

Borealis

the newsletter of the



PO Box 141613, Anchorage, Alaska

February/March 2008

Join us at our Next Meetings!

Monday, February 4, 7:30 p.m.

(Campbell Creek Science Center)

Topic: "Flora of Antarctica – Both Species"

Also: How do plants of the Southern Hemisphere compare and relate to Arctic species?

Speaker: Marilyn Barker

Plant Family: Adoxaceae

Presenter: Andy Anderson-Smith

Monday, March 3, 7:30 p.m.

(Campbell Creek Science Center)

To Be Announced

Plant Family: Myricaceae:

Presenter: Anjanette Steer



For latest information on ANPS events,
check our website at:

[http:// AkNPS.org](http://AkNPS.org)

ANPS membership is on a
calendar-year basis, so that
means:
IT'S TIME TO RENEW!

Tree-Line – What Draws It?

Tree-line often seems from a distance like a consistent definable boundary. One of nature's most dramatic examples of tree-line is the border marking the upper limit of forest growth, i.e., the alpine (high elevation) or Arctic (high latitude) tree-lines. Many authors differentiate between Arctic and alpine tree-lines, Arctic tree-lines being associated with increasing latitude, and alpine tree-lines being associated with increasing altitude. However, in Alaska's mountain ranges it is difficult to distinguish between the two, and the forest limit is determined both by high latitude and altitude.

The scientific study of tree-lines has a long history, which began in the Swiss Alps during the 16th and 17th centuries. Despite four centuries of research, there is not yet a consensus theory to explain Arctic and alpine tree-lines universally around the world. Due to the fact that tree-line can vary significantly both among mountains in the same range and even at different points on the same mountain, it seems unlikely that any single tree-line theory can be applied to the entire world's arctic and alpine tree-lines. Rather, we should perhaps look for a general theory that predicts the approximate tree-line location, and then consider what factors might be responsible for local or smaller scale variation.

The most recent comprehensive tree-line theory centers on *growth limitation*. Dr. Christian Körner, at the Institute of Botany in Basel, Switzerland, has proposed that cell division and differentiation into functional tissue is shut off at temperatures below a certain threshold, which is thought to be in the 5.5°–7.5°C (42–45°F) range. He uses the analogy of a house under construction. The limitation of growth at tree line is not due to a lack of availability of bricks and mortar (the raw materials required for growth) but because the bricklayers (the enzymes) are not prepared to work when conditions are too cold! And because of this, building materials (photosynthates) accumulate to the extent that suppliers (photosynthesis) slow down or stop deliveries altogether. There is evidence that shoot apical meristems of trees are colder for most of the growing season than those of ground-hugging alpine plants. Körner hypothesizes that even though there is enough carbon being fixed at tree-line, temperatures are too low for carbon sinks like growth and renewal, since cellular development is impaired. Cold nights for canopies coupled to the ambient atmosphere may mean that shoot expansion cannot occur at night. Trees shade and insulate their own root zone and cold soils probably impair root growth. The resulting reduced meristem activity, both aboveground and belowground, means that trees may, by the very nature of their growth form, render themselves unsuitable for growth at tree-line.

(Continued on page 6)

Alaska Native Plant Society

2008 Seed List

	<i>Scientific Name</i>	Common Name	Height	Flower Color	Comments
1.	<i>Aconitum delphinifolium</i>	Monkshood	2-4 ft.	Dark blue	Damp; stratify 2-4 months; may take 2 years to germinate
2.	<i>Agoseris aurantiaca</i>	Orange or mountain agoseris	8-10 in.	Orange	Easy
3.	<i>Allium schoenopasum</i>	Chives	10-12 in	Lavender	Easy
4.	<i>Anemone drummondii</i>	Drummond's Anemone	3-5 in.	Blue	Stratify
5	<i>Anemone multifida</i>	Cut-leaf Anemone	6-10 in.	Cream and pink	Stratify
6.	<i>Antennaria dioica</i>	Pink Pussytoes	5-6 in.	Pink	Stratify
7.	<i>Aquilega brevistyla</i>	Small Blue Columbine	12-14 in.	Lavender and white	Easy
8.	<i>Aquilega formosa</i>	Western Columbine	15-20 in.	Red and yellow	Easy
9.	<i>Aster sibirica</i>	Siberian Aster	5-8 in.	Lavender	Easy
10.	<i>Dryas drummondii</i>	River avens	4-5 in.	Yellow	Stratify
11.	<i>Erigeron compositus</i>	Cut-leaf Fleabane	2-3 in.	Pink/white	Easy
12.	<i>Erigeron humilis</i>	Arctic Alpine Fleabane	2 in.	White	Easy
13.	<i>Geum glaciale</i>	Glacier Avens	3-4 in.	Yellow	Easy
14.	<i>Linum perenne</i>	Blue Flax	14-16 in.	Blue	Easy; likes very dry soil
15.	<i>Lupinus kuschei</i>	Yukon Lupine	8-10 in.	Blue	Easy; soak seeds
16.	<i>Mertensia paniculata</i>	Bluebells	14-16 in	Blue	Stratify; easy
17.	<i>Papaver alaskanum</i>	Alaska poppy	6-8 in.	Yellow	Easy; short-lived perennial
18.	<i>Papaver alboroseum</i>	White poppy	2-3 in.	White	Easy; no stratification; may flower the first year; reseeds. Gravelly soil.
19.	<i>Primula eximia</i>	Arctic Primrose	6-8 in.	Magenta	Damp; stratify
20.	<i>Pulsatilla patens</i>	Pasqueflower	10-12 in.	Purple	Easy; likes dry soil
21.	<i>Ranunculus cooleyae</i>	Cooley's Buttercup	4-10 in.	Yellow	Needs damp stratification
22.	<i>Saxifraga tricuspidata</i>	Prickly Saxifrage	3-4 in	Cream	Easy
24.	<i>Swertia perennis</i>	Star Gentian	10-14 in	Purple	Stratification recommended
25.	<i>Campanula uniflora</i>	Arctic Bellflower	3-4 in.	Blue	Easy
26.	<i>Draba densifolia</i>	Dense Leaf Draba	1 in.	Yellow	Easy, likes dry conditions
27.	<i>Oxytropis nigrescens</i>	Purple oxytrope Blackish Oyytrope	1-1.5 in.	Purple	Easy, requires well-drained soli
28.	<i>Saxifraga bronchialis</i>	Yellow-spotted Saxifrage	3-4 in.	Light yellow	Easy, likes average to dry soil

ALASKA NATIVE PLANT SOCIETY 2008 Seed Exchange

The Alaska Native Plant Society sells seed of plants native to Alaska, which have been collected by members during the year. Seeds can be purchased at the regular monthly meetings or by mail order.

NOTE to Donors: If you have gathered seeds that you'd like to donate, please do. We will offer them at meetings and upcoming mall shows.

The price is \$0.50 per package. Package sizes vary considerably due to the number or amount of seeds collected. Some rare or difficult to collect species may contain few seeds, while some easy to collect species may contain a large number of seeds. For mail orders, include an additional \$0.50 for 1 -5 packages, or \$1.00 for 6 or more. Make checks payable to: Alaska Native Plant Society. Send order to: Alaska Native Plant Society, PO Box 141613, Anchorage, AK. 99514

Seed Germination Information

Use a sterile mix for best results. Fine seed should be sprinkled on the surface. Cover large seeds with soil. Keep mixture moist by covering with plastic. For best results water from the bottom of a tray or spray with a fine mister.

If your only seed starting experience has been with easily germinated vegetables or annual flowers, more patience is going to be required when it comes to growing perennials from seed successfully. Some types germinate within days, others take several weeks, and a large number of perennials require what is called **stratification** -- basically, simulating the conditions that exist outside over the winter. These types of seed are sometimes described as "cold germinators". The usual trick is to place the seed with some moist, sterilized commercial seeding mix inside a plastic bag, then storing it in a refrigerator for a period of time to break down the natural chemical germination inhibitors within the seed. A typical period of time is about three to four months. Then the seed is sowed as usual and started indoors under lights. Another approach is to sow the seed in late fall in pots, then leave it outside in a protected (but unheated) coldframe for the winter.

ANPS SEED EXCHANGE ORDER FORM

Orders will be filled in the order that they are received

Order by plant number appearing before the name

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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The price is \$0.50 per packet. For mail orders, add \$0.50 for 1 -5 packets, or \$1.00 for 6 or more.

PLEASE NOTE: Seeds are in limited supply, on a first-come,first-served basis, so list an alternative in case your first choices are no longer available.

Name _____ Number of packets ____ @\$.50 = \$ ____

Address _____ Mailing cost (\$.50 for 1-5 or \$1.00 for 6 or more) = \$ ____

City _____ State _____ Zip _____ Total enclosed \$ ____

Make checks payable to: Alaska Native Plant Society

Send order to: Alaska Native Plant Society, PO Box 141613, Anchorage, AK. 99514

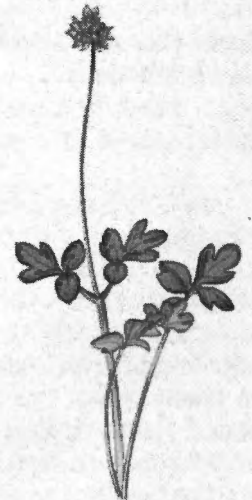
Adoxaceae –The Adox/Elder Family

Adoxaceae has turned out to be a more interesting family than anticipated. Over the years it has been placed in two different orders, Rubiales and the Dipsicales. And now its family status is changing. The genus *Adoxa* itself has moved from being part of the Caprifoliaceae (honeysuckle family) to a family all its own. It doesn't really seem to "fit" anywhere. More recent data moves more of the Caprifoliaceae into the Adoxaceae.

Adoxa moschatellina, the muskroot, is widely distributed in northern regions and is found in alpine and sub-alpine woodlands. It prefers moist forest or open grassy meadows. It can be found over much of Alaska from the Brooks Range to the south and into Canada. *Adoxa* is a perennial herb from a fleshy scaled rhizome with erect stems 5-20 cm tall. The plant exudes a musky odor. Each plant has a single pair of opposite basal leaves. Each leaf is long stalked and divided into 3 long stalked 3-cleft leaflets. The entire plant is glabrous. The flowers are likewise born on a long stalk on sessile heads, one per stalk. The head typically have 5 flowers, one at the top and 4 below. The uppermost flower is 4 merous, the rest are 5-merous. The ripe fruit is dry berry, giving rise to 3-5 cartilaginous nutlets. A feature rather unique to this family is the splitting of each stamen almost to the filament base give rise to one-celled anthers.

Linnaeus named this genus and species in 1753. "Adoxa" is Greek for "without glory" and "mosch" is Greek for "musk". Add the diminutive "ellina" and altogether the name means "the humble, inconspicuous, musky smelling plant".

It may also be known as "Townhall Clock" due to the arrangement of the flower heads. on four sides, at 90 degrees to each other, like a town hall clock. The extra flower or "clock face" on the top gives it a total of five flowers per stem. A mat of shamrock-like leaves gives rise to these lime green flowers - only about 3 inches tall - each spring, then dies down below ground for the rest of the year. *Adoxa moschatellina*, is closely related to two recently described genera in China, and it may well have originated there. It could have reached North America over either land bridge.



Adoxa moschatellina

Sambucus (Elder or Elderberry) is a genus of between 5 and 30 species of shrubs or small trees native to temperate to subtropical regions of both the Northern Hemisphere and the Southern Hemisphere. The leaves are opposite, pinnate, with 5-9 leaflets (rarely 3 or 11), each leaf 5-30 cm long, the leaflets with a serrated margin. They bear large clusters of small white/cream coloured flowers in the late spring, that are followed by clusters of small red, bluish or black (rarely yellow or white) berries. Species have lifespans between 80 and 100 years.

The **red-berried elder** complex is variously treated as a single species *Sambucus racemosa*, found throughout the colder parts of the Northern Hemisphere with several regional varieties or subspecies, or else as a group of several similar species. Red elderberry (var. *arborescens*) may be found from coastal Alaska and the Aleutian Islands south through western British Columbia to San Francisco Bay in California. The flowers are in rounded panicles, and the berries are bright red; they are smaller shrubs, rarely exceeding 3-4 m tall. The elder was formerly held to be unlucky to have in the garden. If an elder tree was cut down, a spirit known as the Elder Mother would be released and take her revenge; shown in one way by a poem known as the Wiccan Rede where one line reads, "Elder be the Lady's tree, burn it not or cursed you'll be." This may derive from ancient Pagan beliefs, which held the elder sacred to the Moon Goddess. The tree could only safely be cut while chanting a rhyme to the Elder Mother.

The following chart compares a few of the features of the redefined the Caprifoliaceae and Adoxaceae (includes *Adoxa*, *Sambucus* and *Viburnum*).

Character	Caprifoliaceae	Adoxaceae
Leaves	Simple, usually exstipulate	Simple to Compound, Usually stipulate
Flowers	Zygomorphic, large	Actinomorphic, small
Pollen	Relatively large, spinose	Small, reticulate
Ovary position	Inferior	Partially inferior
Style	elongate	Short to absent
Stigma	capitate	lobed

Myricaceae —The Bayberry Family

The **Myricaceae** is a small family consisting of about 50 species of trees and shrubs having aromatic leaves. The family Myricaceae has been revised in recent years. In particular, many of the species previously in the genus *Myrica* have been renamed in the genus *Morella*. Thus, the family now consists of three genera: *Morella*, *Myrica*, and *Comptonia* with an additional "relictual" genus known as *Canacomyrica*. The two "myrica" genera are *Myrica gale* and *M. hartwegii*, while the majority of former myricas from North and South America, Asia and Africa now come under the genus *Morella*.

Members of Myricaceae are shrubs and small trees with aromatic alternate leaves. The western varieties are all evergreen, while some in other locals are deciduous. Many of the species bear yellow glandular dots on the surface, from which the characteristic odor of these plants emanates, and have single-seeded fruits often covered with waxy granules, bumps, or layers.

One of the most interesting characteristics of species in the sweet gale family is their ability to fix atmospheric nitrogen gas (N_2 -sometimes known as dinitrogen) into ammonia (NH_3), an inorganic form of nitrogen that can be utilized by plants as a nutrient. Unlike legumes which produce *Rhizobium* nodules, members of the Myricaceae are symbiotic with the filamentous bacteria known as actinomycetes. Root nodules differ morphologically and anatomically from legumes. The nitrogen fixation is carried out inside of specialized nodules on the roots and rhizomes of these plants. This is done by the enzyme nitrogenase, which is synthesized by bacteria that live in a mutualism with the vascular plant. The ability to fix atmospheric dinitrogen into ammonium is an extremely useful trait, because it allows species in the sweet gale family to be relatively successful in nutrient deficient habitats.

The most diverse genus in the Myricaceae is *Myrica*, of which only one species occurs in Alaska. Our lone member of this family is *Myrica gale*, better known to most as sweet gale. It is a shrub usually 1-4 feet in height. It is common to bogs and coastal tidal flats over much of the state south of the Brooks Range, excluding the Aleutians and high mountain regions. Beware walking through a *Myrica* stand as the water can become quite deep, and most definitely can overtop knee boots!

Sweet gale is among Alaska's earliest blooming plants, producing male and female flowers on separate plants beginning in mid-May. The staminate flowers consist of 3-5 stamens subtended by 1-2 bracts. The pistillate flowers consist of one pistil with 2 styles subtended by 2 bracts. Although "nude" (lacking a perianth) the ovary is inferior....becoming so in a very unique way. *Myrica* has intercalary growth beneath the base of the gynoecium resulting in a circumlocular wall comprised of both tissues from the pistil and from the inflorescence axis. The development of this wall occurs AFTER pollination so that the flower has a superior ovary until pollinated, and then an inferior ovary. The fruit is drupe like covered with a white waxy layer that prevents desiccation. These drupes are dispersed and eaten by birds. The drupes can be collected, crushed and used as a food seasoning, much in the way you would use nutmeg.

The foliage has a sweet resinous scent, and is a traditional insect repellent, used by campers to keep biting insects out of tents. It is also a traditional ingredient in British Royal Wedding bouquets, and is used variously in perfumery and as a condiment. In northwestern Europe it was much used in a mixture called gruit as a flavoring for beer from the Middle Ages to the 16th century, but it fell into disuse after hops had become widely available. The Danish brewery Thisted Bryghus produces Porse Guld, a strong beer flavoured with the plant.



Myrica gale

What Grows Above Tree-line?

With their steep changes in elevation, mountains display dramatic differences in habitat over short distances. In Alaska the succession of tree dominance as you as you climb in elevation to tree-line is: Birch/poplar/cottonwood → Alder/fir → White/Sitka Spruce. At higher elevations, there are alpine areas where environmental conditions make it impossible for trees to sustain growth. The vegetation in these areas are often specialized to survive in extreme conditions.

Plants growing above tree-line demonstrate a number of specialized adaptations that allow them to survive in such a harsh environment. Look for plants with these different types of adaptations as you hike in the alpine zone. By carefully observing which plants grow where and what adaptations they have, you can learn about the microenvironment that these plants experience.

Alpine plant adaptations:

Grow low – The most striking thing about hiking above tree-line is the view afforded by the dwarfed vegetation, some reaching only a couple of inches tall. By growing this low to the ground many of these plants stay below the snowpack in the winter and avoid blowing ice. Instead of standing upright, black spruce and balsam fir grow horizontally and form krummholz (“crooked wood”) vegetation. Low growth also allows plants to avoid high winds and stay warm. Try lying down on a windy day above tree-line to notice the difference. *Diapensia* forms in a tight mat of tiny leaves only an inch or two above the ground. It is one of the best examples of this type of adaptation and is able to survive in some of the most exposed areas above tree-line, even where snow is blown off during the winter.

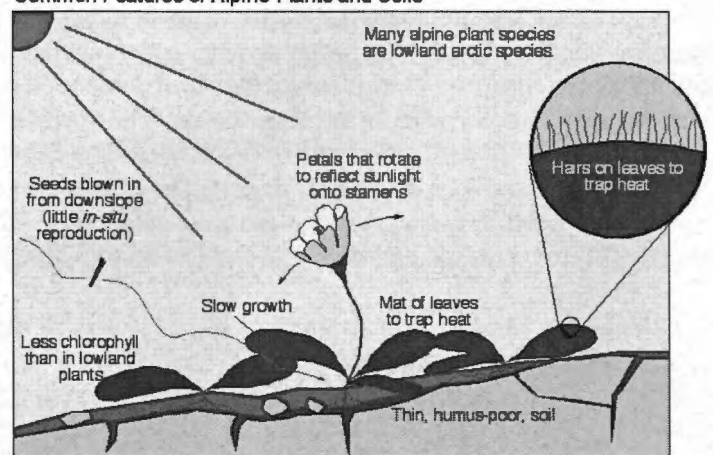
Evergreens get an early start – Many plants above tree-line hold on to their leaves over winter. These plants can begin photosynthesis as soon as growing conditions permit and take full advantage of a short growing season. Evergreens also don't need to require the nutrients needed to develop a new set of leaves each growing season. Although we immediately think of conifers such as hemlock and black spruce as evergreen, above tree-line, other evergreen plants include mountain cranberry, moss plant, diapensia, crowberry, Labrador tea, and many others.

Subsisting on insufficient soils – Most of the soils above treeline are acidic, thin, or non-existent, and offer limited nutrients to the plants growing there. Lichens are a group of organisms that are well adapted to this situation, and can be found covering nearly all rock surfaces in the alpine zone. Lichens are actually two or more organisms living in an association that allows them to survive in places where neither could survive alone. One of the organisms is an alga or bacterium, which is able to photosynthesize and turn sunlight into sugar. It provides some of this energy to its partner; a fungus. In turn, the fungus houses the alga/bacterium and protects it from drying out, and produces enzymes that allow it to collect nutrients directly from the substrate that it grows on. As they grow and decay, lichens often begin the process of soil accumulation for the plants that will follow. Members of the heath family are another well-adapted group of plants. They are one of the best-represented groups above tree-line and include blueberries, cranberries, and alpine azalea. Member of the heath family are also common in nutrient poor bogs found at low elevations.

Don't dry out – Despite tremendous amounts of rain and cloud moisture, alpine plants are subject to drought. Water is not retained in the thin soils and the persistent winds rapidly dry out leaves. The fuzzy underside of Labrador tea is believed to comb water droplets from clouds and act like a sponge to keep the leaf surface moist. Mountain cranberry and many other alpine plants demonstrate another adaptation and develop a waxy cuticle that covers leaf surfaces and seals in moisture.

Perennials persist – Plants that must complete their entire life cycle in a year (annuals) don't do well in extreme environments; one bad year and a population is likely to disappear from that area. Perennials can store extra energy during a good year to make it through a bad year. With one exception, all alpine species in our region are perennials. In addition, since relying on seed set for reproduction is such a risky strategy, many plants above tree-line reproduce vegetatively rather than sexually.

Common Features of Alpine Plants and Soils



LBR 062002

Used with permission Dr. Bruce Railsback, University of Georgia

MYSTERY PLANT

The clues for this month's mystery plant may require some research on your part! Look for help in other parts of this newsletter.

This is an alpine plant found in mountainous areas throughout most of Alaska except South-central and Southeast. It is usually 3-4 in. tall, with slightly dentate narrow stem leaves. The basal leaves have long petioles, are glabrous and somewhat lyrate in shape. Early in the season they are reddish, turning dark green above, but retaining the red tint beneath (hence the species name).

The involucre bracts are often purplish/red as is the underside of the bright yellow ligulate flower. The disk flowers are usually orange, giving the head of flowers a bright orange appearance. The achenes are glabrous and the pappus is white.

Get Ready for the....

2009 Dues Hike

Due to financial reasons, it will be necessary for ANPS to raise their dues for 2009. The new rate will be \$15.00 for regular membership; \$12.00 for seniors and students, \$20.00 for family and \$30.00 for an organization (no change). This is just an announcement of a coming change and DOES NOT AFFECT your dues for 2008.

WE NEED HELP!

Please help us fill these vital board positions:
TREASURER: Our secretary has moved to Fairbanks to further her education. Beryl has assumed the secretary's job and would like someone to take over the Treasurer's job to lessen her load. This is not a huge job as we are a small organization with minimal income.
PROGRAM COORDINATOR - beginning in the fall (7 meetings/yr). Suggestions, contacts and a lot of support will be provided by everyone, but a main coordinator is needed.

ALASKA NATIVE PLANT SOCIETY State and Anchorage Chapter Officers

President Andy Anderson-Smith
Vice President Ken Johnson
Sec/Treasurer Beryl Wardlaw Bailey

Anchorage Chapter Program Coordinators

Membership Verna Pratt
Plant Family Marilyn Barker
Mini-Botany Ken Johnson
Field Trips Anjanette Steer

Newsletter ("*Borealis*")

Editor Ginny Moore

FAX:

Borealis is published bi-monthly October through May. Articles may be sent to Ginny Moore, Anchorage, AK 99516. Phone or FAX: or E-mail: tgmoore@gci.net

MYSTERY
PLANT
ANSWER
Senecio
resedifolius
Dwarf Arctic
Butterweed
Ranunculaceae/
Asteraceae/Aster
Family



To guest speakers, plant family leaders, and mini-botany speakers, as well as those who do the behind-the-scenes coordinating.

YOU MAKE IT HAPPEN!

Want to participate more? Don't hesitate to "raise your hand" and make an offer - you won't be turned down! We need the support of everyone!

ANNUAL MEMBERSHIP APPLICATION/RENEWAL

The Alaska Native Plant Society was organized in 1982 by an enthusiastic group of amateur and professional botanists. It is a non-profit educational organization with the goal of uniting all persons interested in the flora of Alaska. Membership is open to any interested individual or organization. If you wish to join us, please indicate the category of membership you desire, fill in the form below and mail it with the appropriate remittance to:

Alaska Native Plant Society,
P.O. Box 141613,
Anchorage, AK 99514

STATUS New RENEWAL

CATEGORY

- Full-time Student \$ 5
 Senior Citizen \$10
 Individual \$12
 Family \$18
 Organization \$30

Name _____

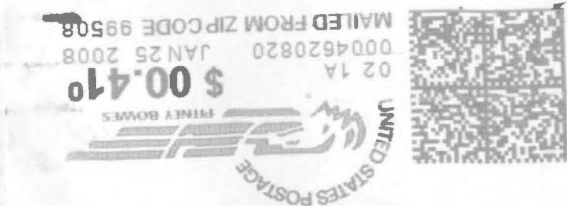
Address _____

City: _____ State _____ Zip _____

Telephone: (Home) _____ (Work) _____ E-Mail: _____

Membership is on a calendar year basis.

IT IS TIME TO RENEW YOUR MEMBERSHIP - NOW!!



Alaska Native Plant Society
P.O. Box 141613
Anchorage, AK 99514