



# Coastal Change Analysis Program (C-CAP)

## NOAA Office for Coastal Management

### Regional Land Cover Classification Scheme

The following information provides a description of land cover classes used with NOAA's Coastal Change Analysis Program (C-CAP) Regional land cover products. These classes have been targeted as important indicators of coastal ecosystems and have been identified as features that can be consistently and accurately derived primarily through remote-sensing means.


These descriptions have been revised from those originally published in *NOAA Coastal Change Analysis Program (C-CAP): Guidance for Regional Implementation*.


#### Unclassified


**Background (0)** – areas within the image file limits but containing no data values.


**Unclassified (1)** – areas in which land cover cannot be determined; these include clouds and deep shadow.

#### Developed Land

 **Developed, High Intensity (2)** – contains significant land area and is covered by concrete, asphalt, and other constructed materials. Vegetation, if present, occupies less than 20 percent of the landscape. Constructed materials account for 80 to 100 percent of the total cover. This class includes heavily built-up urban centers and large constructed surfaces in suburban and rural areas with a variety of land uses.



 **Developed, Medium Intensity (3)** – contains areas with a mixture of constructed materials and vegetation or other cover. Constructed materials account for 50 to 79 percent of total area. This class commonly includes multi- and single-family housing areas, especially in suburban neighborhoods, but may include all types of land use.

 **Developed, Low Intensity (4)** – contains areas with a mixture of constructed materials and substantial amounts of vegetation or other cover. Constructed materials account for 21 to 49 percent of total area. This subclass commonly includes single-family housing areas, especially in rural neighborhoods, but may include all types of land use.

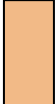
 **Developed, Open Space (5)** – contains areas with a mixture of some constructed materials, but mostly managed grasses or low-lying vegetation planted in developed areas for recreation, erosion control, or aesthetic purposes. These areas are maintained by human activity such as fertilization and irrigation, are distinguished by enhanced biomass productivity, and can be recognized through vegetative indices based on spectral characteristics. Constructed surfaces account for less than 20 percent of total land cover.

	Developed - High Intensity
	Developed - Medium Intensity
	Developed - Low Intensity
	Developed - Open Space
	Cultivated
	Pasture / Hay
	Grassland
	Deciduous Forest
	Evergreen Forest
	Mixed Forest
	Scrub / Shrub
	Palustrine Forested Wetland
	Palustrine Scrub / Shrub Wetland
	Palustrine Emergent Wetland
	Estuarine Forested Wetland
	Estuarine Scrub / Shrub Wetland
	Estuarine Emergent Wetland
	Unconsolidated Shore
	Bare Land
	Water
	Palustrine Aquatic Bed
	Estuarine Aquatic Bed
	Tundra
	Snow / Ice

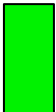


## Agricultural Land

-  **Cultivated Crops (6)** – contains areas intensely managed for the production of annual crops. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
-  **Pasture/Hay (7)** – contains areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle and not tilled. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.


## Grassland

-  **Grassland/Herbaceous (8)** – contains areas dominated by grammanoid 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 grazing.

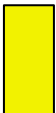


## Forest Land

-  **Deciduous Forest (9)** – contains areas dominated by trees generally greater than 5 meters tall and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
-  **Evergreen Forest (10)** – contains areas dominated by trees generally greater than 5 meters tall and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species maintain their leaves all year. Canopy is never without green foliage.
-  **Mixed Forest (11)** – contains areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover. *Both coniferous and broad-leaved evergreens are included in this category.*


## Scrub Land


-  **Scrub/Shrub (12)** – contains areas dominated by shrubs less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes tree shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.

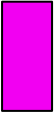
## Barren Land

-  **Barren Land (20)** – 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.
-  **Tundra (24)** – is categorized as a treeless region beyond the latitudinal limit of the boreal forest in pole-ward regions and above the elevation range of the boreal forest in high mountains. In the United States, tundra occurs primarily in Alaska.
-  **Perennial Ice/Snow (25)** – includes areas characterized by a perennial cover of ice and/or snow, generally greater than 25 percent of total cover.


## Palustrine Wetlands


 **Palustrine Forested Wetland (13)** – includes tidal and nontidal wetlands dominated by woody vegetation greater than or equal to 5 meters in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.5 percent. Total vegetation coverage is greater than 20 percent.


 **Palustrine Scrub/Shrub Wetland (14)** – includes tidal and nontidal wetlands dominated by woody vegetation less than 5 meters in height, and all such wetlands that occur in tidal areas in which salinity due to ocean-derived salts is below 0.5 percent. Total vegetation coverage is greater than 20 percent. *Species present could be true shrubs, young trees and shrubs, or trees that are small or stunted due to environmental conditions.*

 **Palustrine Emergent Wetland (Persistent) (15)** – 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 0.5 percent. Total vegetation cover is greater than 80 percent. *Plants generally remain standing until the next growing season.*

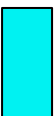
## Estuarine Wetlands

 **Estuarine Forested Wetland (16)** – includes tidal wetlands dominated by woody vegetation greater than or equal to 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 0.5 percent. Total vegetation coverage is greater than 20 percent.


 **Estuarine Scrub/Shrub Wetland (17)** – includes tidal wetlands dominated by woody vegetation less than 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 0.5 percent. Total vegetation coverage is greater than 20 percent.


 **Estuarine Emergent Wetland (18)** – 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 0.5 percent and are present for most of the growing season in most years. Total vegetation cover is greater than 80 percent. *Perennial plants usually dominate these wetlands.*


## Barren Land

 **Unconsolidated Shore (19)** – includes 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.

## Water and Submerged Lands

 **Open Water (21)** – includes areas of open water, generally with less than 25 percent cover of vegetation or soil.

 **Palustrine Aquatic Bed (22)** – includes tidal and nontidal wetlands and deepwater habitats in which salinity due to ocean-derived salts is below 0.5 percent 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.

 **Estuarine Aquatic Bed (23)** – includes tidal wetlands and deepwater habitats in which salinity due to ocean-derived salts is equal to or greater than 0.5 percent 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 greater than 80 percent.