

F. R. Stephens and R. F. Billings

Alaska Region and North Tongass National Forest
U.S. Forest Service, Juneau, Alaska

Plant Communities of a Tide-Influenced Meadow on Chichagof Island, Alaska

Tide-influenced meadows probably occupy less than 1 per cent of the area of southeast Alaska, yet they are a conspicuous feature of the landscape. They form pleasing breaks in the otherwise unbroken expanse of timberland and bog in the low elevations and are very important to wildlife. Waterfowl, deer, brown and black bear, and many smaller birds and animals all feed, at least seasonally, on the plants of these meadows. Deer and bear depend on them for forage in the spring. They are the primary resting and feeding areas for waterfowl on their spring and fall flights. Tide-influenced meadows are present at the mouths of most streams.

This study was conducted while the authors were making a detailed soil survey of the Kadashan watershed in June, 1965. This drainage is on Chichagof Island, Alaska, and empties into Tenakee Inlet from the south, directly across the Inlet from the town of Tenakee (Figure 1).

A pattern of three major plant communities is evident in the Kadashan tide-influenced meadow (Figure 2). This pattern is observed in similar meadows in southeast Alaska. The dominant plants of these communities are: Lyngbye Sedge (*Carex lyngbyei cryptocarpa*)¹, Mountain Hairgrass (*Deschampsia atropurpurea*)², and Beach Ryegrass (*Elymus mollis*).¹ The ecotones between the communities are quite abrupt. Groups of other plants are present under certain local conditions, e.g., occasional small depressions or mounds in otherwise uniform topography.

Methods

Plant communities were characterized by measuring crown cover on eight line intercept transects that crossed all three communities. Each transect started at the lower boundary of the sedge community and extended across the hairgrass community and well up into the ryegrass community. The transects were placed where representative examples of

¹ Species identification by L. A. Viereck, Institute of Northern Forestry, USDA Forest Service, College, Alaska.

² Species identification by R. M. Hurd, Institute of Northern Forestry, USDA Forest Service, Juneau, Alaska.

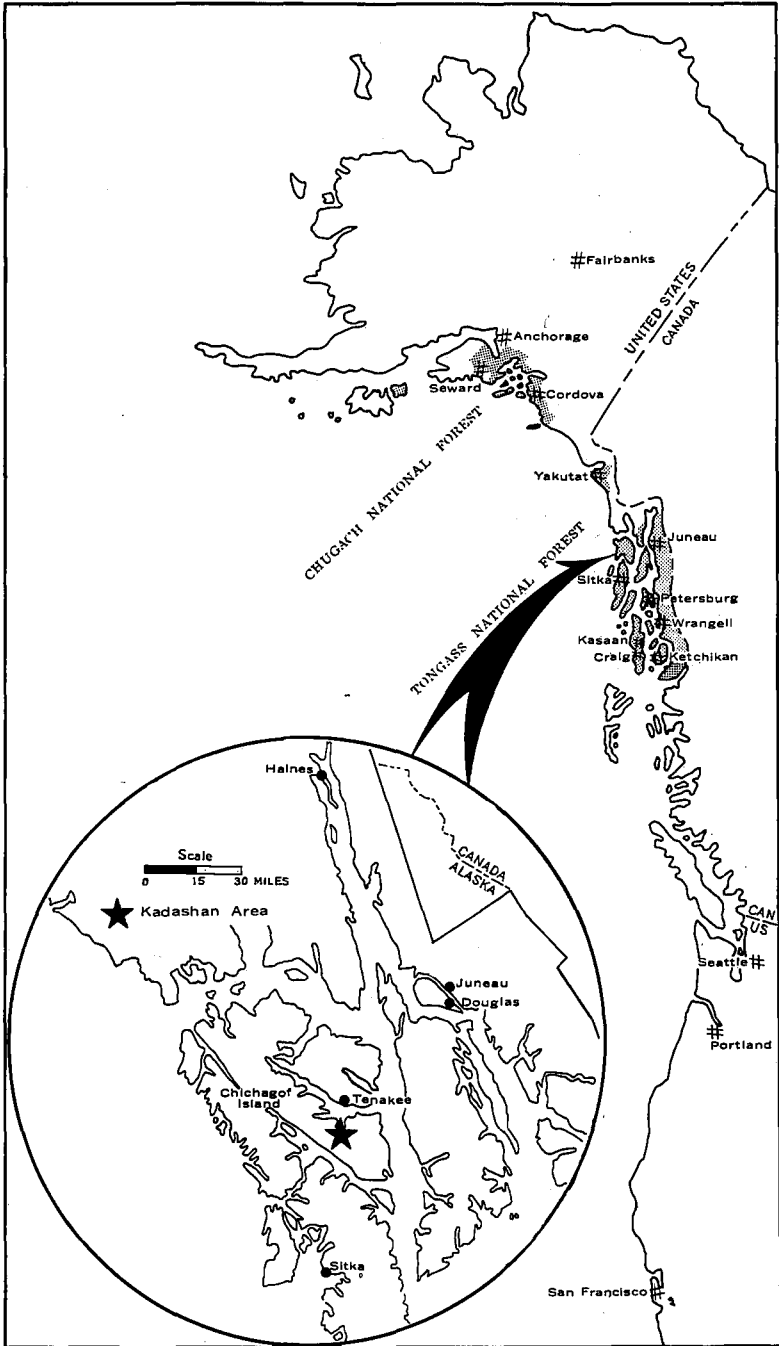


Figure 1. Location of the study area.

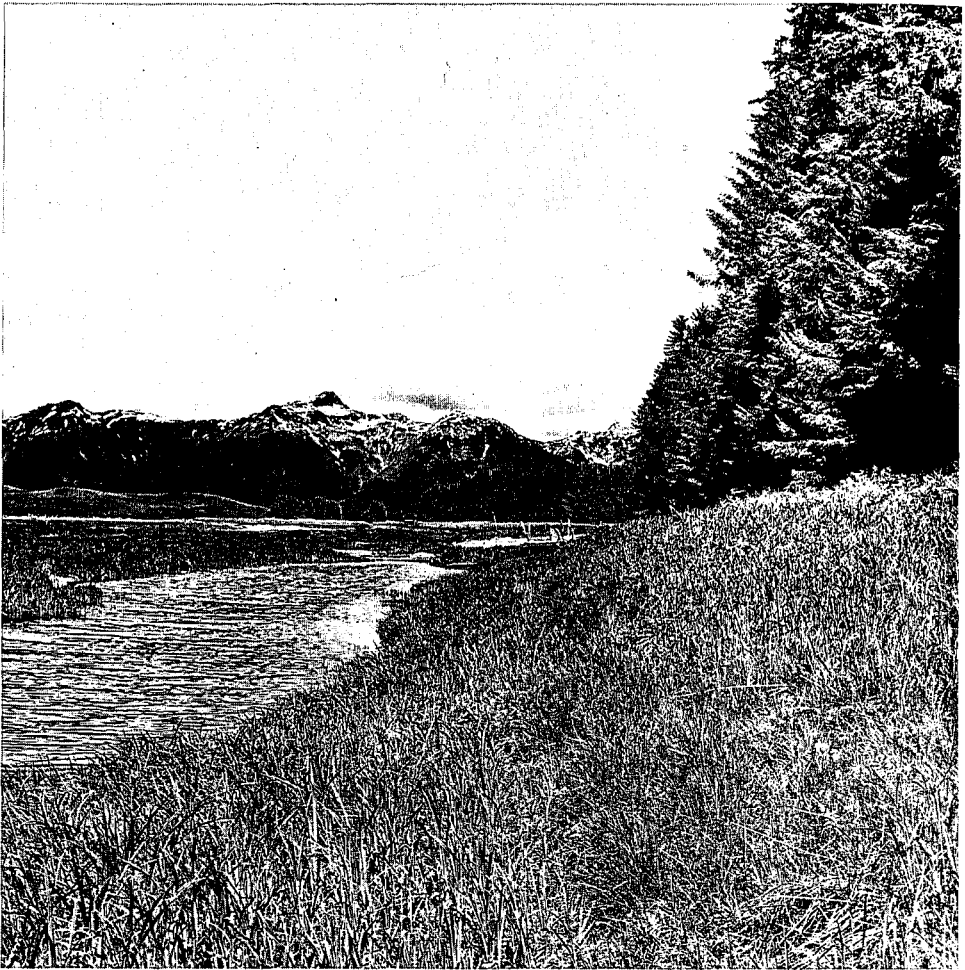


Figure 2. The Kadashan tide-influenced meadow plant communities. From left to right, progressing uphill from tidewater, they are the sedge, hairgrass, and ryegrass communities.

all three communities could be characterized in one 15- to 32-foot transect. Extensive tracts of each community do occur in the Kadashan meadow, but except for reconnaissance observation they were not characterized. However, these tracts appear to have a uniform vegetative pattern very similar to that of the transect locations.

Ecotone elevations were determined with a hand level.

Brief soil descriptions were made and surface soil samples taken from each community on three of the transects, making a total of nine descriptions and soil samples. The samples were analyzed by the Washington State University Soil Testing Laboratory, using standard techniques. pH, cation exchange capacity, and exchangeable sodium, calcium, magnesium, and potassium were determined.

Table 1. Some surface soil chemical characteristics of the Kadashan tide-influenced meadow soils. Data are averages from 3 samples each.

Community	pH	Na	Exchangeable cations			Sum of cations	Cation exchange capacity	Base saturation	Na saturation
			K	Ca	Mg				
		Meq/100		gms soil		per cent			
Sedge	5.8	2.73	0.64	2.04	2.89	8.30	16.44	48	17
Hairgrass	6.7	0.62	0.38	1.25	1.96	4.20	7.32	58	8
Ryegrass	7.3	0.81	0.46	0.60	0.83	2.70	5.73	47	14

Table 2. Average per cent cover (from 8 transects) of species in late June in three plant communities in the Kadashan tide-influenced meadow.

Species	Sedge community	Hairgrass community	Ryegrass community
	per cent		
Sedge (<i>Carex</i> spp.)	77** ¹	2** ²	1
Common Silverweed (<i>Potentilla anserina</i>)	8**	27**	3*
Hairgrass (<i>Deschampsia</i> spp.) and similar grasses	6*	48**	12**
Beach Ryegrass (<i>Elymus mollis</i>)	0	9**	51**
Yarrow (<i>Achillea</i> spp.)	0	4*	12**
Shootingstar (<i>Dodecatheon</i> spp.)	0	3	2*
Black Lily (<i>Fritillaria camchatcensis</i>)	0	0	T ³
Buttercup (<i>Ranunculus</i> spp.)	0	T	1
Beach Pea (<i>Lathyrus maritimus</i>)	0	1	T
Yellow Paintbrush (<i>Castilleja</i> spp.)	0	T	1
Water Parsley (<i>Oenanthe sarmentosa</i>)	0	T	1*

¹** indicates the species occurred in the community in all transects.

²* indicates the species occurred in the community in 4 to 7 transects.

³T indicates 0.5 per cent or less.

Results

The soils are all developed from gravelly alluvium from granitic and metamorphic rocks. Typical soil descriptions are as follows:

SEDGE COMMUNITY SOIL

Horizon	Depth	Description
O	4-0"	Very dark brown (10YR 2/2 moist ³) gravelly sedge peat; abundant roots.
A1	0-8"	Black (N2/0 moist) gravelly loamy sand; abundant roots.
C	8-15+"	Dark yellowish brown (10YR 4/4 moist) and olive gray (5Y 4/2 moist) stratified gravels and sands. Roots many at 8", becoming fewer with depth.

HAIRGRASS COMMUNITY SOIL

Horizon	Depth	Description
O	1-0"	Very dark brown (10YR 2/2 moist) muck; abundant roots.
A1	0-3"	Very dark brown (10YR 2/2 moist) gravelly sand; many roots.
C	3-15+"	Very dark grayish brown (10YR 3/2 moist) stratified gravelly sands; common roots.

RYEGRASS COMMUNITY SOIL

Horizon	Depth	Description
O	1/2-0"	Dead ryegrass leaves and stems.
A1	0-1"	Very dark brown (10YR 2/2 moist) very gravelly sand; abundant roots.
C	1-20+"	Dark grayish brown (10YR 4/2 moist) stratified very gravelly sand; common roots.

³Munsell color notation.

With increasing elevation, soil pH increases while cation exchange capacity and exchangeable cations decrease (Table 1). Exchangeable magnesium is consistently higher than exchangeable calcium. Exchangeable sodium is much higher in the frequently inundated sedge community soil than in the other soils.

A total of 12 plant species were encountered on the transects (Table 2), although a few other species were occasionally observed. Cover estimates and vegetative heights (Figure 3) are as determined on June 25, 1965. Many plants, especially the ryegrass,

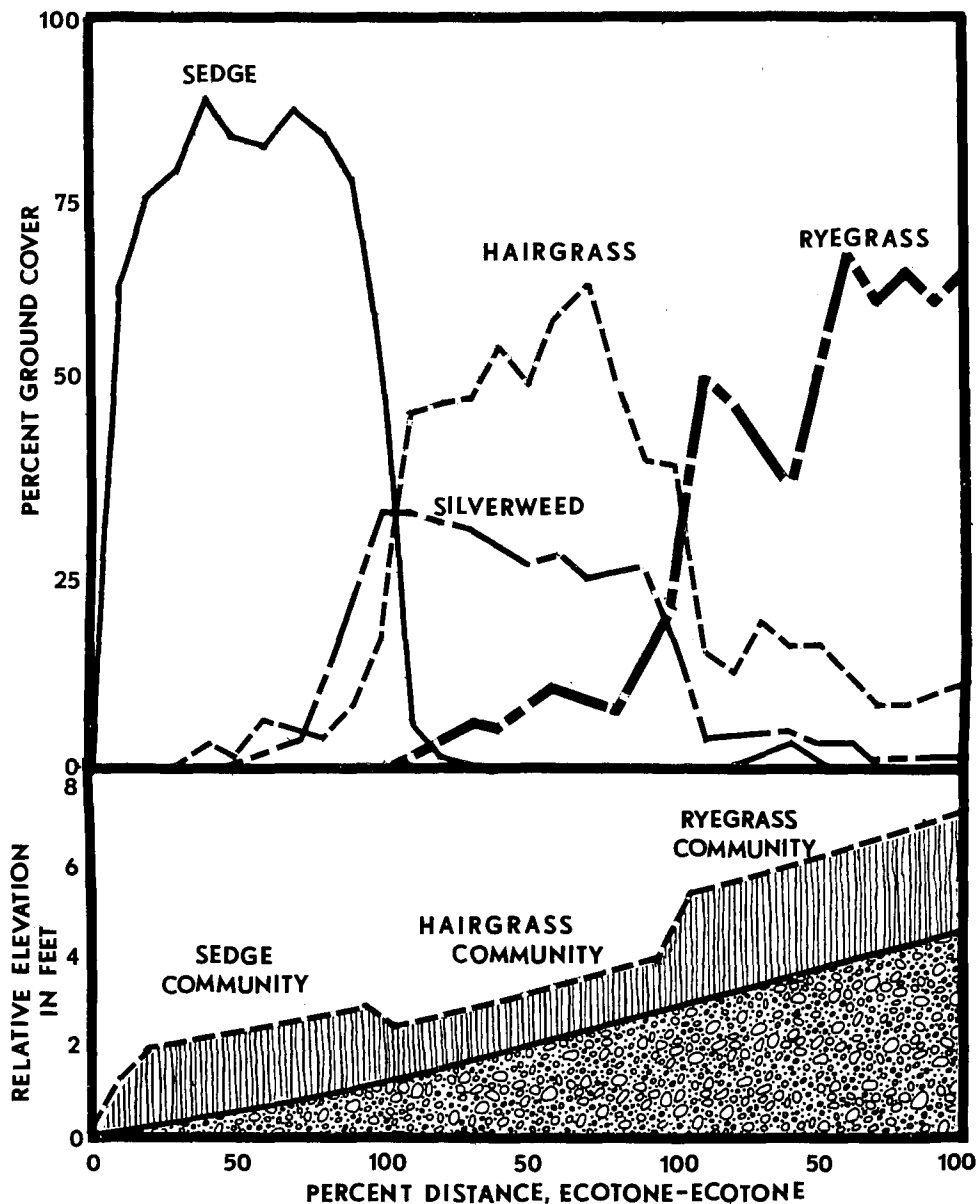


Figure 3. Average per cent cover for four species, relative elevation, and vegetation height for three major plant communities in the Kadashan tide-influenced meadow. All percentages and elevations are averages determined in eight transects.

were still actively growing. Cover and height would both be greater in July or August.

The distribution of these communities is clearly dependent upon elevation (frequency and duration of tidal inundation) and associated soil characteristics (Figure 3). Little or no vegetation grows on the tide flats below the sedge community.

The sedge community is the most homogeneous of the three communities with sedge the only plant in its lower portions. Hairgrass is an occasional minor component, and silverweed grows as an "understory" in the upper portions of the community. No other plants were recorded in the sedge community on any transect.

The hairgrass community appears the most variable of the three. It is not so clearly dominated by any one species. Silverweed rivals the hairgrass in cover per cent (even surpassing the hairgrass in one transect), although the taller hairgrass is more conspicuous.

The highest meadow community is dominated by the tall, vigorous ryegrass. Although the ryegrass did not have a very dense coverage in late June, 1965, it had more than double the coverage and height of any other species in the community on all transects. The ryegrass had grown to a height of 2 to 3 feet, and was still growing vigorously.

Dense Sitka spruce (*Picea sitchensis*)-western hemlock (*Tsuga heterophylla*) timber stands are usually above the ryegrass community, often with a brushy ecotone in between.

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