Cascade Head Experimental Forest (CHE)

The 11,890-acre Cascade Head Experimental Forest (CHEF) was established in 1934 for scientific study of coastal Sitka spruce-western hemlock forests found along the Oregon Coast. The Neskowin Crest Research Natural Area, in the northwest corner of the experimental forest, was established in 1941. In 1974 an act of Congress established the 9,670-acre Cascade Head Scenic Research Area (SRA) that includes the western half of the experimental forest, several prairie headlands, the Salmon River estuary to the south, and contiguous private lands. The combination of the two areas has resulted in a more diverse and coastal related research program. In 1980 the entire area was designated a Biosphere Reserve as part of the United Nations Biosphere Reserve system.

The primary research goals of CHEF and SRA are: 1) to encourage scientific study while promoting a sensitive relationship between humans and their environment; 2) to promote scientific understanding of how the forest and wetland ecosystems relate to human use, disturbance and coastal biodiversity; and 3) to provide educational and research opportunities to students and scientists from a variety of agencies and institutions.

Site Description and Characteristics The Cascade Head Experimental Forest and Scenic Research Area, located on the north-central Oregon coast, is in the Oregon Coast Range ecoregion and is situated within the Salmon River and Neskowin Creek drainages. Elevation ranges from sea level to approximately 530 m.

The coastal strand, including two prairie headlands, is mostly basalt – rock from volcanic lava flows that occurred about 140 million years ago. Soils, derived primarily from tuffaceous siltstones, are fine textured, moderately well drained, and very deep (up to 100+ cm). Soils under forest stands are fertile, rich in organic matter, and contain high levels of nitrogen. Sediments in the estuary reveal surfaces buried from previous earthquakes, the last one occurring in 1700.

Proximity to the Pacific Ocean influences a moderate and very wet climate on Cascade Head. Mean annual temperature is 10 C with minimal seasonal and diurnal fluctuations. Average yearly rainfall is 245 cm although fog drip through the forest canopy may add 50 cm of precipitation a year. Heavy rains and gale-force winds blowing off the ocean are common in late fall and winter. Extensive blow down and wind pruning of trees are evidence of these severe storms.

The region is comprised of a variety of ecosystems that are home to more than 350 species of wildlife. Three federally listed endangered species either use or inhabit the Cascade Head area: spotted owl, marbled murrelet, and Oregon silver spot butterfly. The area is rich in moss and lichen species, over 90 and 180 species respectively, and the vascular plant list for all ecosystem types includes over 400 species.

In 1934 CHEF was primarily covered with a forest that established after the huge Nestucca Fire that burned in the late 1840s. Spruce and hemlock that survived the fire are found near the ridge top and along some of the smaller drainages in the Neskowin Crest Research Natural Area. The Nechesney Indians, who inhabited the area as long as 12,000 years ago, burned some of the forest close to the ocean in the early 1900s. The more gentle country to the east was homesteaded

by European settlers and abandoned in the early 1920s. These abandoned areas now support mostly even-aged, single canopy forests with dense shrub understories. Experimental clearcutting, shelterwood cutting, thinning and salvage from large windstorms have impacted about 25% of the forested area.

Sitka spruce and western hemlock dominate the forest from the coastal edge to about 3-4 km inland. At this point Sitka spruce begins to drop out and Douglas-fir density increases. Western hemlock is found throughout the forest. There are occasional western red cedars and red alder is commonly found in drainages, on clear cuts, and in disturbance areas. Some of the highest growth rates and greatest volumes per hectare reported for any temperate forest in the world are reported for this area.

The Salmon River estuary provides a critical juncture between fresh and salt water, supports numerous forms of life, and maintains staging areas for upstream spawning migrations of anadromous fish and rearing areas for juveniles and smolts. The estuary has a history of livestock grazing that goes back to the late 1800s. In the early 1960s the estuary was diked for pasturage. Dike breaching and removal have been ongoing since 1979. Previous to dike building, the estuary was dominated by high salt marsh vegetation; currently low salt marsh communities dominate the restored areas.

Two grassy headlands are found in the area – Cascade Head itself, owned by The Nature Conservancy, and to the north, Hart's Cove headland within the Neskowin Crest Research Natural Area. Both headlands are basaltic intrusions, dominated by grass species, not all native, and fringed by Sitka spruce forest.

Research Focus Before its establishment in 1934 and for sometime after, an intensive forest inventory was done throughout the experimental forest to determine distribution, age classes, and volumes of major tree species. Early research at Cascade Head includes studies that determined (1) life history and characteristics of native tree species; (2) growth and yield of Sitka spruce-western hemlock, Douglas-fir, and red alder stands; and (3) basic relations between vegetation and climate. Numerous sets of permanent plots have been established, starting in 1935, and continue to be measured and monitored at this time.

A climate station established in 1936 is still operating as an official U. S. Weather Bureau site. From the 1940s through the 1960s, experimental, commercial sized harvests were done to evaluate the silvicultural and economic results of different cutting methods. Although research in applied forestry has continued over the years, other topics are being studied today including forest ecosystem productivity, wind disturbance, nutrient cycling, and global carbon cycling.

Research on the Salmon River estuary has been ongoing since the first dike breaching in 1979. Reestablishment of the salt marsh ecosystems continues to be studied and, more recently, use of these restored ecosystems by anadromous fish is being studied.