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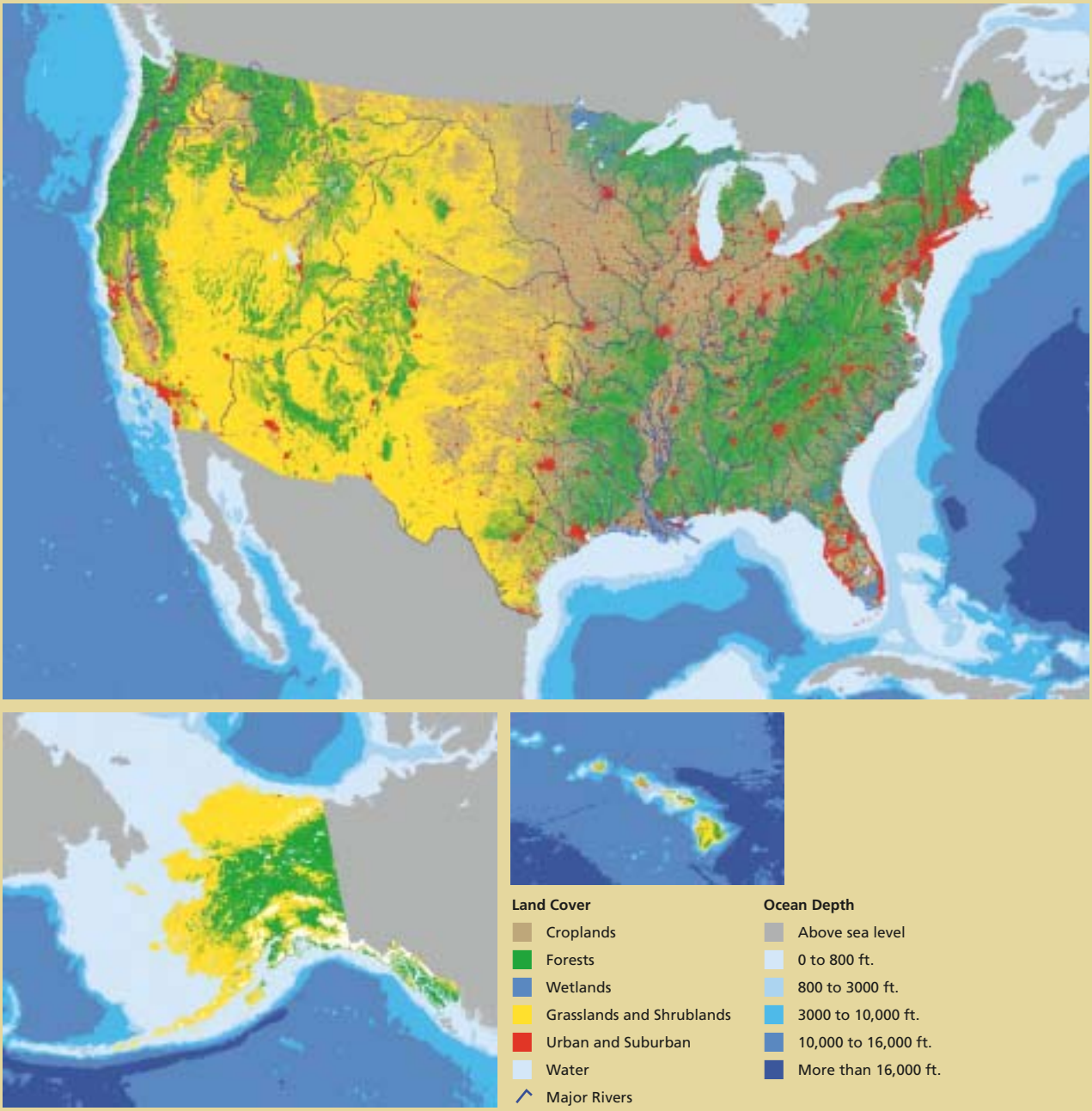
◐ Ecosystem Extent

Map 4.2. U.S. Land Cover and Ocean Depth



This map uses satellite remote sensing information to show the distribution of the ecosystems described in this report. It covers forests, croplands (including pastures and haylands), grasslands and shrublands, urban and suburban areas, most wetlands, and rivers with flows that exceed 1000 cubic feet per second. The map also includes information on the depth of coastal waters, which will be replaced by data on the extent of brackish coastal waters, when such data become available.

Data Source: lower 48 states: Multi-Resolution Land Characterization (MRLC) Consortium; Alaska: Flemming (1996); Hawaii: NOAA; Bathymetry data: NOAA; anaylsis by USGS EROS Data center.

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Ecosystem Extent *(continued)*

What Is This Indicator, and Why Is It Important? This indicator presents the area of the four major land-based ecosystem types covered in this report (forests, farmlands, grasslands and shrublands, and urban and suburban areas) as a percentage of the total U.S. land area, for the most recent 50-year period and compared to presettlement estimates. It also reports on a key component of freshwater ecosystems (freshwater wetlands) and will report on the area of brackish water, a key component of coastal and ocean ecosystems when data become available. The change in area since 1955 is also shown for each ecosystem type.

The area occupied by an ecosystem is one of the most basic elements of its condition. The area devoted to different ecosystem types directly influences the character of the American landscape and largely determines the ecosystem goods and services that are derived from it. Conversion from one ecosystem to another means that the ecosystem goods and services that can be derived from the original ecosystem are no longer available, replaced by the goods and services provided by the new system.

Even though ecosystem area is a basic ecosystem characteristic, reporting on it is not simple. The area of different ecosystem types is tallied by different agencies, using different methods and definitions of the ecosystems. These estimates provide important trend data and are generally well regarded. However, because they use different methods and definitions, data from these different sources cannot be compared or pieced together for a full national picture. Satellite remote sensing can provide such an overall, integrated view (see Map 4.2). However, it is only available at the appropriate scale for one time period (1992) and thus cannot provide information on changes in ecosystem area. In this report, we have generally used the estimates provided by the various agencies as the basis for reporting on ecosystem extent. We present the satellite data for comparison purposes and because, if repeated, it can provide frequent, consistent, and non-overlapping estimates of changes in ecosystem extent.

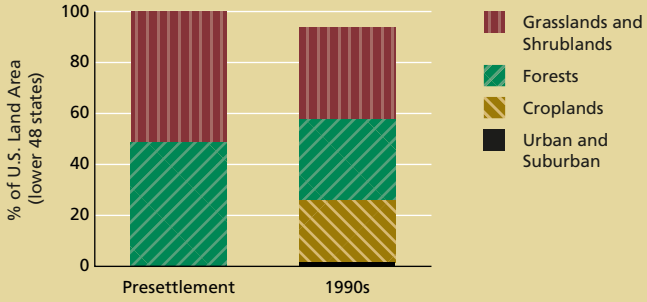
What Do the Data Show? Before European settlement, the land that was to become the United States was dominated by forests and grasslands and shrublands. Researchers have estimated that, before European settlement, there were about 920 million acres of forests

Ecosystem Area: Long-Term Changes and Recent Trends

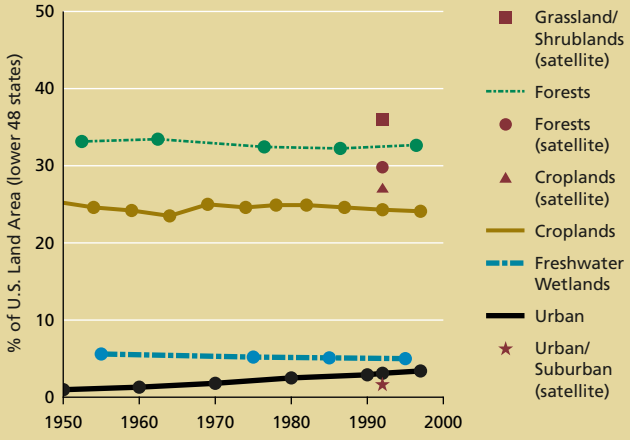
Data Not Adequate for National Reporting on

- Extent of brackish coastal waters

Partial Indicator Data: Long-term Changes for Forests, Croplands, Grasslands/Shrublands, Urban/Suburban



Partial Indicator Data: Recent Trends for Forests, Croplands, Grasslands/Shrublands, Urban/Suburban, Freshwater Wetlands



Data Source: USDA Forest Service (forests, current area, recent trends), USDA Economic Research Service (croplands trends, urban area trends), Multi-Resolution Land Characterization Consortium (MRLC; all satellite data, including current estimate of grass/shrub and urban/suburban area in top graph). Presettlement estimates are from Klopatek et al. (1979). Coverage: lower 48 states

Note: Because these estimates are from different sources, they do not sum to 100% of U.S. land area. Approximately 5% of lands are not accounted for by these data sources. They include some wetlands, some non-suburban developed areas, disturbed areas such as mines and quarries, and the like. In addition, freshwater wetlands currently occupy approximately 5% of the area of the lower 48 states, a reduction of about 50% since presettlement times. However, because they are found within forests, grasslands and shrublands, or croplands, they are not shown separately on the graph. See pp. 69 and 139. Finally, the "urban" trend line in this graph is based on a different definition from the one in this report (see p. 181) and is presented here to illustrate general trends. The definition used in this report was used to generate the "urban/suburban (satellite)" area estimate.

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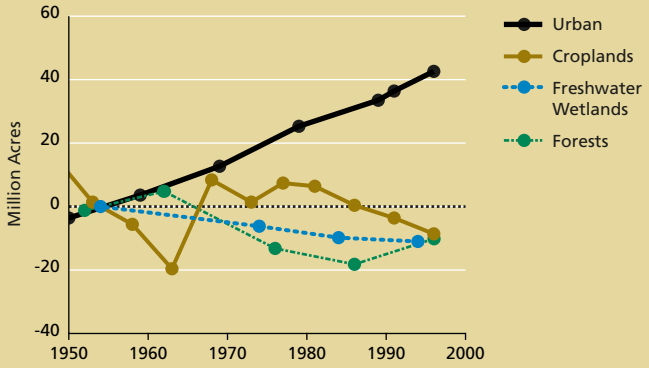
Ecosystem Extent *(continued)*

Change in Ecosystem Area (Compared to 1955)

Data Not Adequate for National Reporting on

- Extent of brackish coastal waters

Partial Indicator Data: Forests, Croplands, Grasslands/ Shrublands, Urban/Suburban, Freshwater Wetlands



Data Source: USDA Forest Service (forest trends), USDA Economic Research Service (cropland and urban area trends), U.S. Fish and Wildlife Service (FWS, freshwater wetlands trends. Coverage: lower 48 states.

Note: The "urban" line in this graph is based on a different definition from that used in this report. It is presented here to illustrate general trends. The definition used in this report was used to generate the "urban/suburban (satellite)" area estimate in the preceding graph.

and between 900 million and 1 billion acres of grasslands and shrublands. Thus, each covered roughly half of the lower 48 states. While these estimates are necessarily imprecise, it is clear that croplands (including pastures) and urban and suburban areas—totaling together about 500 million acres—were created on lands that were either forests or grasslands and shrublands, causing the acreage of these ecosystems to drop. In addition, the area of freshwater wetlands has declined by about 50% since European settlement.

In reading these figures and the ones that follow, it is important to remember that the data presented here are from several sources; they do not add to 100% of the U.S. land area, and gains and losses cannot be tracked accurately from one system to another.

Coasts and Oceans include all waters in the U.S. Economic Exclusion Zone (EEZ), which extends 200 miles from the coastline. Because the area of the EEZ changes only when territory is acquired or international law changes, this indicator focuses on the dynamic area of mixed salt and fresh waters, or brackish waters, surrounding the U.S. coastline. Changes in the extent of brackish water reflect changes in the volume of freshwater runoff from the land, which can be altered by changes in climate and by modification of river flows by dams and other diversions. There are no current or historical data at a national scale on the area of brackish water. Another important aspect of the extent of coastal waters is the area covered by coastal wetlands, coral reefs, and shellfish and seagrass beds (see Coastal Living Habitats, p. 69).

Croplands, that portion of farmlands that is actively used for crop production (including pastures), occupy about 24% of the land area of the lower 48 states, or about 455 million acres. About 23 million fewer acres are in active farmland use than in 1949, but over this period, farmland area has fluctuated. American Indians had some lands under cultivation before European settlement, but there are no firm estimates of this amount. Satellite-based methods produce an estimate of just over 500 million acres of croplands in 1992. This report also identifies a "farmland landscape," which includes both croplands and intermingled and nearby forests, grasslands and shrublands, wetlands, and developed areas; see p. 92.

Forests cover about 33% of the land area of the lower 48 states, or just under 620 million acres. When Alaska is added in, the total is about three-quarters of a billion acres, down from just over 1 billion acres before European settlement. In the lower 48 states, forested area has declined by about 10 million acres since 1955. However, there is more forest now than in the middle of the 19th century (not shown in the illustrations), when many parts of the country were cleared for agriculture and settlement (see the forest area indicator, p. 117). Satellite-based methods produce an estimate of about 560 million acres of forest in the lower 48 states.

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Ecosystem Extent *(continued)*

Fresh waters include 94 million acres of wetlands in the lower 48 states, or about 5% of total land area. About half the freshwater wetlands that existed at the time of European settlement have been converted to other uses; about 10% of the wetlands existing in 1955 had been converted by the mid-1990s, although the rate of loss slowed after the 1980s. Comparable data do not exist for Alaska. Wetlands occur in many ecosystem types, so their area is often counted as part of the area of forests, grassland and shrublands, farmlands, and urban and suburban areas. Satellite-based methods estimate about 80 million acres of wetlands. While freshwater wetlands are a critical and highly visible aspect of the extent of freshwater systems, the area of lakes and ponds and the number of miles of streams are also important (see Freshwater Extent, p. 139).

Grasslands and shrublands, often called rangelands, occupy about 36% of the land area of the lower 48 states, or about 680 million acres. These figures do not include pastures and haylands. For this national estimate, these pastures and haylands—some of which resemble "natural" grasslands and shrublands and some of which are highly managed—are counted as croplands. In the chapter on grasslands and shrublands, however, these lands are included in the area estimates for this system (p. 161). If these less-managed (uncultivated) pastures were reported as grasslands and shrublands, the decline in grassland and shrubland area would be less than is indicated on the top graph on p. 41.

Urban and suburban areas take up about 32 million acres, or 1.7% of the area of the lower 48 states. This figure is based on a newly developed definition applied to satellite imagery; comparable satellite-based data from earlier periods are not available. To show trends, therefore, we also present a USDA estimate, based upon the Census Bureau definition of urban area. (This definition uses population, rather than the percentage of land area covered by buildings, roads, and the like, to define "urban.") Using the Census-based definition, urban areas cover 64 million acres—twice the area produced by the satellite-based method—and have grown by 40 million acres since 1955. Because it focuses on actual land cover, the satellite-based definition is more appropriate for this report and is used as the basis for the urban and suburban indicators (see Area of Urban and Suburban Lands, p. 181).

The technical note for this indicator is on page 207.