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War Department in Washington, D.C. Weather observations were taken primarily by observer sergeants in the Army Signal Service. From 1891 to 1940, the Weather Bureau was under the jurisdiction of the Department of Agriculture. In 1905, the first wireless weather telegraph was received by a ship at sea. Kite experiments and eventually airplane stations became new sources for recording temperature, humidity, and winds.

In 1940, President Franklin D. Roosevelt moved the Weather Bureau to its more appropriate home under the Department of Commerce. When NOAA was formed in 1970, the Weather Bureau took on the new name National Weather Service.

Today, the National Weather Service uses some of the most technologically advanced equipment and procedures for forecasting weather. NWS relies on satellites, radar, highly developed communication and information systems, and automated weather forecasting to provide the United States with accurate weather predictions and observations.

Program Planning and Integration (PPI) was formed as a result of a structural realignment of NOAA's administration in 2002. PPI is in charge of NOAA's decision-making responsibilities on a corporate level, including overseeing budgets, providing a strategic plan, maintaining an inventory on current plans, and ensuring that all programs within the matrix of NOAA are following its mission.

The National Marine Fisheries Service originated as the Office of Commissioner of Fish and Fisheries on February 9, 1871, when President Grant recognized a need for fisheries conservation. Spencer Fullerton Baird, assistant secretary of the Smithsonian Institution, was appointed commissioner. He established a headquarters for the Fish Commission at Woods Hole, Massachusetts, in 1885. This became the first federal fishery research laboratory, and it was in a town that was quickly becoming world famous for its growing community of elite oceanographers and marine biologists. Fisheries research continued until the organization adopted its current name, National Marine Fisheries Service on October 3, 1970, when it became a division of NOAA.

The NMFS oversees many major aspects of oceanic fisheries within the coastal and offshore areas of the United States. Its focus is on the rela-

tionship between marine animals, their environment, and humans. Much of its work is based on resource management, seeking to conserve and maintain existing stocks of important commercial and game fish, and ensuring fair allocation among fishers. NMFS scientists conduct biological research on systematics, habitat, physical oceanography, ecology, biodiversity, and pathology.

NOAA Marine and Aviation Operations operates all NOAA ships and aircraft used in aiding ongoing environmental research. NOAA's fleet of ships carries out many marine duties, including hydrographic surveys, fishing surveys, and other oceanographic and atmospheric research expeditions. NOAA pilots aid in aerial ocean surveys and collection of weather data and atmospheric conditions. NMAO also oversees the NOAA Diving Program, a rigorous training that provides NOAA with expert divers for all underwater duties.

The NOAA Commissioned Corps, a direct descendant of the Coast and Geodetic Survey, is a division of NMAO. NOAA Corps is one of the seven uniformed services of the United States, and its officers are responsible for operating NOAA ships and aircraft, as well as managing other research interests and working as divers. Along with NOAA Corps officers, wage marine and civilian employees manage and operate all of the ships and aircraft.

Scientific research and advanced technology remain NOAA's highest priority. NOAA continues to serve the United States by focusing on ecosystem conservation, climate, weather and water, and commerce and transportation.

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Sources

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NATIONAL WEATHER SERVICE

The National Weather Service (NWS) is the official government agency responsible for providing weather, hydrologic, and climate forecasts and

warnings for the United States, its territories, adjacent waters, and ocean areas. The NWS traces its roots back to 1870, when a joint resolution was passed by Congress requiring the secretary of war "to provide for taking meteorological observations at the military stations in the interior of the continent and at other points in the States and Territories." President Ulysses S. Grant signed the resolution into law on February 9, 1870, creating the nation's first government weather service, under the auspices of the U.S. Army Signal Corps.

On October 1, 1890, Congress transferred the weather operations of the Signal Corps to the Department of Agriculture, and the new civilian agency was officially renamed the U.S. Weather Bureau. The Weather Bureau remained in the Department of Agriculture until 1940, when it was transferred to the Department of Commerce. A 1965 reorganization act moved the Weather Bureau to a new Commerce Department agency known as the Environmental Science Services Administration (ESSA). In 1970, the ESSA was replaced by the National Oceanic and Atmospheric Administration (NOAA), and the name of the Weather Bureau was officially changed to the National Weather Service.

During the 1990s, the NWS underwent a \$4.5 billion modernization program that resulted in a restructuring of the organization. In addition to consolidating a network of more than 300 field offices, such new technologies as Doppler-based Next Generation Weather Radar (NEXRAD), the Automated Surface Observing System (ASOS), and the Advanced Weather Interactive Processing System (AWIPS) were implemented to improve forecast accuracy and increase the lead times of severe-weather warnings.

Presently, the NWS maintains 122 Weather Forecast Offices (WFOs), supported by thirteen River Forecast Centers (RFCs), six Regional Headquarters, and nine National Centers for Environmental Prediction (NCEP), including the Storm Prediction Center (SPC), Tropical Prediction Center (TPC), and Climate Prediction Center (CPC). The NWS has a staff of more than 4,500 full-time employees.

In addition to data collected via automated networks, the NWS relies on more than 12,000 Cooperative Observers to record daily maximum and minimum temperatures and precipitation amounts from locations across the United

States. Data collected by surface-based networks are augmented by upper-air observations conducted twice daily at more than 100 locations, as well as data collected by networks of river and stream gauges, marine buoys, and geostationary and polar-orbiting satellites.

The NWS produces an average of 25 million forecasts, 41,000 warnings, and 2,200 flood watches each year. Besides monitoring current conditions and issuing forecasts, watches, and warnings, the NWS conducts applied meteorological and hydrological research and educational outreach.

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OIL DRILLING AND EXPLORATION

Oil forms in sedimentary rock as the result of a process in which organic deposits are buried deep in the earth and mature at prolonged pressure and high temperatures into petroleum, a compound of hydrogen and carbon. Oil is the portion of petroleum that is liquid at standard temperatures, the other portion being gas. The oil and gas rise from the source rock toward Earth's surface.

The geologic conditions required for the formation of an oil reservoir are the presence of rock that is both porous enough to hold the oil and permeable enough that the oil can move easily through the rock. For oil to collect in a sedimentary basin, it must be capped by a seal, generally of fine-grained rock, that arrests the further movement of the oil and completes the oil trap. Oil exploration is the process of trying to determine where these traps are located, both on land and offshore, and then estimating the extent of the reservoir and the difficulty of its extraction.

Sometimes oil advertises its presence at the surface, seeping from sedimentary rock as a black, tarlike substance. In this form, it has long been used by local people for fuel and other