Supplemental Map Information (User Report)
Outline

Project ID: R05Y06P01

Project Title or Area: Coastal Maine Updates Tier I

PHOTOINTERPRETATION – Contractor

Map Name (1:100K): Augusta, Bath, Kittery, Lewiston, Portland, Skowhegan

Personnel: Irene Huber (PIQC), Todd Nuerminger (PIQC), Jennifer Silva (PI), Meredith Borenstein (PI), and Eric Marshall (GIS); University of Massachusetts - Amherst, Natural Resources Assessment Group

Date Started: 9/30/2006
Date Completed: 8/15/2006
Number of Quads: 73

Augusta (1:100K): Augusta, Belgrade, Bowdoinham, Camden, China Lake, Damariscotta, East Pittston, Gardiner, Jefferson, NorthWhitefield, Purgatory, Richmond, Rockland, Searsmont, Thomaston, Togus Pond, Union, Vassalboro, Waldoboro East, Waldoboro West, Weeks Mills, West Rockport, Wicassett.
Bath (1:100K): Bath, Boothbay Harbor, Bristol, Friendship, Hewett Island, Louds Island, Monhegan, New Harbor, Pemaquit Point, Phippsburg, Small Point, Tenants Harbor, Westport.
Kittery (1:100K): Alfred, Biddeford, Biddeford Pool, Kennebunk, Kennebunkport, Milton, North Berwick, Rochester, Sanford, Somersworth, Wells.
Lewiston (1:100K): Lewiston, Lisbon Falls, North Monmouth.
Portland (1:100K): Bar Mills, Cape Elizabeth, Cumberland Center, Gorham, Gray, Great East Lake, Mousam Lake, Naples, North Pownal, North Windham, Old Orchard Beach, Portland East, Portland West, Prouts Neck, Raymond, Sebago Lake, Standish, Waterboro, Yarmouth.
Skowhegan (1:100K): Albion, Fairfield, Rome, Waterville.

Editing Layer: NWI base data

Source Imagery (type, scale and date):

For stereo photointerpretation: CIR transparencies, 1:40K, Spring 1991 which were determined to be of poor quality and of limited use.

For mapping: 2 foot ground sample distance (GSD) true color digital orthophotographs from ME GIS (spring 2003 & spring 2004), 1 foot GSD true color digital orthophotographs from ME GIS (spring 2003 & spring 2004), half-foot GSD true color digital orthophotographs from ME GIS (April 2001), and 1 meter GSD black and white digital orthophotographs from USGS (1991 to 2003).

Collateral Data (include any digital data used as collateral):

Data Sets	Notes
High-Res NHD	NHD data was determined to be superior to NWI linear data
1:24K NWI data	1976-77 (from 1:80K B&W interpretation)
Digital USDA/NRCS SSURGO Soils Data	http://soils.usda.gov/
Gulf of Maine Wetland data	Used to assist in determining the extent of tidal influence

Inventory Method (original mapping, map update, techniques used):

The NWI data, selected as the editing layer for this NWI project, was produced in (Eric: the NWI base data we've edited was generated from 1:58K CIR air photo interpretation flown in mid-1980's)1976-77 from 1:80K B&W interpretation. Enhancement of the original NWI wetland polygon and linear data was aligned to 2004 imagery. The project was scoped as an on-screen updating and enhancing effort supported by stereoscopic interpretation of 1991-1994 era CIR aerial photography. Due to the poor quality of the available CIR aerial photography, it was not usable as collateral. See PI comments, below.

Classification (Cowardin *et al*., 1979) wetlands, riparian, uplands, hydrogeomorphic, etc.):

UMASS used the Cowardin *et al.* (1979) system for wetlands and deepwater habitats.

Data Limitations:

General description of the Project Area:

212 Laurentian Mixed Forest Province

(http://www.fs.fed.us/colorimagemap/ecoreg1_provinces.html)
North-central lake-swamp-morainic plains, New England lowlands

Land-surface form.--Most of this province has low relief, but rolling hills occur in many places. Lakes, poorly drained depressions, morainic hills, drumlins, eskers, outwash plains, and other glacial features are typical of the area, which was entirely covered by glaciers during parts of the Pleistocene. Elevations range from sea level to 2,400 ft (730 m).

This stand of beech and hemlock illustrates mixed deciduous- coniferous forest in the Laurentian Mixed Forest Province, Allegheny National Forest, Pennsylvania.

Climate.--Winters are moderately long and somewhat severe, but more than 120 days have temperatures above 50F (10C). Average annual temperatures range from 35 to 50F (2 to 10C). A short growing season imposes severe restrictions on agriculture; the frost-free season lasts from

100 to 140 days. Snow usually stays on the ground all winter. During winter, the province lies north of the main cyclonic belt; but during summer it lies within this belt, and the weather is changeable. Average annual precipitation is moderate, ranging from 24 to 45 in (610 to 1,150 mm); maximum precipitation comes in summer.

Vegetation.--This province lies between the boreal forest and the broadleaf deciduous forest zones and is therefore transitional. Part of it consists of mixed stands of a few coniferous species (mainly pine) and a few deciduous species (mainly yellow birch, sugar maple, and American beech); the rest is a macromosaic of pure deciduous forest in favorable habitats with good soils and pure coniferous forest in less favorable habitats with poor soils. Mixed stands have several species of conifer, mainly northern white pine in the Great Lakes region, with an admixture of eastern hemlock. Eastern red cedar is found in the southeast. Pine trees are often the pioneer woody species that flourish in burned-over areas or on abandoned arable land. Because they grow more rapidly than deciduous species where soils are poor, they quickly form a forest canopy; but where deciduous undergrowth is dense, they have trouble regenerating, and remain successful only where fire recurs. Fires started by lightning are common in this province, particularly where soils are sandy and there is a layer of dry litter in summer.

Soils.--The greatly varying soils include peat, muck, marl, clay, silt, sand, gravel, and boulders, in various combinations. Spodosols are dominant in New England and along the Great Lakes coast; Inceptisols and Alfisols dominate farther inland. The Alfisols are medium to high in bases and have gray to brown surface horizons and subsurface horizons of clay accumulation.

Fauna.--In winter, the shorttail weasel (ermine) and snowshoe hare turn white, as they do in polar provinces. The black bear, striped skunk, marmot, chipmunk, and two genera of jumping mice all pass the winter in hibernation. So do badger and the striped ground squirrel that live in the western parts of the province. Beaver and muskrat remain active all winter, working beneath the ice that covers the lakes and streams.

Ptarmigan also turn white in winter. Many other birds, especially insectivorous species, migrate south. Common summer resident birds include the white-throated sparrow, northern junco, and yellow-bellied sapsucker.

Description of wetland habitats:

- Organize by Cowardin classification type:
- Wetland classification codes and corresponding community type(s):

Description of other habitats:

- Riparian
- Uplands

Regional specialized conventions:

Region 5 NWI mapping conventions were employed, to include customized conventions for the coastal Maine project area, denoted (*):

- The “E” water regime describes wetland hydrology that is seasonally-flooded/saturated.
- The “5” emergent subclass is used to identify *Phragmites australis*.

- The “R4x” code is used for ditches crossing wetlands and for non-vegetated ditches within non-tidal wetlands, at the discretion of the Region.
- The “a” (acid) modifier is applied in this Region for bogs.
- The “s” (spoil) special modifier is applied to areas subject to deposition of spoil and other thin coverings of unconsolidated material that does not effectively fill wetland.
- The “g” (organic) special modifier in conjunction with SS4 or FO4 (needle-leaved evergreen) subclass is used to identify Atlantic white cedar (*Chamaecyparis thyoides*) and Northern white cedar (*Thuja occidentalis*).
- For commercial cranberry bogs, the PSSf classification is employed.
- The “Pf” and “Pfd” (palustrine farmed/ditched) convention is used for farmed hydric soils in agricultural areas. Interpretation of these areas is supported by collateral hydric soils data, saturation and/or ponding in the signatures, and till lines visible up to and sometimes through the wet depressions.
- Canals are classified PUBKHhx where sections are less than 20 acres in size, and L1UBKHhx where greater than 20 acres in size.
- (*) Lobster impoundments were classified as M2US3KMh.
- (*) Vernal pools were classified as PUS3E.
- (*) Mixing of AB with RS has been applied to classify regularly-flooded coastal rocky shores with mottling of attached aquatic bed that is inseparable for mapping purposes, per Regional direction.
- Groins and jetties were classified as M2RS2Pr or E2RS2Pr.
- Where conditions warrant, double special modifiers are used per Regional direction.

Photointerpreter Comments:

This project used digital NWI data originating from the early to mid-1980’s. The original dataset was generated by air-photintepretation ink-on-mylar, zoom transferred onto a stable base and digitized. This old NWI dataset has been updated and enhanced to an orthorectified image base. Shifts resulting from this process are discussed below.

A trends dataset has been developed using old NWI data compared to the orthos, to document losses and gains due to development or natural processes since the 1980’s (for example, wetland loss to residential, commercial or industrial development, gains of new reservoirs; loss of salt marsh due to dune blow outs.) Trend polygons were assigned a land use/land cover code based on the Anderson (1976) classification system. Trends scoped for analysis with this project do not include wetland to wetland and/or deepwater habitat type changes.

On-screen image interpretation involved the following tasks: reattribution of polygons; addition of missed wetlands; expansion and/or reduction of polygon boundaries; deletion of upland land use polygons; attribution and re-alignment of hydrography, and removal of linear hydrography through permanently-flooded and semi-permanently flooded polygons; application of water regime special modifiers to describe disturbed and altered wetlands and deepwater habitats: ditching, impoundment (to include tidally restricted habitats), spoil deposition, beaver, excavation, artificial water control; application of

special modifiers to identify bog and *T. occidentalis* and *C. thyoides* communities; re-establishing system breaks; identification and classification of tidally-influenced freshwater wetlands and deepwater habitats; identification and classification of brackish wetland and deepwater habitats (oligohaline ("6") modification); identification and attribution for the presence of *Phragmites australis*; mapping of commercial fishery impoundments; merging of internal polygons to meet NWI targeted minimum mapping unit standards; reattribution of class "UB" (unconsolidated bottom); merging of same code polygons; reshaping of hydric soil polygons to exclude residential, commercial and other development; re-classification for vegetation height distinction; mapping of wetland and deepwater habitat losses and gains; identification and classification of salt marsh pannes and pools; re-attribution of code alpha-numerics to meet NWI standards.

Due to the extent of wetlands missing in the original NWI data and lack of a usable collateral source of CIR for stereo photo interpretation, on screen updating relied on collateral reference to USDA/NRCS SSURGO hydric soils datasets. Given the extent of wetlands in Maine, and differences in mapping standards between NRCS and NWI, the scope for this project was changed in January 2006 to include attribution of hydric soil polygons and partially hydric soil polygons (with greater than 50% hydric inclusions) with Cowardin classification.

ALL ATTRIBUTED SOILS POLYGONS START WITH THE LETTER "H", IN THE ATTRIBUTE COLUMN (ex. HPFO1E)

The method agreed upon for this process involved the following steps:

1) NWI data interpretable on screen by image analysis was updated and enhanced. This data was QC'd both UMASS and the USFWS Regional Coordinator.
2) Digital hydric soil polygons (with the updated, image-interpreted NWI polygons removed from the hydric soil dataset) were imported into the NWI data using ArcGIS 9.1. Road centerlines were buffered by 8 meters and removed from the hydric soil dataset. The hydric soil polygons were attributed with Cowardin classification at a scale conducive to cover types (Between 1:6,000 and 1:15,000) and developed areas were removed.
3) Hydric soil water regime attribution was based on a crosswalk of soil types to water regime developed by R. Tiner (FWS) and Dr. P. Veneman (UMass), with some exceptions allowed for image interpretation of "B" (saturated) wetlands on slopes. This data was not used for photointerpretable wetlands, and as a result there may be discrepancies between water regimes classification of the NWI data and that of the hydric soil wetlands.
4) Cowardin-attributed hydric soil polygons are maintained as a separate dataset from NWI polygons interpretable on screen.
5) Some portions of the project area were worked prior to the hydric soil method outlined above, and include line drawing of hydric soil polygons as interpretable, with development and road crossings removed.

Brackish classification (assignment of "6" modifiers) was supported by collateral

reference to USFWS Gulf of Maine Project (GOMP) map data. Due to scale, alignment and mapping standard discrepancies and with respect to conflict with "6" breaks in the old NWI data, image interpreter judgment was exercised when applying the GOMP data to the updating. GOMP data was unavailable for the portions of New Hampshire in this project. Conflicts were resolved using best photointerpreter judgment, vegetation clues, presence/absence of tidal restrictions, and internet sources.

Some regularly-flooded tidal flats (E2US2N, E2US3N) were mapped with little or no signature visible at the tide stage of the 2004 ortho imagery. This may occur where interpreter judgment weighed collateral information from the DRG and the GOMP. Interpretation differentiated mud and sand tide flats. Where differentiation was impaired as the substrate appeared to be sandy mud, the mud subclass predominated. All pannes and pools were coded E2US4P per NWI Regional Coordinator direction.

Beaver modifiers have been applied in a significant fashion as they have had much influence on Maine wetlands subject to updating. Beaver modification was interpreted for wetland communities in complex with active dams (PUBFb or with mix) at the time of image overflight; for active dams within a polygonal perennial river channel (PUBHb); and for beaver succession without an active dam at the time of overflight (various meadow and shrub communities, often with dead woody cover). The DRG was also consulted for determining beaver succession classification without an active dam. Additionally, the old NWI data under-mapped many marsh-symbolized wetlands (*i.e.* Sebago Lake quad).

Significant amounts of interpretable 'E' and "C" wetlands were not indicated as hydric soils in the digital SSURGO data, for example, mixed alluvial wetlands immediately bordering perennial rivers in floodplains. Interpreter judgment was exercised to map these wetlands.

Shifts and offset of the old NWI digital data is significant when imported into the orthorectified images. The problem is especially pronounced in coastal zones. Interpreters made considerable effort to correct shifts and offsets. If not corrected, both interpretable enhancements and the import/attribution of hydric soils would result in various map accuracy problems: slivers and holes between wetlands; wetland delineation inaccuracies (internally, upper limits and isolated); inaccuracies with hydrography (hydrologic connections); inaccurate wetland landscape position; wetland juxtaposition; and mis-classification of wetland as uninterpretable hydric soil wetland.

Interpreter judgment was made to ensure trends were not falsely documented due to shifts in the data. Generally, this was accomplished by moving shifted polygons to with portions not developed to the corresponding interpretable signature on the image, and supported by the DRG where necessary, and then performing the trend. Where the entire polygon was developed, the DRG was consulted to best attain trend accuracy.

There is likely more larch *(Larix laricina)* in forested wetlands and bog communities than

detectable with on-screen image interpretation. The old NWI data had limited or subjective (e.g. PSS7) classification of this species.

Much of the old NWI data classified marine and rocky shores with rockweed (*Fucus*, *Ascophyllum*) as M2AB1N. Rocky shore habitat frequently appears with a mottling rather than a banding of attached aquatic bed. Per NWI Regional Coordinator direction, we have used a mix of AB/RS or RS/AB to accommodate this problem. Where AB is visibly banded at production scale, attempts were made to separate the classes. Differenting irregularly flooded rocky shore (__RS_P) from the regularly flooded zone has not been problematic.

The New Hampshire side of the Dover East quad has poor quality imagery (blurry) and is true color/leaf out making accurate Photo-interpretation is nearly impossible. Black and white imagery for Portsmouth quads was more useful to determine forest cover.

References:

Anderson, J.R., E.E. Hardy, J.T. Roach and R.E. Witmer. 1976. A Land Use and land Cover Classification System for Use with Remote Sensor Data. U.S. Geological Survey Professional Paper 96A. U.S. Government Printing Office, Washington, D. C. 28 pp.

Cowardin, L.M., V. Carter, F.C. Goulet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. Office of Biological Services, Fish and Wildlife Service, US Department of the Interior, Washington D.C.

US Forest Service Website, Ecosystem Provinces - http://www.fs.fed.us/colorimagemap/ecoreg1_provinces.html (viewed 3/7/2005)