C-CAP High-Resolution Land Cover Classification Schemes

Definitions and Guidance for Mapping Production and Data Use ***for Alaska***

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Phase 1 High-Resolution Product Land Cover Categories

Phase 1 data represent a subset of NOAA's standard Coastal Change Analysis Program (C-CAP) land cover categories. These categories represent those found to be most useful as stand-alone products and are often a precursor to the more detailed categorical distinctions that would be included in our phase 2 development.

Impervious (Man-made)

General Definition: Anthropogenic features which do not allow infiltration from precipitation. This includes buildings, parking lots, and roads developed from asphalt, concrete, or other constructed surfaces. Impervious can also include unpaved roads and similar features (driveways, parking areas, etc.) that are highly trafficked and often compacted, leading to their functioning like a paved, impervious surface.

Minimum Mapping Units:

- Buildings that are greater than 200 square feet should be captured.
- Roads that have greater than 15 feet width and 100 feet long should be captured.
- Other paved surface that exceeds 1,000 square feet should be captured.
- It should be noted that while the other paved surface category has a stated minimum mapping unit of 400 square feet, such features are often made from an interconnecting set of impervious features that may be smaller than this area alone (i.e., driveways and sidewalks, for example), but because of their connectedness to one another, or features such as buildings or roads, these paved surfaces are expected to be mapped.

Definition Details:

- Artificial turf and in-ground swimming pools are included in the impervious class.
- Railways are generally included as part of the impervious class for these phase 1 products, but would be considered bare in subsequent mapping phases (unless they are running through highly urbanized areas, over pavement, or where road features are crossed).
- Unpaved roads that are infrequently traveled should not be captured. Examples include two tracks, roads in agricultural areas used for internal travel between fields, and unpaved forest access roads not used as through roads (e.g., logging roads).
- Solar panel installations are generally not included as impervious (C-CAP tries to map those as part of our open space developed class).

Water

General Definition: Open water surface features include water-covered areas with less than 25 percent vegetation cover.

Minimum Mapping Units:

- Area of water is > 0.25 acre (1,000 square meters).
- River features greater than 10 to 15 feet wide, and visible, are expected to be mapped.

Definition Details:

- Phase 1 water extent mapping can be influenced by the tidal stage in the imagery. Phase 1 products with higher tide conditions are likely to include intertidal, unconsolidated shore (sands

and muds) features. Distinguishing these intertidally exposed features would occur during our phase 2 mapping.

- Floating aquatic vegetation is ideally captured as water in phase 1, but often has such a strong spectral response that it obscures the water signature, and can often be left out of the water class (in such cases, it would be expected to be picked up as a grass feature).
- Docks should be classified as open water (not as impervious), but more substantial features, such as piers and bridges, are not mapped as water (and would be mapped as impervious).

Canopy – Tree (Forested)

General Definition: Contains areas dominated by woody vegetation that is greater than 15 ft (5 meters) in height. This can be as individual trees, groups of trees, or larger forested areas where percent cover is greater than 20 percent.

Minimum Mapping Units:

- Tree Area > 0.25 acre (1,000 square meters) and a minimum of 7 feet wide.

Canopy – Scrub/Shrub

General Definition: Contains areas dominated by woody vegetation that is less than 15 feet (5 meters) tall. This class includes woody vegetation that consisting of shrub species, and tree species that are in early successional stages of regrowth or that are stunted from environmental conditions.

Minimum Mapping Units:

- Shrub area > 0.25 acres (1,000 square meters) and a minimum of 7 feet wide.

Phase 2 High-Resolution Product Land Cover Categories: Categories Included in Addition to Those Mapped within Phase 1

Phase 2 data represent a complete mapping of NOAA's standard coastal C-CAP land cover categories. This work builds upon the mapping products produced in phase 1, to add more detail and correct any errors that may have been present in that earlier phase mapping.

Impervious Under Tree Canopy

General Definition: This category represents an intersection of features that could be mapped as either impervious surface or tree canopy, or both, because both exist within the same space (but at different heights within that area). This category is typically obtained from an independent mapping of impervious and canopy features (as produced in phase I products) and does not tend to be mapped explicitly on its own.

Minimum mapping units and **specifics** are based on the impervious and tree canopy classes (described above).

Bare Land

General Definition: Contains areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earth material. Generally, vegetation accounts for less than 10 percent of total cover. This category may include permanently unvegetated features but also often capture features in states of transition, such as exposed soil at construction sites (such as new development) or in recent forest clear cuts. This category can also include unpaved, infrequently traveled roads; recently tilled areas of exposed soils in agricultural settings; and railroad features.

Minimum Mapping Units:

- Barren area > 0.1 acres (400 square meters).
- Railroad features longer than 100 feet and clearly visible should be mapped to this class.

Open Space Developed

General Definition: Open space developed, or OSD, is grass and other vegetation that is not woody and is associated with developed areas or recreation, mostly managed grasses or low-lying vegetation planted in developed areas for recreation, erosion control, or aesthetic purposes. These areas are maintained by human activity such as fertilization, irrigation, or mowing and often occur in locations that are within or adjacent to other developed features (i.e., neighborhoods, golf courses, airports, cemeteries, sports fields, etc.).

Minimum Mapping Units:

- Area is > 0.1 acre (400 square meters).

Definition Details:

- These areas would typically be thought of as herbaceous grasslands, though there can be instances where bare features (within urban areas) might also be included.
- Artificial turf would not typically be included in OSD (it would be expected to be mapped as an impervious surface).
- Transmission line rights-of-way should be excluded from OSD and are considered grassland.

Cultivated Crops

General Definition: Contains areas intensely managed for the production of annual crops, all land being actively tilled, orchards, vineyards, nurseries, cranberry bogs, and aquaculture.

Minimum Mapping Units:

- Cultivated area > 0.5 acre (2,000 square meters).

Definition Details:

- These areas would include vegetated crop features and areas of fields that are fallow or recently tilled (and that might otherwise be considered bare).
- Similarly, there may be instances where confusion associated with vegetation height might have resulted in taller crops being categorized as scrub/shrub in phase 1 mapping products.
- Areas of cranberry bogs or aquaculture may have been mapped as water in phase 1 mapping, but would be considered agriculture in phase 2.

Pasture/Hay

General Definition: Contains areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops. This cover type is expected to be perennial (i.e., not tilled on an annual basis) but is generally more intensively managed than natural grasslands.

Minimum Mapping Units:

- Area of grassland > 0.5 acres (2,000 square meters).

Definition Details:

- The presence of livestock, or supporting features (such as ponds or feed sheds) is indicative of pasture/hay.
- The presence of hay bales is indicative of pasture/hay.
- Scrub/shrub vegetation can be mapped within pasture fields.

Grass/Herbaceous

General Definition: Contains areas dominated by graminoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling but can be utilized for light grazing.

Minimum Mapping Units:

- Area of grassland > 0.25 acres (1,000 square meters).

Definition Details:

- Herbaceous features not mapped as open space developed, cultivated, pasture/hay, or a wetland category would be considered a grassland.

Deciduous Forest (Tree)

General Definition: Contains areas dominated by woody vegetation that is greater than 15 ft (5 meters) in height. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change. This can be as individual trees, groups of trees, or larger forested areas where percent cover is greater than 20 percent.

Minimum Mapping Units:

- Tree Area > 0.1 acre (400 square meters) and a minimum of 7 feet wide.

Definition Details:

- Phase 2 classifications may not include distinctions of trees by deciduous and evergreen types. In those instances, C-CAP products would include a single undifferentiated upland tree category.

Evergreen Forest (Tree)

General Definition: Contains areas dominated by woody vegetation that is greater than 15 ft (5 meters) in height. More than 75 percent of the tree species maintain their leaves all year. This can be as individual trees, groups of trees, or larger forested areas where percent cover is greater than 20 percent.

Minimum Mapping Units:

- Tree Area > 0.1 acre (400 square meters) and a minimum of 7 feet wide.

Definition Details:

- Phase 2 classifications may not include distinctions of trees by deciduous and evergreen types. In those instances, C-CAP products would include a single undifferentiated upland tree category.

Palustrine Forested Wetlands

General Definition: Includes tidal and nontidal wetlands dominated by woody vegetation greater than 15 ft (5 meters) in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.05 percent (0.5 parts per thousand). Total vegetation coverage is typically greater than 20 percent.

Minimum Mapping Units:

- Tree area > 0.1 acre (400 square meters) and a minimum of 7 feet wide.
- Within wetland areas that are > 0.25 acres (1,000 square meters).

Definition Details:

- These areas would have been captured primarily as tree features in phase 1 products.

Palustrine Scrub/Shrub Wetlands

General Definition: Includes tidal and nontidal wetlands dominated by woody vegetation less than 15 ft (5 meters) in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.05 percent (0.5 parts per thousand). Total vegetation coverage is typically greater than 20 percent.

Minimum Mapping Units:

- Shrub area > 0.1 acre (400 square meters) and a minimum of 7 feet wide.
- Within wetland areas that are > 0.25 acres (1,000 square meters).

Definition Details:

- These areas would have been captured primarily as scrub/shrub features in phase 1 products.
- Species present could be true shrubs, young trees and shrubs, or trees that are small or stunted due to environmental conditions.

Palustrine Emergent Wetlands

General Definition: Includes tidal and nontidal wetlands dominated by persistent emergent vascular plants, emergent mosses, or lichens, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.05 percent (0.5 parts per thousand). Total vegetation coverage is typically greater than 20 percent.

Minimum Mapping Units:

- Herbaceous area > 0.1 acre (400 square meters).
- Within wetland areas that are > 0.25 acres (1,000 square meters).

Estuarine Forested Wetlands

General Definition: Includes tidal wetlands dominated by woody vegetation greater than 15 ft (5 meters) in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.05 percent (0.5 parts per thousand). Total vegetation coverage is typically greater than 20 percent.

Minimum Mapping Units:

- Tree area > 0.1 acre (400 square meters) and a minimum of 7 feet wide.
- Within wetland areas that are > 0.25 acres (1,000 square meters).

Definition Details:

- These areas would have been captured primarily as tree features in phase 1 products.

Estuarine Scrub/Shrub Wetlands

General Definition: Includes tidal wetlands dominated by woody vegetation less than 15 ft (5 meters) in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.05 percent (0.5 parts per thousand). Total vegetation coverage is typically greater than 20 percent.

Minimum Mapping Units:

- Shrub area > 0.1 acre (400 square meters) and a minimum of 7 feet wide.
- Within wetland areas that are > 0.25 acres (1,000 square meters).

Definition Details:

- These areas would have been captured primarily as scrub/shrub features in phase 1 products.
- Species present could be true shrubs, young trees and shrubs, or trees that are small or stunted due to environmental conditions.
- Mangrove features, depending upon their height, may be captured within the estuarine scrub/shrub class.

Estuarine Emergent Wetlands

General Definition: Includes all tidal wetlands dominated by erect, rooted, herbaceous hydrophytes (excluding mosses and lichens). These wetlands occur in tidal areas in which salinity due to ocean-derived salts is equal to or greater than 0.05 percent (0.5 parts per thousand) and is present for most of the growing season in most years.

Minimum Mapping Units:

- Herbaceous area > 0.1 acre (400 square meters).
- Within wetland areas that are > 0.25 acres (1,000 square meters).

Unconsolidated Shore

General Definition: Contains intertidal areas made up of material such as silt, sand, or gravel that is subject to inundation and redistribution due to the action of water. Substrates lack vegetation except for pioneering plants that become established during brief periods when growing conditions are favorable.

Minimum Mapping Units:

- Area of unconsolidated shore has a width > 20 feet wide.
- Total area of unconsolidated shore > 0.1 acres (400 square meters).

Definition Details:

- These areas may have been captured as water in phase 1 mapping.
- The distinction between bare land and unconsolidated shore along coastlines should be located at the mean higher high water (MHHW) level.
- The distinction between water (or benthic habitats) and unconsolidated shore should be located at the mean lower low water (MLLW) level.
- Corals, seagrass beds, and oyster reefs would not be included.

Palustrine Aquatic Bed

General Definition: Contains tidal and nontidal wetlands and deep-water habitats in which salinity due to ocean-derived salts is less than 0.05 percent (0.5 parts per thousand), and which are dominated by plants that grow and form a continuous cover principally on or at the surface of the water. These include algal mats, detached floating mats, and rooted vascular plant assemblages. Total vegetation cover is greater than 80 percent.

Minimum Mapping Units:

- Area of aquatic bed has a width > 20 feet wide.
- Total area of aquatic bed > 0.1 acres (400 square meters).

Definition Details:

- These areas could have been captured as water in phase 1 mapping, but can often have such a strong spectral vegetation response that they obscure the water signature.

Estuarine Aquatic Bed

General Definition: Contains tidal wetlands and deep-water habitats in which salinity due to ocean-derived salts is equal to or greater than 0.05 percent (0.5 parts per thousand), and which are dominated by plants that grow and form a continuous cover principally on or at the surface of the water. These include algal mats, kelp beds, and rooted vascular plant assemblages. Total vegetation cover is typically greater than 80 percent.

Minimum Mapping Units:

- Area of aquatic bed has a width > 20 feet wide.
- Total area of aquatic bed > 0.1 acres (400 square meters).

Definition Details:

- These areas could have been captured as water in phase 1 mapping, but can often have such a strong spectral vegetation response that they obscure the water signature.

Ice/Snow

General Definition: Contains areas characterized by a perennial cover of ice or snow.
Note that the ice/snow category is only included in the phase 1 products currently being produced in Alaska. Other areas of the country where ice/snow exists will be mapped as part of phase 2 production.

Minimum Mapping Units:

- Area of snow or Ice > 0.25 acre (1,000 square meters).

Definition Details:

- Extent of area mapped is based on what is visible in the imagery used as a mapping baseline (or an alternative imagery source, if available).