub wetlands, emergent wetlands, and other wetlands and waters. OEA independently reviewed the wetland identification and classifications and found them to be acceptable for the purposes of this analysis.

Table C-1
Wetland Acres by Function within the Rail Line Footprint by Alternative^a (page 1 of 5)

| Alternative | Type | Total | Functional Capacity | Export of Detritus (acres) | Groundwater Discharge (acres) | Groundwater Recharge (acres) | Stream Flow Moderation (acres) | Wildlife Habitat (acres) | Storm Water and Flood Water Storage (acres) | Modification of Water Quality (acres) | Vegetation Diversity (acres) |
|--|----------------------|-------|---------------------|----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------|---|---------------------------------------|------------------------------|
| Mac West-Connector 1-Willow | Emergent Wetlands | 19 | High | 15 | 13 | 0 | 3 | 19 | 6 | 20 | 19 |
| | | | Moderate | 0 | 6 | 10 | 9 | 1 | 14 | 0 | 1 |
| | | | Low | 4 | 1 | 9 | 8 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 120 | High | 81 | 72 | 0 | 0 | 120 | 40 | 120 | 120 |
| | | | Moderate | 0 | 48 | 48 | 80 | 0 | 81 | 0 | 0 |
| | | | Low | 40 | 0 | 73 | 40 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 113 | High | 111 | 97 | 0 | 5 | 112 | 6 | 113 | 112 |
| | | | Moderate | 0 | 12 | 28 | 106 | 0 | 107 | 0 | 0 |
| | | | Low | 2 | 4 | 85 | 2 | 0 | 0 | 0 | 0 |
| Mac West-Connector 1-Houston-Houston North | Emergent Wetlands | 29 | High | 25 | 21 | 0 | 2 | 28 | 3 | 28 | 28 |
| | | | Moderate | 0 | 7 | 18 | 19 | 1 | 25 | 0 | 1 |
| | | | Low | 3 | 0 | 11 | 8 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 134 | High | 95 | 87 | 0 | 0 | 134 | 39 | 134 | 134 |
| | | | Moderate | 0 | 47 | 47 | 95 | 0 | 95 | 0 | 0 |
| | | | Low | 39 | 0 | 87 | 39 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 153 | High | 152 | 137 | 0 | 7 | 152 | 6 | 153 | 153 |
| | | | Moderate | 0 | 11 | 35 | 145 | 0 | 146 | 0 | 0 |
| | | | Low | 1 | 4 | 117 | 1 | 0 | 0 | 0 | 0 |
| Mac West-Connector 1-Houston-Houston South | Emergent Wetlands | 23 | High | 20 | 17 | 0 | 2 | 23 | 4 | 23 | 23 |
| | | | Moderate | 0 | 6 | 14 | 14 | 1 | 20 | 0 | 1 |
| | | | Low | 3 | 1 | 9 | 8 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 123 | High | 84 | 76 | 0 | 0 | 123 | 39 | 123 | 123 |
| | | | Moderate | 0 | 47 | 47 | 83 | 0 | 84 | 0 | 0 |
| | | | Low | 39 | 0 | 76 | 39 | 0 | 0 | 0 | 0 |

**Table C-1
Wetland Acres by Function within the Rail Line Footprint by Alternative (page 2 of 5)**

| Alternative | Type | Total | Functional Capacity | Export of Detritus (acres) | Groundwater Discharge (acres) | Groundwater Recharge (acres) | Stream Flow Moderation (acres) | Wildlife Habitat (acres) | Storm Water and Flood Water Storage (acres) | Modification of Water Quality (acres) | Vegetation Diversity (acres) |
|--|----------------------|-------|---------------------|----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------|---|---------------------------------------|------------------------------|
| Mac West-Connector 1-Houston-Houston South | Scrub/Shrub Wetlands | 130 | High | 129 | 118 | 0 | 3 | 130 | 3 | 130 | 130 |
| | | | Moderate | 0 | 11 | 29 | 126 | 0 | 127 | 0 | 0 |
| | | | Low | 1 | 2 | 102 | 1 | 0 | 0 | 0 | 0 |
| Mac West-Connector 2-Big Lake | Emergent Wetlands | 18 | High | 13 | 13 | 0 | 0 | 17 | 4 | 18 | 17 |
| | | | Moderate | 0 | 5 | 9 | 11 | 1 | 14 | 0 | 1 |
| | | | Low | 4 | 0 | 9 | 7 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 118 | High | 79 | 71 | 0 | 0 | 118 | 39 | 118 | 118 |
| | | | Moderate | 0 | 47 | 47 | 79 | 0 | 79 | 0 | 0 |
| | | | Low | 39 | 0 | 71 | 39 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 138 | High | 134 | 116 | 0 | 8 | 138 | 13 | 138 | 138 |
| | | | Moderate | 0 | 14 | 46 | 125 | 0 | 125 | 0 | 0 |
| | | | Low | 5 | 7 | 92 | 5 | 0 | 0 | 0 | 0 |
| Mac East-Connector 3-Willow | Emergent Wetlands | 6 | High | 3 | 2 | 0 | 2 | 5 | 4 | 6 | 4 |
| | | | Moderate | 0 | 3 | 5 | 1 | 1 | 2 | 0 | 1 |
| | | | Low | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 82 | High | 78 | 69 | 0 | 8 | 82 | 4 | 82 | 82 |
| | | | Moderate | 0 | 12 | 12 | 69 | 0 | 78 | 0 | 0 |
| | | | Low | 4 | 0 | 69 | 4 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 50 | High | 49 | 43 | 0 | 7 | 50 | 5 | 51 | 50 |
| | | | Moderate | 0 | 4 | 20 | 41 | 0 | 45 | 0 | 0 |
| | | | Low | 1 | 4 | 31 | 2 | 0 | 0 | 0 | 0 |
| Mac East-Connector 3-Houston-Houston North | Emergent Wetlands | 14 | High | 13 | 10 | 0 | 1 | 13 | 1 | 14 | 13 |
| | | | Moderate | 0 | 4 | 12 | 11 | 1 | 13 | 0 | 1 |
| | | | Low | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |

**Table C-1
Wetland Acres by Function within the Rail Line Footprint by Alternative (page 3 of 5)**

| Alternative | Type | Total | Functional Capacity | Export of Detritus (acres) | Groundwater Discharge (acres) | Groundwater Recharge (acres) | Stream Flow Moderation (acres) | Wildlife Habitat (acres) | Storm Water and Flood Water Storage (acres) | Modification of Water Quality (acres) | Vegetation Diversity (acres) |
|--|----------------------|-------|---------------------|----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------|---|---------------------------------------|------------------------------|
| Mac East-Connector 3-Houston-Houston North | Forested Wetlands | 96 | High | 92 | 84 | 0 | 8 | 96 | 4 | 96 | 96 |
| | | | Moderate | 0 | 12 | 12 | 84 | 0 | 92 | 0 | 0 |
| | | | Low | 4 | 0 | 84 | 4 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 91 | High | 91 | 84 | 0 | 9 | 91 | 6 | 91 | 91 |
| | | | Moderate | 0 | 2 | 27 | 81 | 0 | 85 | 0 | 0 |
| | | | Low | 0 | 4 | 64 | 1 | 0 | 0 | 0 | 0 |
| Mac East-Connector 3-Houston-Houston South | Emergent Wetlands | 9 | High | 8 | 6 | 0 | 1 | 8 | 2 | 9 | 8 |
| | | | Moderate | 0 | 1 | 8 | 6 | 1 | 7 | 0 | 1 |
| | | | Low | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 85 | High | 81 | 73 | 0 | 8 | 85 | 4 | 85 | 85 |
| | | | Moderate | 0 | 12 | 12 | 73 | 0 | 81 | 0 | 0 |
| | | | Low | 4 | 0 | 73 | 4 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 68 | High | 68 | 65 | 0 | 5 | 68 | 2 | 68 | 68 |
| | | | Moderate | 0 | 2 | 20 | 62 | 0 | 66 | 0 | 0 |
| | | | Low | 0 | 2 | 48 | 1 | 0 | 0 | 0 | 0 |
| Mac East-Big Lake | Emergent Wetlands | 6 | High | 4 | 4 | 0 | 0 | 5 | 2 | 6 | 5 |
| | | | Moderate | 0 | 2 | 5 | 4 | 1 | 4 | 0 | 1 |
| | | | Low | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 82 | High | 78 | 70 | 0 | 8 | 82 | 4 | 82 | 82 |
| | | | Moderate | 0 | 12 | 12 | 70 | 0 | 78 | 0 | 0 |
| | | | Low | 4 | 0 | 71 | 4 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 86 | High | 83 | 74 | 0 | 11 | 86 | 12 | 86 | 86 |
| | | | Moderate | 0 | 6 | 38 | 72 | 0 | 75 | 0 | 0 |
| | | | Low | 4 | 7 | 48 | 4 | 0 | 0 | 0 | 0 |

**Table C-1
Wetland Acres by Function within the Rail Line Footprint by Alternative (page 4 of 5)**

| Alternative | Type | Total | Functional Capacity | Export of Detritus (acres) | Groundwater Discharge (acres) | Groundwater Recharge (acres) | Stream Flow Moderation (acres) | Wildlife Habitat (acres) | Storm Water and Flood Water Storage (acres) | Modification of Water Quality (acres) | Vegetation Diversity (acres) |
|--|----------------------|-------|---------------------|----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------|---|---------------------------------------|------------------------------|
| Mac East Variant-Connector 2a-Big Lake | Emergent Wetlands | 5 | High | 4 | 3 | 0 | 0 | 5 | 2 | 5 | 5 |
| | | | Moderate | 0 | 2 | 5 | 4 | 1 | 4 | 0 | 1 |
| | | | Low | 2 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 82 | High | 78 | 70 | 0 | 8 | 82 | 4 | 82 | 82 |
| | | | Moderate | 0 | 12 | 11 | 70 | 0 | 78 | 0 | 0 |
| | | | Low | 4 | 0 | 70 | 4 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 82 | High | 78 | 69 | 0 | 11 | 82 | 12 | 82 | 82 |
| | | | Moderate | 0 | 6 | 34 | 67 | 0 | 70 | 0 | 0 |
| | | | Low | 4 | 7 | 47 | 4 | 0 | 0 | 0 | 0 |
| Mac East Variant-Connector 3 Variant-Willow | Emergent Wetlands | 5 | High | 3 | 1 | 0 | 2 | 4 | 4 | 5 | 4 |
| | | | Moderate | 0 | 3 | 5 | 1 | 1 | 2 | 0 | 1 |
| | | | Low | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 84 | High | 77 | 69 | 0 | 8 | 84 | 6 | 84 | 84 |
| | | | Moderate | 0 | 14 | 14 | 69 | 0 | 77 | 0 | 0 |
| | | | Low | 6 | 0 | 69 | 6 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 46 | High | 45 | 39 | 0 | 7 | 46 | 5 | 46 | 46 |
| | | | Moderate | 0 | 4 | 16 | 37 | 0 | 41 | 0 | 0 |
| | | | Low | 1 | 4 | 30 | 2 | 0 | 0 | 0 | 0 |
| Mac East Variant-Connector 3 Variant-Houston-Houston North | Emergent Wetlands | 14 | High | 13 | 10 | 0 | 1 | 13 | 1 | 14 | 13 |
| | | | Moderate | 0 | 4 | 12 | 11 | 1 | 13 | 0 | 1 |
| | | | Low | 1 | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| | Forested Wetlands | 98 | High | 92 | 84 | 0 | 8 | 98 | 6 | 98 | 98 |
| | | | Moderate | 0 | 14 | 14 | 84 | 0 | 92 | 0 | 0 |
| | | | Low | 6 | 0 | 84 | 6 | 0 | 0 | 0 | 0 |

**Table C-1
Wetland Acres by Function within the Rail Line Footprint by Alternative (page 5 of 5)**

| Alternative | Type | Total | Functional Capacity | Export of Detritus (acres) | Groundwater Discharge (acres) | Groundwater Recharge (acres) | Stream Flow Moderation (acres) | Wildlife Habitat (acres) | Storm Water and Flood Water Storage (acres) | Modification of Water Quality (acres) | Vegetation Diversity (acres) |
|--|----------------------|-------|---------------------|----------------------------|-------------------------------|------------------------------|--------------------------------|--------------------------|---|---------------------------------------|------------------------------|
| Mac East Variant-Connector 3 | Scrub/Shrub Wetlands | 86 | High | 86 | 80 | 0 | 9 | 86 | 6 | 86 | 86 |
| | | | Moderate | 0 | 2 | 23 | 77 | 0 | 81 | 0 | 0 |
| | | | Low | 0 | 4 | 63 | 1 | 0 | 0 | 0 | 0 |
| Mac East Variant-Connector 3 | Emergent Wetlands | 9 | High | 8 | 6 | 0 | 1 | 8 | 2 | 9 | 8 |
| | | | Moderate | 0 | 2 | 8 | 5 | 1 | 7 | 0 | 1 |
| | | | Low | 1 | 1 | 1 | 2 | 0 | 0 | 0 | 0 |
| Mac East Variant-Houston-Houston North | Forested Wetlands | 86 | High | 81 | 73 | 0 | 8 | 86 | 6 | 86 | 86 |
| | | | Moderate | 0 | 14 | 14 | 73 | 0 | 81 | 0 | 0 |
| | | | Low | 6 | 0 | 73 | 6 | 0 | 0 | 0 | 0 |
| | Scrub/Shrub Wetlands | 64 | High | 63 | 60 | 0 | 5 | 64 | 2 | 64 | 64 |
| | | | Moderate | 0 | 2 | 17 | 58 | 0 | 61 | 0 | 0 |
| | | | Low | 0 | 2 | 47 | 1 | 0 | 0 | 0 | 0 |

^a Sources: Magee and Hollands, 1998; HDR, 2008.

Table C-2
Wetlands within the Rail Line Footprint of the Southern Segments and Segment Combinations^a (page 1 of 3)

| National Wetland Inventory Code | Description | Mac West-Conn 1 | | Mac West-Conn 2 | | Mac East-Conn 3 | | Mac East | | Mac East Var-Conn 2a | | Mac East Var-Conn 3 Var | |
|---------------------------------|--|-----------------|------------------------------|-----------------|------------------------------|-----------------|------------------------------|--------------|------------------------------|----------------------|------------------------------|-------------------------|------------------------------|
| | | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) |
| PFO1/SS1B | Saturated broadleaf deciduous forest with broadleaf scrub/shrub understory | 24 | 11.2 | 24 | 12.1 | 23 | 22.3 | 23 | 23 | 23 | 23 | 23 | 23 |
| PFO4/EM1B | Saturated broadleaf deciduous forest with persistent emergent understory | 0 | 0 | 0 | 0 | 1 | 1.0 | 1 | 1.0 | 1 | 1.0 | 1 | 1.0 |
| PFO4/SS1B | Saturated needleleaf evergreen forest with broadleaf scrub/shrub understory | 2 | 0.7 | 2 | 0.8 | 7 | 6.6 | 7 | 6.8 | 7 | 6.8 | 7 | 6.8 |
| PFO4/SS3B | Saturated needleleaf evergreen forest with broadleaf evergreen scrub/shrub understory | 22 | 10.2 | 22 | 11 | 19 | 18.5 | 19 | 18.7 | 19 | 18.7 | 19 | 19.1 |
| PFO4/SS3C | Seasonally flooded needleleaf evergreen forest with broadleaved evergreen scrub/shrub understory | 4 | 2.1 | 4 | 2.3 | 2 | 2.4 | 2 | 2.5 | 2 | 2.5 | 2 | 2.5 |
| PFO4/SS4B | Saturated needleleaf evergreen forest with needleleaf evergreen scrub/shrub understory | 1 | 0.4 | <1 ^b | 0.2 | 5 | 4.7 | 5 | 4.8 | 5 | 4.8 | 5 | 4.8 |
| PFO4B | Saturated needleleaf evergreen forest | 48 | 21.9 | 45 | 22.4 | 11 | 11.1 | 11 | 10.9 | 10 | 10.4 | 13 | 13.0 |
| PFO1/4B | Saturated broadleaf deciduous/needleleaf evergreen forest | 1 | 0.7 | 1 | 0.7 | 3 | 3.3 | 3 | 3.4 | 3 | 3.4 | 3 | 3.4 |
| PFO4/1B | Saturated needleleaf evergreen/broadleaf deciduous forest | 7 | 3.4 | 7 | 3.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PSS1/EM1B | Saturated broadleaf deciduous scrub/ shrub with persistent emergent understory | 4 | 1.8 | 4 | 1.9 | 2 | 2.2 | 2 | 2.3 | 2 | 2.3 | 2 | 2.3 |
| PSS1/EM1C | Seasonally flooded broadleaf deciduous scrub/shrub with persistent emergent understory | 6 | 2.9 | 5 | 2.7 | 3 | 2.6 | 3 | 2.7 | 2 | 1.9 | 2 | 2.0 |
| PSS1/EM1F | Semipermanently flooded broadleaf deciduous scrub/shrub with persistent emergent understory | 9 | 4.3 | 9 | 4.7 | 1 | 1.1 | 1 | 1.1 | 1 | 1.1 | 1 | 1.1 |

Table C-2
Wetlands within the Rail Line Footprint of the Southern Segments and Segment Combinations^a (page 2 of 3)

| National Wetland Inventory Code | Description | Mac West-Conn 1 | | Mac West-Conn 2 | | Mac East-Conn 3 | | Mac East | | Mac East Var-Conn 2a | | Mac East Var-Conn 3 Var | |
|---------------------------------|---|-----------------|------------------------------|-----------------|------------------------------|-----------------|------------------------------|--------------|------------------------------|----------------------|------------------------------|-------------------------|------------------------------|
| | | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) |
| PSS1C | Seasonally flooded broadleaf deciduous scrub/shrub | 1 | 0.4 | 1 | 0.4 | 1 | 0.9 | 0 | 0 | 0 | 0 | 1 | 0.9 |
| PSS4/EM1B | Saturated needleleaf evergreen with persistent emergent understory | 1 | 0.5 | <1 | 0.2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PSS4/EM1C | Seasonally flooded needleleaf evergreen with persistent emergent understory | <1 | 0.2 | <1 | <0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PSS4B | Saturated needleleaf evergreen scrub/shrub | 10.4 | 4.8 | 10 | 5.0 | 2 | 1.8 | 2 | 1.8 | 1 | 0.9 | 1 | 0.9 |
| PSS1/4B | Saturated broadleaf deciduous/needleleaf evergreen scrub/shrub | 14 | 6.6 | 13 | 6.7 | 6 | 6.1 | 6 | 6.1 | 6 | 6.1 | 6 | 6.3 |
| PSS1/4C | Seasonally flooded broadleaf deciduous/needleleaf evergreen scrub/shrub | 0 | 0 | 0 | 0 | 3 | 2.8 | 3 | 2.9 | 0 | 0 | 0 | 0 |
| PSS3/1B | Saturated broadleaf evergreen/broadleaf deciduous scrub/shrub | 4 | 2.0 | 1 | 0.6 | <1 | 0.2 | <1 | 0.2 | <1 | 0.2 | <1 | 0.2 |
| PSS3/1C | Seasonally flooded broadleaf evergreen/broadleaf deciduous scrub/shrub | <1 | 0.1 | <1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PSS3/4B | Saturated broadleaf evergreen/needleleaf evergreen scrub/shrub | 33 | 15.0 | 33 | 16.3 | 11 | 10.6 | 10 | 10.4 | 10 | 10.4 | 11 | 10.9 |
| PSS4/1B | Saturated needleleaf evergreen/broadleaf deciduous scrub/shrub | <1 | 0.1 | 1 | 0 | 1 | 0.8 | 1 | 0.8 | 1 | 0.8 | 1 | 0.8 |
| PSS4/3B | Saturated needleleaf evergreen/broadleaf evergreen scrub/shrub | 8 | 3.6 | 2 | 1.0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Table C-2
Wetlands within the Rail Line Footprint of the Southern Segments and Segment Combinations^a (page 3 of 3)**

| National Wetland Inventory Code | Description | Mac West-Conn 1 | | Mac West-Conn 2 | | Mac East-Conn 3 | | Mac East | | Mac East Var-Conn 2a | | Mac East Var-Conn 3 Var | |
|--|--|-----------------|------------------------------|-----------------|------------------------------|-----------------|------------------------------|--------------|------------------------------|----------------------|------------------------------|-------------------------|------------------------------|
| | | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) |
| PEM1B | Saturated persistent emergent | 9 | 4.0 | 8 | 4.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PEM1C | Seasonally flooded persistent emergent | 2 | 0.7 | 1 | 0.4 | 1 | 0.6 | <1 | 0 | 0 | 0 | <1 | 0.4 |
| PEM1F | Semi-permanently flooded persistent emergent | 5 | 2.2 | 4 | 1.8 | <1 | 0.2 | <1 | 0.2 | <1 | 0.2 | <1 | 0.1 |
| L2UBH | Permanently flooded unconsolidated bottom littoral | <1 | 0.1 | <1 | 0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PUBH | Pond | <1 | <0.1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| R3UBH | Upper perennial stream – unconsolidated bottom | <1 | 0.1 | 0 | 0 | <1 | 0.1 | <1 | 0.1 | <1 | 0.1 | <1 | 0.1 |
| All Wetlands and Waters^c | | 218 | | 200 | | 103 | | 100 | | 94 | | 99 | |
| Upland | | 190 | | 188 | | 365 | | 307 | | 292 | | 353 | |

^a Source: HDR, 2008; HDR, 2010.

^b < = less than.

^c Totals might not equal sums of values due to rounding.

Table C-3
Wetlands within the Rail Line Footprint of the Northern Segments and Segment Combinations^a (page 1 of 2)

| National Wetland Inventory Code | Description | Willow | | Big Lake | | Houston-Houston North | | Houston-Houston South | |
|---------------------------------|--|--------------|------------------------------|--------------|------------------------------|-----------------------|------------------------------|-----------------------|------------------------------|
| | | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) | Area (acres) | Wetland Proportion (percent) |
| PFO4/EM1B | Saturated needleleaf evergreen forest with persistent emergent understory | 1 | 1.9 | 0 | 0 | 0 | 0 | 0 | 0 |
| PFO4/SS1B | Saturated needleleaf evergreen forest with broadleaf deciduous scrub/shrub understory | 1 | 2.1 | <1 | 0.6 | 5 | 4.9 | 0 | 0 |
| PFO4/SS1C | Seasonally flooded needleleaf evergreen forest with broadleaf deciduous scrub/shrub understory | <1 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| PFO4/SS3B | Saturated needleleaf evergreen forest with broadleaf evergreen scrub/shrub understory | 2 | 4.8 | 3 | 3.9 | 4 | 3.8 | 2 | 3.5 |
| PFO4/SS4B | Saturated needleleaf evergreen forest with needleleaf evergreen scrub/shrub understory | 2 | 4.5 | 4 | 5.0 | 5 | 5.5 | 5 | 8.7 |
| PFO4B | Saturated needleleaf evergreen forest | 5 | 13.5 | 4 | 5.5 | 10 | 9.9 | 5 | 8.9 |
| PSS1/EM1B | Saturated broadleaf deciduous scrub/shrub with persistent emergent understory | 6 | 16.7 | 1 | 1.7 | 13 | 12.6 | 2 | 3.5 |
| PSS1/EM1C | Seasonally flooded broadleaf deciduous scrub/shrub with persistent emergent understory | 6 | 17.2 | 20 | 27.0 | 14 | 13.7 | 8 | 13.5 |
| PSS1/EM1F | Semi-permanently flooded broadleaf deciduous scrub/shrub with persistent emergent understory | 0 | 0 | 0 | 0 | 1 | 0.7 | 1 | 1.2 |
| PSS1A | Temporarily flooded broadleaf deciduous scrub/shrub | <1 | 1.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| PSS1B | Saturated broadleaf deciduous scrub/shrub | 1 | 1.6 | 5 | 6.6 | 0 | 0 | 1 | 1.5 |
| PSS1C | Seasonally flooded broadleaf deciduous scrub/shrub | 1 | 2.1 | 6 | 7.8 | 1 | 1.1 | <1 | 0.5 |
| PSS4/EM1B | Saturated needleleaf evergreen scrub/shrub with persistent emergent understory | 1 | 2.1 | 5 | 7.4 | 2 | 1.9 | 1 | 1.8 |
| PSS4/EM1C | Seasonally flooded needleleaf evergreen scrub/shrub with persistent emergent understory | 0 | 0.0 | 1 | 0.8 | <1 | 0.5 | <1 | 0.8 |
| PSS4B | Saturated needleleaf evergreen scrub/shrub | <1 | 0.5 | 3 | 3.6 | 1 | 1.1 | 1 | 1.6 |
| PSS3/1B | Saturated broadleaf evergreen/broadleaf deciduous scrub/shrub | <1 | 0.8 | 1 | 1.9 | 1 | 1.4 | 4 | 7.4 |
| PSS3/4B | Saturated broadleaf evergreen/needleleaf evergreen scrub/shrub | 1 | 2.9 | 2 | 3.0 | 13 | 12.5 | 10 | 17.3 |

**Table C-3
Wetlands within the Rail Line Footprint of the Northern Segments and Segment Combinations^a (page 2 of 2)**

| National Wetland Inventory Code | Description | Willow | | Big Lake | | Houston-Houston North | | Houston-Houston South | |
|---------------------------------|--|-------------|------------------------------|-------------|------------------------------|-----------------------|------------------------------|-----------------------|------------------------------|
| | | Area (acre) | Wetland Proportion (percent) | Area (acre) | Wetland Proportion (percent) | Area (acre) | Wetland Proportion (percent) | Area (acre) | Wetland Proportion (percent) |
| PSS3/4C | Seasonally flooded broadleaf evergreen/needleleaf evergreen scrub/shrub | <1 | 0.5 | 0 | 0 | 0 | 0.0 | 0 | 0.0 |
| PSS1/3B | Saturated broadleaf deciduous/broadleaf evergreen scrub/shrub | 2 | 4.2 | 0 | 0 | <1 | 0.4 | <1 | 0.2 |
| PSS1/3C | Seasonally flooded broadleaf deciduous/broadleaf evergreen scrub/shrub | 0 | 0 | 1 | 1.7 | 0 | 0 | 0 | 0 |
| PSS1/4B | Saturated broadleaf deciduous/needleleaf evergreen scrub/shrub | <1 | 0.3 | 0 | 0.0 | 3 | 2.9 | <1 | 0.3 |
| PSS4/1B | Saturated needleleaf evergreen/broadleaf deciduous scrub/shrub | 1 | 2.4 | 7 | 8.9 | 2 | 2.4 | 0 | 0 |
| PSS4/1C | Seasonally flooded needleleaf evergreen/broadleaf deciduous scrub/shrub | 0 | 0 | <1 | 0.3 | 0 | 0 | 0 | 0 |
| PSS4/3B | Saturated needleleaf evergreen/broadleaf evergreen scrub/shrub | 1 | 1.9 | 5 | 7.0 | 9 | 9.0 | 8 | 13.4 |
| PEM1B | Saturated persistent emergent | 2 | 4.8 | 1 | 1.3 | 2 | 1.8 | 1 | 1.0 |
| PEM1C | Seasonally flooded persistent emergent | 2 | 6.6 | 4 | 5.2 | 7 | 7.0 | 5 | 7.8 |
| PEM1F | Semi-permanently flooded persistent emergent | <1 | 1.3 | <1 | 0.5 | 5 | 4.6 | 3 | 4.8 |
| | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PABH | Aquatic bed pond | 0 | 0 | 0 | 0 | 1 | 1.0 | <1 | 0.7 |
| PUBH | Pond | <1 | 0.5 | 0 | 0 | 1 | 0.6 | 1 | 1.2 |
| R3ABH | Upper perennial stream – aquatic bed | <1 | 0.3 | 0 | 0 | 0 | 0 | 0 | 0 |
| R3UBH | Upper perennial stream – unconsolidated bottom | 1 | 4.0 | <1 | 0.4 | 1 | 0.9 | <1 | 0.5 |
| R3USC/R3USA | Seasonally/temporarily flooded upper perennial stream – unconsolidated shore | <1 | 0.8 | 0 | 0 | 0 | 0 | 0 | 0 |
| All Wetlands and Waters | | 38 | | 75 | | 101 | | 61 | |
| Upland | | 358 | | 285 | | 166 | | 160 | |

^a Source: HDR, 2008; HDR, 2010.

^b < = less than.

^c Totals might not equal sums of values due to rounding.

C.4 References

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