NESKOWIN CREST RESEARCH NATURAL AREA

Supplement No. 13[1]

Sarah E. Greene[2]

The Research Natural Area described in this supplement is administered by the Forest Service, U.S. Department of Agriculture. Forest Service Research Natural Areas are located within Ranger Districts which are themselves administrative subdivisions of National Forests. Normal management and protective activities are the responsibility of District Rangers and Forest Supervisors. Scientific and educational uses of these areas are the responsibility of the research branch of the USDA Forest Service. A scientist interested in using one of the areas in Oregon and Washington should, therefore, contact the Director of the Pacific Northwest Forest and Range Experiment Station (809 N.E. 6th Ave., Portland, Oregon 97232) and outline the activity planned. If extensive use of one or more Forest Service Research Natural Areas is planned, a cooperative agreement between the scientist and the USDA Forest Service may be necessary. The Forest Supervisor and District Ranger administering the affected Research Natural Area will be informed of mutually agreed on activities by the Experiment Station Director. A scientist should still visit the administering Ranger Station when initiating the work and explain its nature, purpose, and duration. Permission for brief visits to Research Natural Areas for observational purposes can be obtained from the District Ranger.

Neskowin Crest Research Natural Area, described in this supplement, is part of a Federal system of such areas established for research and educational purposes. Each Research Natural Area constitutes a site where some natural features are preserved for scientific purposes, and natural processes are allowed to dominate. Their main purposes are to provide:

1. Baseline areas against which effects of human activities can be measured;
2. Sites for study of natural processes in undisturbed ecosystems; and
3. Gene pool preserves for all types of organisms, especially rare and endangered types.

The Federal system is outlined in "A Directory of the Research Natural Areas on Federal Lands of the United States of America."[3] Of the 68established Federal Research Natural Areas in Oregon and Washington, 45 are described in "Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators."

Supplements 1 through 12 describe areas not included in the guidebook. This supplement, No. 13, revises the description of Neskowin Crest Research Natural Area given in the guidebook because the area was enlarged in 1980.

The guiding principle in management of Research Natural Areas is to prevent unnatural encroachments or activities that directly or indirectly modify ecological processes on the areas. Logging and uncontrolled grazing are not allowed, for example, nor is public use that threatens significant impairment of scientific or educational values. Management practices necessary for maintenance of the ecosystem may be allowed.

1982

[1] This supplement revises the description of Neskowin Crest Research Natural Area in "Federal Research Natural Areas in Oregon and Washington: A Guidebook for Scientists and Educators," by Jerry F. Franklin, Frederick C. Hall, C.T. Dyrness, and Chris Maser (Pacific Northwest Forest and Range Experiment Station, 1972). The guidebook is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, stock number 001-001 00225-9.

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[3] Federal Committee on Ecological Reserves. A directory of the Research Natural Areas on Federal lands of the United States of America. Washington DC: U.S. Department of Agriculture, Forest Service; 1977.

Federal Research Natural Areas provide a uniquely valuable system of publicly owned and protected examples of undisturbed ecosystems available to the scientist. Research can be conducted with minimal interference and reasonable assurance that investments in long-term studies will not be lost to logging, land development, or similar activities. In return, a scientist wishing to use a Research Natural Area has some obligations; these are to:

1. Obtain permission from the appropriate administering agency before using the area;[4]
2. Abide by the administering agency's regulations governing use of the natural area, including specific limitations on the type of research, sampling methods, etc., allowed; and
3. Inform the administering agency of the progress of the research, published results, and disposition of collected materials.

[4] Five agencies cooperate in this program. in. the Pacific Northwest (each agency differs slightly in Its requirements): Forest Service in the U.S. Department of Agriculture;. Bureau of. Land Manage. Dept, Fish and Wildlife Service, and National Park Service in the U.S. Department. of the Interior; and the U.S. Department of Energy.

The purposes of these limitations are simple to insure that the scientific and educational values on the area are not impaired, to accumulate a documented body of know ledge about the area, and to avoid conflict between new and old studies. Research on Research Natural Areas must be essentially nondestructive; destructive analysis of vegetation is generally not allowed, nor are studies requiring extensive modification of the forest floor or extensive excavation of soil. Collection of plant and animal specimens should be restricted to the minimum necessary for provision of vouchers and other research needs and in no case to a degree that significantly reduces the population levels of species. Such collections must also be carried out in accordance with applicable State and Federal agency regulations. Within these broad guidelines, the appropriate uses of Research Natural Areas are determined on a case-by-case basis by the administering agency.

A scientist wishing to use a particular Research Natural Area must determine the administering agency, contact it regarding the proposed use and obtain the necessary permission. Each agency differs slightly In Its requirements.

Access and Accommodations

Access to the Research Natural Area is by U.S. Highway 101 between Lincoln City and Neskowin, Oregon. A maintained trail, #1303, traverses a portion of the west half of the RN A, entering it from the south. To reach this trail, turn west off U.S. Highway 101 onto Forest Road 1861 at the Cascade Head summit. Continue on Forest Road 1861 for about 6 km (3.7 mi) to its junction with Forest Road 122. Keep left on Road 1861 and follow signs for Hart's Cove Trail (1303). Trail 1303 enters the southwestern corner of the RNA about 1.6 km (1 mi) from the trail head. Several unmarked low-standard trails provide access to research sites in the RNA. Details on access will be provided by the Pacific Northwest Forest and Range Experiment Station, Portland, Oregon, to scientists wishing to use the RNA.

Commercial accommodations are available at Neskowin, 1.6 km (1 mi)north, and at Lincoln City about 14 km (9 mi) south. Neskowin Creek Forest Camp is located along the Neskowin scenic drive (old U.S.l0l)within Cascade Head Experimental Forest.

Environment

The Neskowin Crest Research Natural Area is topographically rugged. It occupies a headland dissected by numerous drainages. It plunges abruptly into the ocean in a series of cliffs along the northwest and west boundaries. Topography is gentle only along major ridgetops; slopes are steep. Elevation ranges from sea level to over 427 m (1,400ft) at the southeast corner. The tops of the ocean cliffs-the lowest elevations with forests-are 45 to 75 m (150 to 250 ft) in elevation. Numerous small permanent streams rise within the RN A, and drainages of two larger streams (Calf and Chitwood Creeks) are within the RNA.

The RN A lies entirely on a headland of volcanic bedrock, alkalic basalt flows, breccias, and waterlain pyroclastic rocks of **I** ate- Eocene age (Snavely and Wagner 1964, Snavely and Vokes 1949). The headland exists only because these volcanic materials are more resistant to erosion than are surrounding sedimentary formations. There appears, however, to be a capping of marine tuffaceous siltstone over the basalt bedrock in most locations; basaltic outcrops are generally confined to ocean cliffs (Snavely and Vokes 1949).

Oregon marine climate is pronounced in this oceanside RNA. It is wet and cool; seasonal and diurnal fluctuations in temperature are minimal. Strong ocean winds sweep the area. Although most precipitation occurs during the winter, there is no drought in the summer. Summer fog is a dominant climatic phenomenon; it envelops the headland on most warm summer days. The fog condenses on tree crowns and falls to the ground as "fog drip." A study of precipitation in forests and in openings on Cascade Head near the RN A indicated a 26-percent increase in precipitation caused by fog drip under stands (Ruth 1954). The following data are from the nearest weather station at Cascade Head Experimental Forest headquarters (listed as Otis 2 NE in U.S. Weather Bureau 1965):

Mean annual temperature	13.3°C (50. 6°F)
Mean January temperature	5.3°C (41.5°F)
Mean July temperature	15.3°C (59.6°F)
Mean January minimum temperature	2.2°C (35.9°F)
Mean July maximum temperature	20.9°C (69.7°F)
Average annual precipitation (does not include fog drip)	2 496 mm (98.26 in)
June through August precipitation (does not include fog drip)	163 mm (6.42 in)

Additional climatic data for this station and vicinity are available in Ruth (1954). Because the weather station is located at an elevation lower and farther inland than the RNA, temperatures are probably somewhat cooler and precipitation higher on the RNA, especially when fog drip is included.

Soils in the RN A have not been mapped or classified into series; profiles examined, however, can best be characterized as Astoria-like Sols Bruns Acides. They have developed primarily from tuffaceous siltstones, although basalt bedrock sometimes causes significant local modifications of the profiles. Soils are moderately fine textured and moderately well drained. A typical profile consists of the following horizons: 2-8 cm (0.8-3.2 in), 01 and 02; 5-10 cm (2-4 in), very dark brown silt loam All; 7-23 cm (2.8-9.2 in), dark brown A12; 15-40 cm (6-16 in), dark yellowish brown silty clay loam A30r B 1; 15-80 cm (6-32 in), dark yellowish- brown silty clay loam B2; and a B3 or C horizon, or both. Surface soils are strongly

Sitka spruce and western hemlock forests grow on a headland that projects into the Pacific Ocean; two complete stream drainages and a prairie are included on the end of the headland.

The Neskowin Crest Research Natural Area (RN A) was established on October 26, 1941, as an example of Sitka spruce-western hemlock forest on the ocean front. [5] The area was enlarged in 1980 to include two complete stream drainages, a grassy headland community, and a greater length of coastline. The 476-ha(1,190-acre) tract, located in Tillamook County, Oregon, is administered by the Hebo Ranger District(Hebo, Oregon), Siuslaw National Forest. It is part of the 4 815-ha (11,890-acre) Cascade Head Experimental Forest, maintained by the Pacific Northwest Forest and Range Experiment Station for research and demonstration of management techniques of coastal spruce-hemlock forest (Madison 1957). The RN A is also part of the Cascade Head Scenic Research Area set aside by an act of the United States Congress in 1974 (Public Law 93-535). The RNA occupies all of section 2 and portions of sections 1, 3, 10, 11, and 12, T. 6 S., R. 11 W, Willamette meridian (lat45°05' N.; long. 124°00' W) (fig. *NC-1).*

[5] Scientific and common names for plants are given in table NC-4.

Figure NC-1.—Neskowin Crest Research Natural Area, Tillamook County, Oregon.

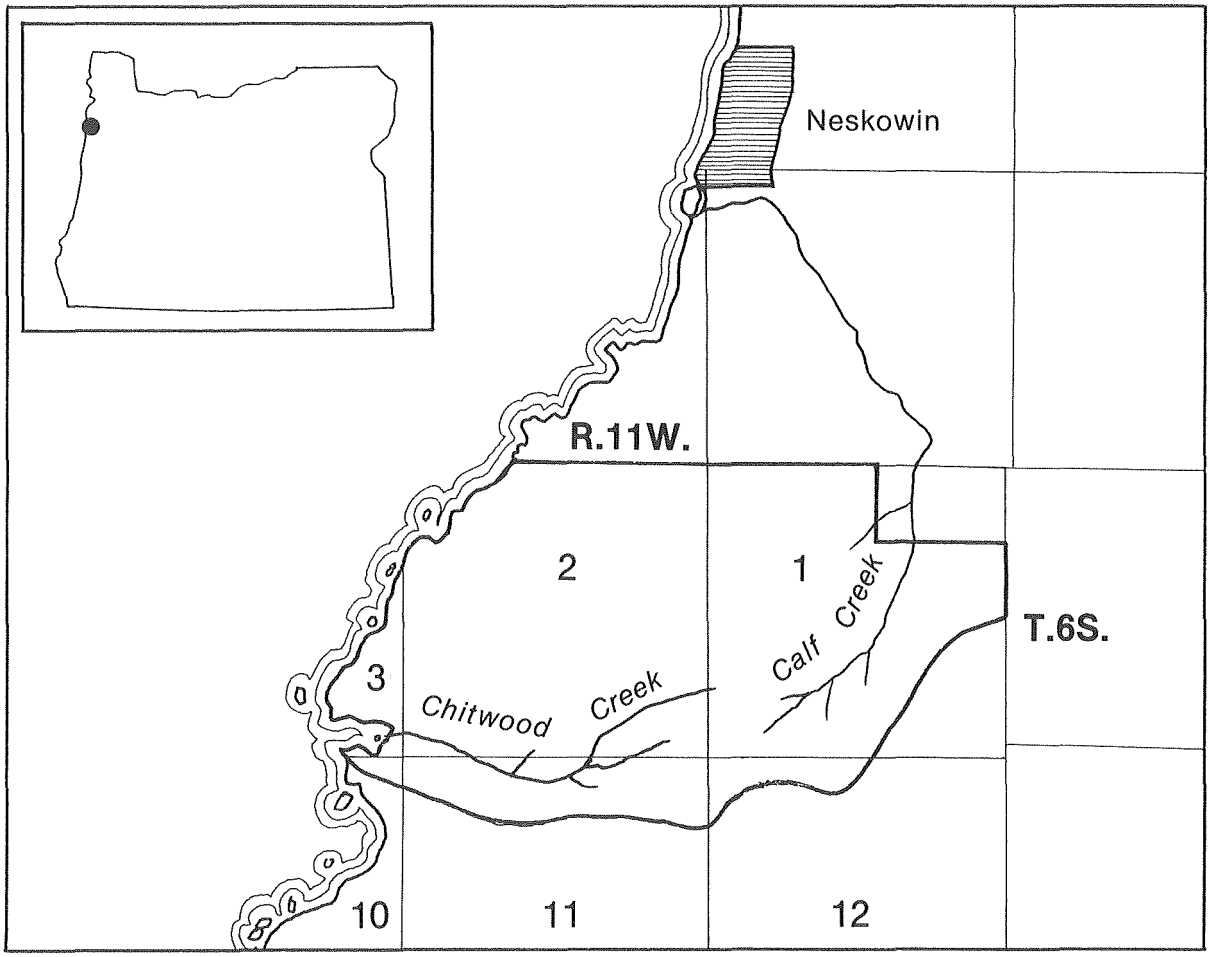

Figure NC-2.—Communities in the Neskowin Crest Research Natural Area. (A) Small opening choked with Rubus spectabilis, Menziesia ferruginea, *and* Sambucus melanocarpa *up to 3 m (9.9 ft) in height. (B) Old-growth Sitka spruce and western hemlock with abundant western hemlock regeneration. (C) 120-year-old Sitka spruce growing on rotting log with typical* Polystichum munitum-Oxalis oregana *understory. (D) Prairie headland.*

acid (pH 5.3), high in organic matter (20 percent) and total nitrogen (0.50 percent), and low in percent base saturation (10 percent). This low percentage is probably caused by the high amount of precipitation and the acid nature of the litter.

Biota

Society of American Foresters (SAF) cover types (Eyre 1980) for the area are estimated as follows:

SAF cover type	Name	Area of type in RNA
223	Sitka spruce	11 ha (27 acres)
224	Western hemlock	180 ha (450 acres)
225	Western hemlock-Sitka spruce	233 ha (583 acres)

The area falls entirely within Küchler's (1964) Spruce-Cedar-Hemlock Forest and the *Picea sitchensis* Zone of Franklin and Dyrness (1973). The 52 ha (130 acres) of grassy headland community included in the enlarged area cannot be related to Küchler's vegetation units nor to SAF cover types.

The forest in the RNA is dominated by Sitka spruce and western hemlock, with an occasional western redcedar, Douglas-fir, and red alder. One large, old Sitka spruce was 215 cm (85 in) in diameter at breast height (d.b.h.) and 73 m (240 ft) in height in 1980. These trees are over 250 years of age. The bulk of the forest is composed of spruce and hemlock about 130 years old, 75 to 100 cm (30 to 40 in) in d.b.h., and 60 m (200 ft) tall (fig. NC-2). Both age classes are intermixed over most of the RNA, and old growth is scattered through younger stands.

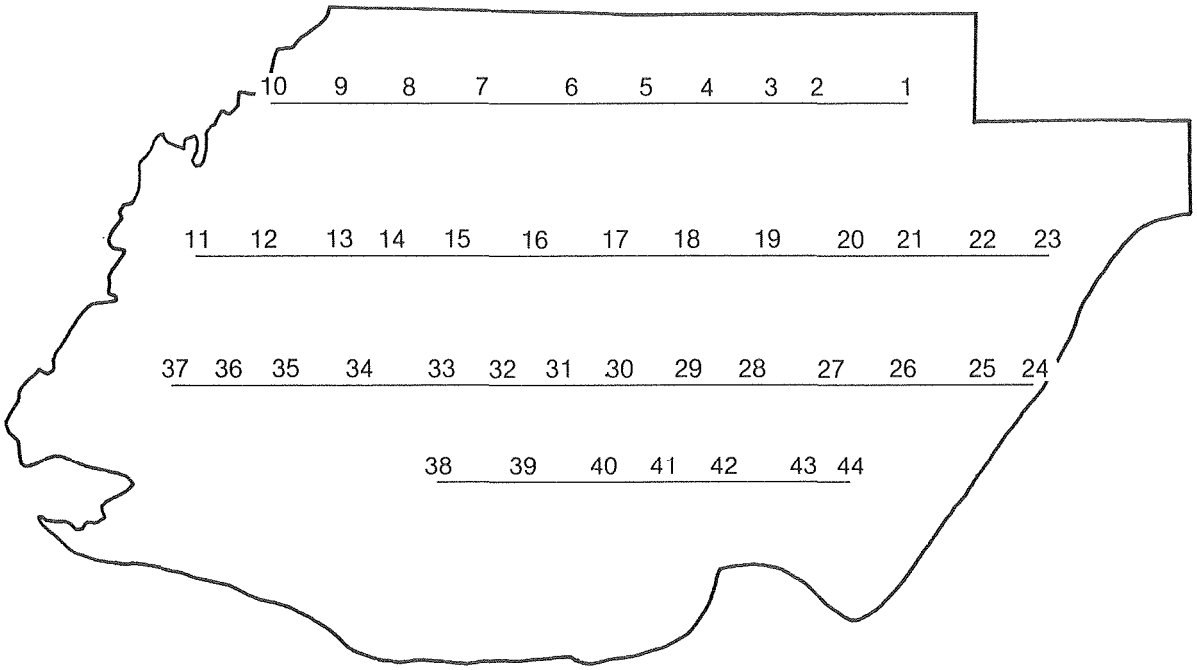

Figure NC-3.—Four transects in the Neskowin Crest Research Natural Area containing 44 sample plots.

A series of 44 permanent sample plots were installed from 1977 to 1979 along four east-west transects in the RNA (fig. NC-3). All trees 5 cm (2 in) and larger were tagged and d. b.h. measured on the 1 00o-m^2 (10,758-ft^2) circular plots. An optical dendrometer was used to measure height and volume on a subs ample of the trees. The distribution of hemlock and spruce in the various diameter classes is illustrated in figure NC-4. At this time in succession, hemlock clearly outnumbers spruce in reproductive diameter classes (up to 10 cm; 4 in), and it is beginning to compete in the larger diameter classes. Spruce still dominate the 100+ cm (40 in) diameter classes but are being lost to windthrow and top breakage. The openings that result from losses are filled more quickly by hemlock regeneration than by spruce regeneration, except in larger, ocean-spray-prone openings where spruce is more aggressive than hemlock.

Board-foot volume (International 1/4-in rule) averages 200,072 board feet (fbm) per hectare (81,001/acre) over all plots (table NC-1). Volumes range from 41,307 fbm/ha (16,253/acre) on plot 34 to 546,282 fbm/ha (218,513/acre) on plot 16. Plot 34 occurs in an area of recent windthrow and contains 207 trees, only 3 of which are larger than 15 cm (6 in) in d.b.h. Plot 16 contains 16 trees, half of which are larger than 50 cm (20 in), with individual trees 209 and 176 cm (84 and 70 in).

It is apparent that hemlock is beginning to dominate the forest in numbers of stems per hectare and basal area. Though biomass is still greater for Sitka spruce (table N C-l), succession is unquestionably toward replacement of the mixed forest by western hemlock. Regeneration is dispersed irregularly throughout the RNA. It is generally restricted to gaps in the tree canopy and to logs, root wads, and stumps beneath the canopy. Young saplings or seedlings are seldom rooted in bare mineral soil. Where severe windthrow has occurred, as in plot 34, dense thickets of western hemlock are established; no spruce were recorded for this plot. There are areas where Sitka spruce is very thick, however; some spruce are encountered along the trails.

Understory vegetation has been sampled on 37 of the plots. Average percent coverage for shrubs, herbs, and bryophytes, and frequency for herbs only are shown in table NC-2. Because of the importance of substrate to regeneration, coverages are also shown for four substrates.

Understory composition is generally uniform throughout the RNA. *Polystichum munitum, Oxalis oregana, Blechnum spicant, Maianthemum bifolium,* and *Montiasibirica* are the constant and characteristic herbs. Though shrub coverage is

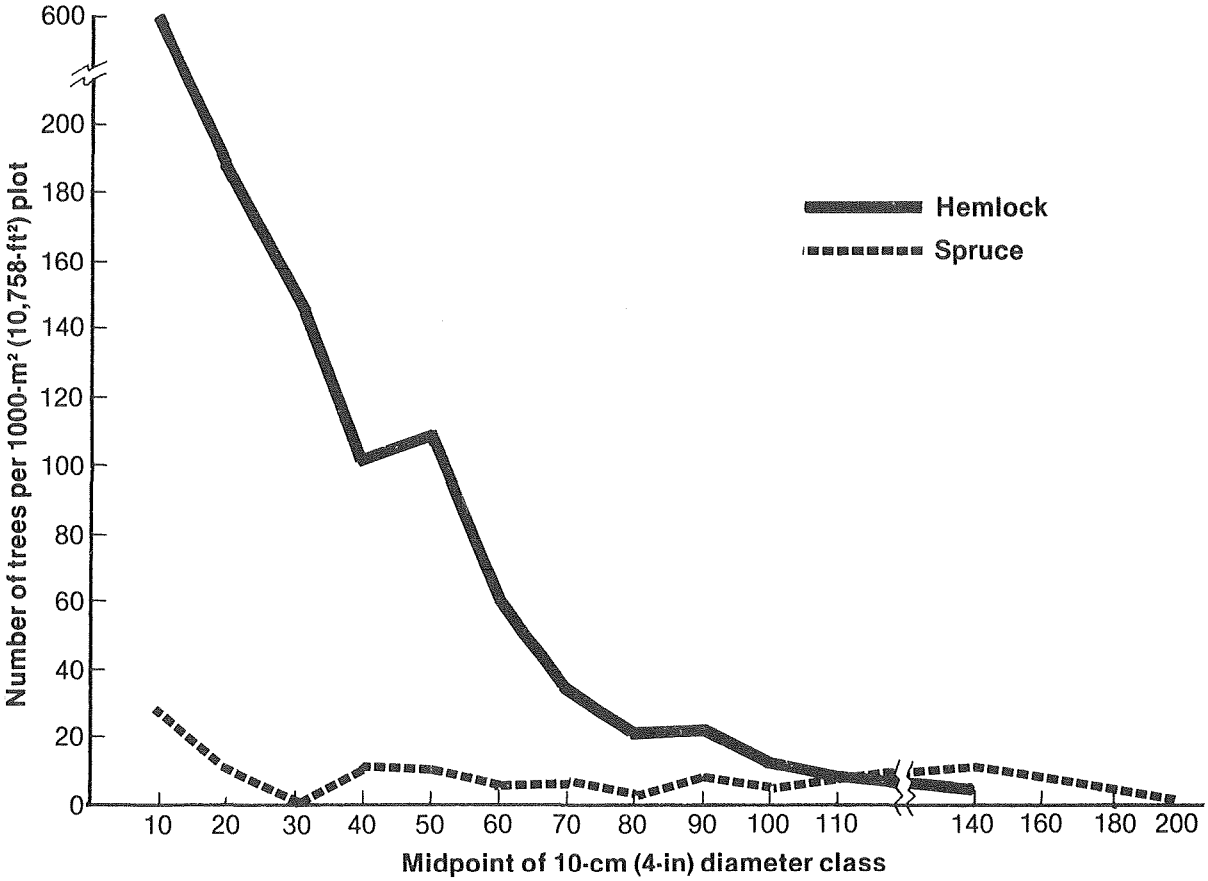

Figure NC-4.—Distribution of hemlock and spruce by diameter class.

Table NC-1—Basal area, biomass, and board-foot volume of western hemlock and Sitka spruce on 44 sample plots in the Neskowin Crest Research Natural Area

Tree	Average basal area	Stem and bark biomass		Volume[1/]	Stems
		Average	Plot with largest amount		
	m^2	t/ha		fbm/ha	number/ha
Western hemlock	35.3	197.7	473.6	110,091.0	367.0
Sitka spruce	22.4	253.2	908.9	89,981.0	49.0

[1/]International ¼-inch rule.

Table NC-2—Coverage for shrubs, herbs, substrates, and bryophytes, and frequency for herbs in the Neskowin Crest Research Natural Area

Species	Coverage	Frequency
	Percent	
Shrubs:		
Vaccinium parvifolium	6.0	
Rubus spectabilis	5.3	
Menziesia ferruginea	3.8	
Oplopanax horridum	1.8	
Sambucus melanocarpa	1.3	
Herbs:		
Polystichum munitum	22.3	60.6
Oxalis oregana	6.0	45.6
Blechnum spicant	3.6	32.6
Montia sibirica	1.5	36.1
Maianthemum bifolium	1.4	25.0
Substrate:		
Log	11.8	
Root wad	2.2	
Tsuga heterophylla base	1.6	
Picea sitchensis base	1.4	
Terrestrial bryophytes:		
Mosses	14.9	
Liverworts	2.3	
Lichens	.4	
Epiphytic bryophytes:		
Mosses	6.1	
Liverworts	3.7	
Lichens	.8	

less than herb coverage, certain shrubs occur regularly. *Vaccinium parvifolium* appears in all plots, *Menziesia ferruginea* in 92 percent, and *Rubus spectabilis* in 67 percent. Less common species include *Clintonia uniflora, Rubus parvifolium, Trillium ovatum, Tiarella trifoliata, T. unifoliata, Galium triflorum,* and *Luzula parviflora.*

The western hemlock/swordfern community that prevails in the RN A is typical for the Oregon coast. Topography in the RN A is irregular. There are many openings, seep areas, and windthrow patches. These areas break up the continuity of the hemlock/swordfern plant community. The north-south ridge on the east end of the RN A supports a heavier cover of grasses *(Calamagrostis canadensis, Carex atrosquama,* and *Luzula parviflora)* than the rest of the area. It is likely that this area comprises a different plant community.

Terrestrial and epiphytic mosses, lichens, and liverworts were recorded for 37 plots. Little work of this kind has been done on the coast. Table N C-2 shows the percent coverage for the most common of the three bryoid growth forms. Table N C-3 is a list of the bryophytes and terrestrial lichens found on the permanent sample plots.

A dense tangle of shrubs and herbs develops on the lower slopes, along streams, and in seep areas. Typical species in addition to the aforementioned are: *Oplopanax horridum, Rubus parviflorus, Ribes bracteosum, Dryopteris dilatata, Sambucus melanocarpa, Athyrium filix-femina, Disporum smithii,* and *Stachys mexicana.* Within the shrub layer, *Rubus spectabilis* is predominant on steep, unstable slopes and in openings; *Vaccinium parvifolium, Menziesia ferruginea,* and *Oplopanax horridum* are prevalent on more gentle, stable, shaded areas; *Carex obnupta, Corydalis scouleri, Liysichitum americanum,* and *Chrysosplenium glechomaefolium* typify swamp areas.

Substrate is an important component of the understory. Almost all regeneration occurs on dead wood, root wads, and the bases of dead or dying trees. The average percent cover of the total plot area for down logs is greater than any shrub or herb except *Polystichum munitum.*

A partial plant species list for the forested portion of the RNA is given in Table NC-4.

The grassy headland prairie, included in the enlarged RNA, is formed on a basaltic intrusion and is similar to many found along the Oregon coast. The prairie is surrounded on three sides by partially open-grown, old-growth Sitka spruce. On the upper (northeast and southeast) edges of the prairie are boggy areas and several springs flowing onto gentle slopes with poor drainage.

The following communities have been described for the headland in the RNA:

1. *Equisetum maximum* community, restricted to sites with high soil moisture during the entire year. *Ranunculus occidentalis* is an important species.
2. *Polystichum munitum-Rubus parviflorus* community, usually on soils 45cm (18 in)or less in depth. Other definitive species are *Tellima grandiflora* and *Disporum smithii.*

Table NC-3—Bryophytes and terrestrial lichens in 44 permanent sample plots at Neskowin Crest Research Natural Area[1]

Plant	Scientific name
Bryophytes	*Antitrichia curtipendula* (Hedw.) Brid.
	Blepharostoma trichophyllum (L.) Dum.
	Brachythecium asperimum (C. Mull.) Sull.
	Calypogeia muelleriana (Schiffn.) K. Mull.
	Calypogeia neesiana (Mass. et Carest.) K. Mull.
	Cephalozia bicuspidata (L.) Dum.
	Cephalozia lunulifolia (Dum.) Dum.
	Claopodium crispifolium (Hook.) Ren. & Card.
	Conocephalum conicum (L.) Lindb.
	Dicranum fuscescens Turn.
	Dicranum scoparium Hedw.
	Diplophyllum albicans (L.) Dumort.
	Ditrichum heteromallum (Hedw.) Britt.
	Frullania tamarisci (L.) Dum. subsp. *nisquallensis* (Sull.) Hatt.
	Hookeria lucens (Hes.) Sm.
	Hylocomium splendens (Hedw.) B.S.G.
	Hypnum circinale Hook.
	Isopterygium elegans (Brid.) Lindb.
	Isothecium stoloniferum Brid.
	Lepidozia reptans (L.) Dum.
	Leucolepis acanthoneura (Schwaegr.)
	Lophozia incisa (Schrad.) Dumort.
	Pellia endiviifolia (Dicks.) Dum.
	Plagiothecium undulatum (Hedw.) B.S.G.
	Pogonatum alpinum (Hedw.) Rohl. var. *sylvaticum* (Hoppe) Lawt.
	Pogonatum contortum (Brid.) Lesq.
	Rhizomnium glabrescens (Kindb.) Kop.
	Rhytidiadelphus loreus (Hedw.) Warnst.
	Riccardia multifida (L.) S. Gray
	Riccardia palmata (Hedw.) Carruth.
	Scapania bolanderi Aust.
	Stokesiella oregana (Sull.) Robins.
	Stokesiella proelonga (Hedw.) Robins.
Terrestrial lichens	*Cladonia decortica* (Florke) Spreng.
	Peltigera membranacea (Ach.) Nyl.
	Peltigera pulverulenta (Tayl.) Nyl.

[1] Nomenclature is as follows: Hepatics according to Stotler and Crandall-Stotler (1977); mosses according to Ireland and others (1980); lichens according to Thomson (1967) and G.F. Otto and T. Ahti ("Lichens of British Columbia, preliminary checklist," 1967, on file at the herbarium, University of Alberta, Edmonton). Specimens of all species are deposited in the herbarium at the University of Alberta, Edmonton.

Table NC-4—Vascular plants in forested area, Neskowin Crest Research Natural Area[1]

Scientific name	Common name
Trees:	
Alnus rubra Bong.	Red alder
Picea sitchensis (Bong.) Carr.	Sitka spruce
Pseudotsuga menziesii (Mirb.) Franco	Douglas-fir
Thuja plicata Donn.	Western redcedar
Tsuga heterophylla (Raf.) Sarg.	Western hemlock
Shrubs:	
Gaultheria shallon Pursh	Salal
Menziesia ferruginea Smith	Fool's huckleberry
Oplopanax horridum (Smith) Miq.	Devil's club
Ribes bracteosum Dougl.	Stink currant
Rubus parviflorus Nutt.	Thimbleberry
Rubus spectabilis Pursh	Salmonberry
Sambucus racemosa var. *melanocarpa* (Gray) McMinn	Black elderberry
Vaccinium alaskaense Howell	Alaska huckleberry
Vaccinium ovatum Pursh	Evergreen huckleberry
Vaccinium parvifolium Smith	Red huckleberry
Forbs:	
Achlys triphylla (Smith) DC	Vanilla leaf
Anaphalis margaritacea (L.) B. & H.	Pearly everlasting
Chimaphila menziesii (R. Br.) Spreng.	Little pipsissewa
Chrysosplenium glechomaefolium Nutt.	Western golden-carpet
Clintonia uniflora (Schult.) Kunth.	Beadlily
Corydalis scouleri Hook.	Corydalis
Disporum smithii (Hook.) Piper	Smith's fairy-bell
Galium trifidum L.	Small bedstraw
Galium triflorum Michx.	Several-flowered bedstraw
Listera cordata (L.) R. Br.	Heart-leafed listera
Lysichitum americanum Hult. & St. John.	Skunk cabbage
Maianthemum bifolium Jeps.	False lily-of-the-valley
Marah oreganus (T & G.) Howell	Oregon bigroot
Mimulus guttatus DC.	Yellow mimulus
Montia sibirica (L.) How.	Western springbeauty
Oenanthe sarmentosa Presl.	Water parsley
Osmorhiza chilensis H. & A.	Mountain sweet-root
Oxalis oregana Nutt.	Oxalis
Petasites frigidus (L.) Fries	Sweet coltsfoot
Pyrola uniflora L.	Woodnymph
Ranunculus uncinatus D. Don	Little buttercup
Stachys mexicana Benth.	Mexican betony
Stellaria crispa Cham. & Schlecht.	Crisped starwort
Streptopus amplexifolius (L.) DC	Clasping-leaved twisted-stalk
Tiarella trifoliata L.	Foamflower
Tiarella unifoliata (Hook.) Kurtz.	Coolwort foamflower
Trillium ovatum Pursh	Trillium

Table NC-4—Vascular plants in forested area, Neskowin Crest Research Natural Area[1] (continued)

Scientific name	Common name
Viola glabella Nutt.	Stream violet
Viola sempervirens Greene	Evergreen violet
Graminoids:	
Calamagrostis canadensis (Michx.) Beauv.	Bluejoint reedgrass
Carex atrosquama (Mack.) Crong.	Sedge
Luzula parviflora (Ehrh.) Desv.	Smallflowered woodrush
Melica subulata (Griseb.) Scribn.	Oniongrass
Pteridophytes:	
Athyrium filix-femina (L.) Roth	Lady fern
Blechnum spicant (L.)	Deer fern
Dryopteris austriaca (Jacq.) Woyner	Spreading woodfern
Polypodium glycyrrhiza D.C. Eat.	Licorice fern
Polystichum munitum (Kaulf.) Presl.	Sword fern
Woodsia oregana D.C. Eat.	Woodsia

[1] Nomenclature follows Hitchcock and Cronquist (1976).

3. *Carex obnupta* community, usually on soils 30 cm (12 in) deep or less. *Carex* is the only important species in this community.
4. *Artemisia suksdorfii-Solidago canadensis* community found on the exposed, south-facing end of the prairie on deep soils. This community is commonly found on coastal prairies farther north.
5. *Solidago canadensis* community, situated above the *Artemisia-Solidago* community and on deeper soils. It is an earlier successional stage of the *Artemisia-Solidago* community.

Two more plant groups are found, though not as distinct communities:

6. *Lupinus littoralis* group, considered part of the internal pattern of one or more of the large grassy communities.
7. *Angelica lucida-Rubus spectabilis* group, an aberrant form of the *Polystichum-Rubus parviflorus* community.

Table NC-5 lists plant species for the headland (Davidson 1967).

Aquatic Habitat

Neskowin Crest RNA includes two complete and undisturbed stream drainages. Chitwood Creek, a first-order stream flowing west toward the ocean, is in the southern portion of the RNA. Calf Creek, a first-order stream flowing northeast into Neskowin Creek, is in the eastern portion (fig. NC-1).

Calf Creek has a steep overall gradient for a coastal stream, especially near the headwaters. A complex multiple-channel system exists in the lower drainage caused by mass movement and large logs moved by debris torrents. The lack of abundant debris in the channels and along the banks is evidence of recent storm activity. In some places the upper banks of Calf Creek support young stands of red alder; in these areas there is little *Rubus spectabilis* which is generally common along creeks in the Coast Ranges. The dead wood in the stream helps to create pools for fish and provides food for invertebrates. Decomposition rate for organic matter in the channel is high because of moderate temperatures and extreme wetness. The stream probably supports cutthroat trout and searun cutthroat.

Chitwood Creek, which flows west into the ocean, does not have as high a gradient as Calf Creek, especially at the headwaters. There are no trout. Otherwise, Chitwood Creek is similar to Calf Creek. Both areas provide excellent opportunities for studying the riparian zone and its interaction with the stream channel.

Table NC-5—Species list for coastal headland prairie, Neskowin Crest Research Natural Area[1]

Scientific name	Common name
Trees:	
Alnus rubra Bong.	Red alder
Picea sitchensis (Bong.) Carr.	Sitka spruce
Sambucus callicarpa Greene.	Elderberry
Tsuga heterophylla (Raf.) Sarg.	Western hemlock
Shrubs:	
Amelanchier florida Lindl.	Serviceberry
Baccharis pilularis DC.	Bacchares
Berberis aquifolium Pursh.	Tall Oregongrape
Gaultheria shallon Pursh.	Salal
Lonicera involucrata (Rich.) Banks.	Bearberry honeysuckle
Menziesia ferruginea J.E. Sm.	Fool's huckleberry
Rosa gymnocarpa Nutt.	Little wild rose
Rosa nutkana Presl.	Rose
Ribes bracteosum Dougl.	Stink currant
Ribes laxiflorum Pursh.	Western blackcurrant
Rubus parviflorus Nutt.	Thimbleberry
Rubus spectabilis Pursh.	Salmonberry
Rubus vitifolius C. & S.	Blackberry
Urtica lyallii Ait.	Lyall's nettle
Vaccinium parvifolium J.E. Sm.	Red huckleberry
Forbs:	
Achillea millefolium L.	Yarrow
Allium sp.	Wild onion
Anaphalis margaritacea (L.) B. & H.	Pearly everlasting
Angelica lucida L.	Seacoast angelica
Artemisia suksdorfii Piper.	Coast mugwort
Aster foliaceus Lindl.	Leafy aster
Cardamine angulata Hook.	Seaside bittercress
Cardamine oligosperma Nutt.	Little western bittercress
Carex hendersonii Bail.	Henderson's sedge
Carex obnupta Biol.	Slough sedge
Castilleja littoralis Penn.	Pacific paintbrush
Cerastium arvense L.	Field chickweed
Cerastium glomeratum Thuill. (introduced)	Chickweed
Cerastium holosteoides Fries. (introduced)	Cerastium
Chrysosplenium glechomaefolium Nutt.	Western golden-carpet
Cirsium vulgare (Savi) Airy-Shaw. (introduced)	Bull thistle
Corydalis scouleri Hook.	Corydalis
Crepis capillaris (L.) Wallr. (introduced)	Smooth hawksbeard

Table NC-5—Species list for coastal headland prairie, Neskowin Crest Research Natural Area[1] (continued)

Scientific name	Common name
Forbs (continued):	
Conioselinum chinense (L.) B.S.P.	Hemlock-parsley
Dentaria tenella Pursh.	Toothwort
Disporum smithii (Hook.) Piper	Smith's fairy-bell
Dryopteris filix-mas (L.) Schott.	Shield-fern
Epilobium adenocaulon Haussk.	Willow-weed
Equisetum maximum Lam.	Horsetail
Eriophyllum lanatum (Pursh) Forbes.	Eriophyllum
Erysimum capitatum (Dougl.) Greene.	Wallflower
Galium aparine Cleavers.	Goose grass
Galium trifidum L. var. *pacificum* Wieg.	Small bedstraw
Galium triflorum Michx.	Several-flowered bedstraw
Heracleum lanatum Michx.	Cow-parsnip
Hydrophyllum occidentale (Wats.) Gray.	Western waterleaf
Hypochaeris radicata L. (introduced)	Hairy cats-ear
Hypopitys fimbriata (Gray) How.	Pinesap
Juncus effusus L. var. *pacificus* Fern. & Wieg.	Soft rush
Lupinus littoralis Dougl.	Lupine
Luzula parviflora (Ehr.) Desv.	Small-flowered woodrush
Lysichitum americanum Hult. & St. John	Skunk cabbage
Maianthemum bifolium DC. var. *kamtschaticum* (Gmel.) Jeps.	False lily-of-the-valley
Marah oreganus (T. & G.) Howell	Oregon bigroot
Mimulus guttatus DC.	Yellow mimulus
Montia sibirica (L.) How.	Western spring beauty
Oplopanax horridum (J.E. Sm.) Miq.	Devil's club
Osmorhiza nuda Torr.	Osmorhiza
Oxalis oregana Nutt.	Oxalis
Plantago lanceolata L. (introduced)	English plantain
Polemonium carneum Gray	Salmon polemonium
Polystichum munitum (Kaulf.) Presl.	Swordfern
Prunella vulgaris L. *labiatae* (introduced)	Self-heal
Pteridium aquilinum (L.) Kuhn. var. *pubescens* Underw.	Bracken fern
Ranunculus occidentalis Nutt.	Western buttercup
Rumex acetosella L. (introduced)	Sheep sorrel
Rumex crispus L. (introduced)	Yellow dock
Rumex obtusifolius L. (introduced)	Broad-leaved dock
Sagina procumbens L.	Procumbent pearlwort
Sanicula septentrionalis Greene.	Sanicle
Scrophularia californica C. & S.	Figwort
Senecio jacobaea L. (introduced)	Tansy ragwort
Sidalcea hirtipes C.L. Hitch.	Hairy-stemmed checker-mallow
Smilacina sessilifolia (J.G. Bak.) Nutt.	Star-flowered false Solomon's seal

Table NC-5—Species list for coastal headland prairie, Neskowin Crest Research Natural Area[1] (continued)

Scientific name	Common name
Forbs (continued):	
Solidago canadensis L.	Goldenrod
Stachys emersonii Piper.	Mexican betony
Stelleria crispa C. & S.	Crisped starwort
Synthyris reniformis (Dougl.) Benth.	Round-leaved synthyris
Tellima grandiflora (Pursh) Dougl.	Fringecup
Tiarella trifoliata L.	Foamflower
Tolmiea menziesii (Pursh) T. & G.	Youth-on-age
Trifolium dubium Sibth. (introduced)	Suckling clover
Trifolium repens L. (introduced)	White clover
Vicia gigantea Hook.	Giant vetch
Viola glabella Nutt.	Stream violet
Grasses:	
Agrostis tenuis Sibth. (introduced)	Colonial bentgrass
Agrostis semiverticillata C. Christ (introduced)	Water bentgrass
Anthoxanthum odoratum L. (introduced)	Sweet vernalgrass
Bromus sitchensis Trin.	Alaska bromus
Calamagrostis nutkaensis (Presl.) Steud.	Reedgrass
Dactylis glomerata L. (introduced)	Orchard-grass
Elymus glaucus Buckl.	Wildrye
Festuca arundinacea Schreb. (introduced)	Reed fescue
Festuca elatior L. (introduced)	Meadow fescue
Festuca rubra L. (introduced)	Red fescue
Glyceria leptostachya Buckl.	Slenderspike mannagrass
Holcus lanatus L. (introduced)	Common velvet-grass
Lolium multiflorum Lam. (introduced)	Italian ryegrass
Lolium perenne L. (introduced)	English ryegrass
Melica subulata (Griseb.) Scribn.	Oniongrass
Phleum pratense L. (introduced)	Common timothy
Poa pratensis L. (introduced)	Kentucky bluegrass

[1] Adapted from Davidson (1967, p. 76-78).

Mammals

Table N C-6 is a tentative list of mammals found on the RN A.

History of Disturbance

In the forested portion of Neskowin Crest Research Natural Area, the dominance of 130year-old spruce and hemlock indicates that the area has been subject to at least occasional fires. The last major fire occurred about 1845. In recent years, winter storms have been the most important cause of natural disturbance. Most of the damage has occurred along the southern boundary, but severe east winds in 1971 broke many old-growth Sitkaspruceat2to 5m(6to 15ft) above ground line throughout the RN A. Some areas were completely leveled and are now dense thickets of western hemlock saplings. Debris torrents in streams are most likely to occur during severe winter storms.

Table NC-6—Tentative list of mammals in the Neskowin Crest Research Natural Area

Order	Scientific name[1]	Common name
Marsupialia	*Didelphis marsupialis*	Opossum
Insectivora	**Neurotrichus gibbsi*	Shrew mole
	**Scapanus orarius*	Coast mole
	Scapanus townsendi	Townsend mole
	Sorex bendirii	Marsh shrew
	Sorex trowbridgii	Trowbridge shrew
	Sorex vagrans	Wandering shrew
	Sorex yaquinae	Yaquina shrew
Chiroptera	*Antrozous pallidus*	Pallid bat
	Eptesicus fuscus	Big brown bat
	Lasionycteris noctivagans	Silver-haired bat
	Lasiurus cinereus	Hoary bat
	Myotis californicus	California myotis
	Myotis evotis	Long-eared myotis
	Myotis lucifugus	Little brown myotis
	Myotis thysanodes	Fringed myotis
	Myotis volans	Long-legged myotis
	Myotis yumanensis	Yuma myotis
	Plecotus townsendi	Townsend big-eared bat
Lagomorpha	**Lepus americanus*	Snowshoe hare
	Sylvilagus bachmani	Brush rabbit
Rodentia	**Aplodontia rufa*	Mountain beaver
	Arborimus albipes	White-footed vole
	Arborimus longicaudus	Red tree vole
	**Clethrionomys californicus*	California red-backed vole
	Erethizon dorsatum	Porcupine
	Eutamias townsendi	Townsend chipmunk
	Glaucomys sabrinus	Northern flying squirrel
	Microtus longicaudus	Long-tailed vole
	**Microtus oregoni*	Oregon or creeping vole
	Neotoma cinerea	Bushy-tailed woodrat
	**Peromyscus maniculatus*	Deer mouse
	**Tamiasciurus douglasi*	Chickadee
	Thomomys mazama	Mazama pocket gopher
	Zapus trinotatus	Pacific jumping mouse

Table NC-6—Tentative list of mammals in the Neskowin Crest Research Natural Area (continued)

Order	Scientific name[1]	Common name
Carnivora	**Canis latrans*	Coyote
	**Lynx rufus*	Bobcat
	Martes americana	Marten
	Mephitis mephitis	Striped skunk
	Mustela erminea	Short-tailed weasel or ermine
	Mustela frenata	Long-tailed weasel
	Mustela vison	Mink
	Procyon lotor	Raccoon
	**Spilogale putorius*	Spotted skunk or civet cat
	Urocyon cinereoargenteus	Gray fox
	Ursus americanus	Black bear
	Vulpes vulpes	Red fox
Artiodactyla	**Odocoileus hemionus columbianus*	Black-tailed deer

[1] An asterisk (*) indicates presence verified by sign, sighting, or collection.

In 1980the RNA was enlarged to include part of a clear cut on the south boundary along Cliff Creek. The clear-cut area has regenerated well and poses no real threat to the Chitwood Creek drainage.

The headland has a long history of human disturbances. It is thought that Indians periodically burned most of the Oregon coast. The RNA headland was homesteaded from at least 1896 to 1935. Cattle grazed, onions and potatoes were grown, buildings were erected, and timber was felled. In 1938 the headland was bought by the U.S. Government. Livestock grazing, farming, and felling of timber have not been allowed since. The headland is currently used by hikers and occasionally by campers.

Research

Considerable research is being done or has been done on Neskowin Crest RNA. Growth, mortality, and successional change are being studied in the sample plots. George LaRoi, Botany Department, University of Alberta, Edmonton, Canada, studied the understory vegetation, the population structure of immature trees, and woody debris on the plots in 1979. Battelle Laboratories of Richland, Washington, started a study of litter fall in 1979 to monitor environmental pollutants. Eric Quaye, Botany Department, Oregon State University, Corvallis, is conducting research on the structure and function of coastal spruce-hemlock forests in the RNA. Davidson (1967) described the plant communities of the headland. Some studies of vertebrate animals have been conducted on the RNA (Maser and Franklin 1974).

The RNA and its environs offer some special research opportunities. The RNA is part of the Cascade Head Scenic Research Area which also includes The Nature Conservancy's Cascade Head Preserve; the floral communities of this natural headland can be studied or compared with those of the headland in the Neskowin Crest RNA. The RNA headland also includes Hart's Cove and over 1.6 km (1 mi) of coastline that provide opportunities to study sea organisms.

The RNA is part of the Cascade Head Experimental Forest, much of which is similar to the RNA in forest type and environment. Because of these similarities, parts of the Experimental Forest could be used for work involving destructive sampling or manipulation, and the RNA could be a control site.

Maps and Aerial Photographs

Special maps applicable to Neskowin Crest RNA are: Topography-15' Hebo, Oregon, quad-

range, scale 1:62,500, issued by the U.S. Geological Survey in 1955; and **Geology**-*Geology of the Coastal Area Between Cape Kiwanda and Cape Foul weather, Oregon,* scale 1:62,500 (Snavely and Vokes 1949); *Geologic Sketch of Northwestern Oregon,* scale 1:500,000 (Snavely and Wagner 1964); and *Geologic Map of Oregon West of the 121st Meridian,* scale 1:500,000 (Peck 1961). Either the District Ranger (Hebo Ranger District, Hebo, Oregon) or Forest Supervisor (Siuslaw National Forest, Corvallis, Oregon) can provide details on the most recent aerial photos and forest type maps for the area.

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