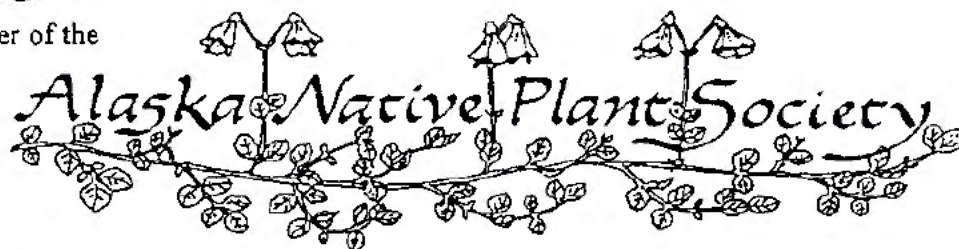


# Borealis

the newsletter of the



PO Box 141613, Anchorage, Alaska

Dec. 2019-Jan 2020

## Join us at our Next Meetings!

### Monday, December 2, 7:00 PM

Main Topic: "The Use of Drones and Multispectral Imagery to Map and Monitor Vegetation Communities"

Speaker: John Marshall

Mini-Botany – *Beringian Endemics*

Speaker: TBA

Plant Family: Roseaceae: *Physocarpus capitatus* - Pacific Ninebark

Speaker: Mary Stella

### Monday, January 6, 7:00 PM

Main Topic: "Arctic Coastal Plains Research"

Speaker: Zoe Meade

Mini-Botany – *Douglasia beringensis*

Speaker: Dennis Ronsse

Plant Family: Roseaceae: *Spiraea*

Speaker: Zoe Meade

All of our meetings, unless otherwise announced, are held at the Campbell Creek Science Center, 5600 Science Center Drive, just off Lake Otis Parkway, south of Tudor.

For the latest information about ANPS events and field trips, go to

[www.aknps.org/](http://www.aknps.org/)

## OUR WORLD

## Alaska's Climate "Weirding"

Thanks to climate scientists, we know that the average global temperature has risen by 1 degree Celsius over the past century. What many people may not realize is that over the same time frame, Alaska's average temperature has risen twice as much.

In 2019 Alaska experienced one of its hottest summers on record. Wildfires, exacerbated by the high temperatures, consumed more than two million acres. In July, Anchorage saw thermometers hit 90 degrees for the first time in recorded history. And sea ice off Alaska's coast vanished completely—something that has happened before, but never so early in the year. Sea ice levels for 2019 are still about the second lowest ever recorded. Even precipitation levels around the state were warped. While much of the southeast and south central parts of the state

In August, the southern part of Alaska experienced warmer than normal temperatures and extremely dry conditions; from abnormally dry to extreme drought warnings were issued. Intense wildfire activity extended especially south of the Alaska Range and the Kenai through the entire month. The Anchorage area was continuously dry for the whole month and smoke from wild fires made Anchorage the city with the worst air quality in the US this summer. Meanwhile the Interior experienced substantially wetter and cooler than average weather; flooding warnings were issued and heavy rain caused flooding, damages to buildings and landslides on the northern side of the Alaska Range.

In September, Alaska again recorded warmer than average temperatures all across the state. Mean monthly temperatures in Utquaqvik (formerly Barrow) were 8.7 °F degrees warmer than normal and in Kotzebue 5.2 °F warmer.

While warmer temperatures have changed our gardening procedures, what does all of this mean for our native plant populations? This month we'll look at some of the current studies.

# Botany 2020, July 18-22 in Anchorage!



In July, Anchorage will be host to a national botanical conference that will include members of the American Bryological and Lichenological Society, American Fern Society, American Society of Plant Taxonomists, Botanical Society of America, International Association for Plant Taxonomy, and Society for Herbarium Curators.

The theme of this year's conference is "**Plants at the Extremes**" and the conference will include both

symposia and colloquia formats. The deadline for submitting proposals for inclusion in either of these formats is October 23. You can find more information about how to submit a proposal at <https://2020.botanyconference.org/botany-conference-proposals.html>.

Botanical Society of America claims to be the home for ALL botanists and plant scientists and supports the breadth and diversity of botanical research and education. We are the leading Society dedicated to botany and its future. The BSA has several options for membership that accommodate professional botanists and their students, as well as K-12 teachers, community college educators, affiliated professionals, and amateurs who can benefit from what the BSA has to offer. Memberships are for a calendar year, January 1 – December 31. You may **join and/or renew your membership** at <https://crm.botany.org>.

Our own Alaska Native Plant Society is hoping to interface with the event in July by offering special field trips during that time to encourage participation of our out-of-town visitors.

**Borealis**

the newsletter of the



## ALASKA NATIVE PLANT SOCIETY

### State and Anchorage Chapter Officers

President	Dennis Ronsse
Vice President	Zoe Meade
Secretary	Ginger Hudson
Treasurer	Mary Stella

### Anchorage Chapter Program Coordinators

Membership	Mary Stella
Plant Family	Timm Nawrocki
Mini-Botany	Timm Nawrocki
Field Trips	Dennis Ronsse

### Newsletter ("**Borealis**")

Editor	Ginny Moore
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*Borealis* is published bi-monthly, fall through spring. Articles may be sent to Ginny Moore, , Anchorage, AK 99516. Phone or FAX: , E-mail: [elfinwood@gmail.com](mailto:elfinwood@gmail.com)



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**ANPS HAS EARNED OVER \$1,000  
FROM MEMBERS SHOPPING AT FREDDY'S!  
WON'T YOU JOIN US?**

**IT DOESN'T AFFECT YOUR OWN REWARDS POINTS.**

Fred Meyer is donating \$2.5 million per year to non-profits in Alaska, Idaho, Oregon and Washington, based on where their customers tell them to give. Here's how the program works:

- Sign up for the Community Rewards program by linking your Fred Meyer Rewards Card to (non-profit) at [www.fredmeyer.com/communityrewards](http://www.fredmeyer.com/communityrewards). You can search for us by our name or by our non-profit number **GC263**.
- Then, every time you shop and use your Rewards Card, you are helping (non-profit) earn a donation!
- **You still earn your Rewards Points, Fuel Points, and Rebates, just as you do today.**
- If you do not have a Rewards Card, they are available at the Customer Service desk of any Fred Meyer store.
- For more information, please visit [www.fredmeyer.com/communityrewards](http://www.fredmeyer.com/communityrewards).



# FROM WHAT WE GATHER



## **Frontiers 183: Alaska Plants - From Sour Dock to Stinkweed**

<https://www.youtube.com/watch?v=82e1vMoqps&feature=youtu.be>

In September, Rhonda McBride, KTVA Channel 11 News journalist, offered a full show on Alaska native plants. If you missed the show you can still watch it through the Youtube link above.

The garden in the courtyard at the Alaska Native Medical Center doesn't have many flowers, mostly greenery that fades into the backdrop. But take a closer look.

It may be a relatively small garden, but if you become acquainted with the plants that grow there, a big world opens-up – a world we explore this week on Frontiers.

Each bed has been carefully cultivated to replicate different climates in the state. There's one for vegetation that grows in birch forests, another for tundra, as well as Alaska's rocky shores – a great jumping off point for a conversation about how Alaska Natives used wild plants for both food and medicine.

Here are highlights from the show:

- Food as medicine: Chef Amy Foote, who oversees the kitchens at the Alaska Native Medical Center (ANMC), shows how to incorporate sour dock into akutaq, a mixture of berries and fat, also known as "Eskimo ice cream." Sour dock is a wild cousin of rhubarb with a bit of a kick to it. The recipe is provided.
- Plants as medicine: Dana Diehl, the Wellness Director at ANMC, shares her knowledge about the healing properties of plants, gleaned from elders in Aniak. As a child, Dana learned to make teas and salves from the leaves of plants that grew around her. She also introduces a plant you can rub on your skin to ward off mosquitos.
- Integrative medicine: Dr. Allison Kelliher and Dr. Gary Ferguson are featured guests. Kelliher specializes in family medicine and Ferguson is a naturopath. Both have studied the health benefits of wild plants in Alaska and incorporate them into their practices. [In a KTVA Web Extra, they talk more about how modern science and traditional medicine can work to complement each other.](#)
- A healing instrument: One might not think of the wood from a violin as a plant used as medicine. But in Southeast Alaska, a handmade violin, presented at a potluck in Metlakatla, helped to heal old hurts for children in two different families. It's a familiar story – how siblings, as adults, discover they have brothers and sisters they didn't know about.

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## **ALASKA COMMUNITY FORESTRY PROGRAM RESOURCES**

The Alaska Division of Forestry, with financial assistance from the USDA Forest Service, helps establish and sustain local community forestry programs throughout Alaska. The state fosters partnerships between government agencies, businesses, and volunteers to meet local needs. As well as the resources listed below, they offer landscaping and horticultural classes. A recent offering included Tree Biology, Using An Air Spade, Tree Pruning and Shrub Pruning. International Society of Arboriculture Continuing Education Credits are available. Classes include indoor and outdoor sessions.

- Urban tree and forest inventories and management plans;
- Selecting species appropriate for different sites;
- Planting, pruning, and caring for trees and shrubs;
- Site design, planting specifications and details;
- Tree problem diagnosis;
- Local ordinances and other means of preserving and maintaining public trees;
- Retaining and protecting trees during construction;
- Organizing volunteers to plant and care for trees.

Contact: Jim Renkert, Program Coordinator  
 Alaska Div. of Forestry  
 Community Forestry Program  
 550 W. Seventh Avenue, Suite 1450  
 Anchorage, AK 99501-3566  
 (907) 269-8465

# Wildfires Could Permanently Alter Alaska's Forest Composition

**Berkeley Lab study finds evergreen conifer trees will decline and deciduous broadleaf trees dominate in a warmer climate with more wildfires**

**This summer, Alaska has experienced** record high temperatures and devastating wildfires. If such events become more frequent, how might that impact our northernmost forests? A team of researchers led by the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) projected that the combination of climate change and increased wildfires will cause the iconic evergreen conifer trees of Alaska to get pushed out in favor of broadleaf deciduous trees, which shed their leaves seasonally.

Using a well-tested ecosystem model called ecosys, they predicted that by the year 2100 the relative dominance of evergreen conifer trees (black spruce) will decline by 25% and non-woody herbaceous plants such as moss and lichen will decline by 66%, while broadleaf deciduous trees (aspen) will become dominant, nearly doubling in prevalence. With such large declines, this shift in vegetation will highly likely have reverberations for the entire ecosystem and climate.

"Expansion of the deciduous broadleaf forests in a warmer climate may result in several ecological and climatic feedbacks that affect the carbon cycle of northern ecosystems," said Zelalem Mekonnen, a Berkeley Lab postdoctoral fellow who was first author of the study.

The paper, "Expansion of High-Latitude Deciduous Forests Driven by Interactions Between Climate Warming and Fire," was published in August 2019 in *Nature Plants*. The study was funded as part of DOE's Office of Science through the [Next-Generation Ecosystem Experiment—Arctic](#) project and included co-authors from UC Irvine, the University of Alberta, and Woods Hole Research Center. NGEA-Arctic seeks to gain a predictive understanding of the Arctic terrestrial ecosystem's feedback to climate and is a collaboration among scientists at Oak Ridge National Laboratory, Berkeley Lab, Los Alamos National Laboratory, Brookhaven National Laboratory, and the University of Alaska Fairbanks.

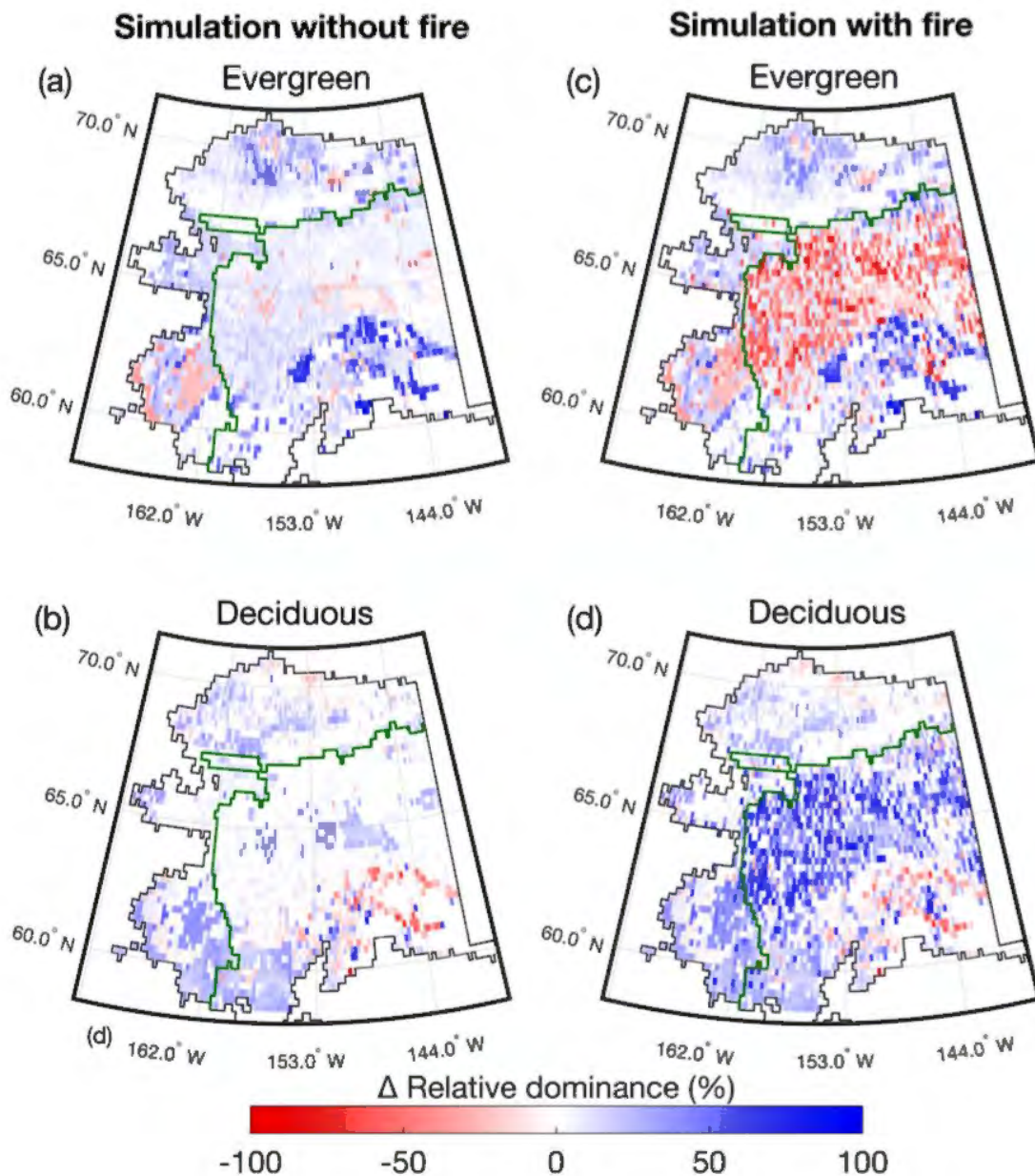
"We predict the forest system will remain a net sink for carbon, meaning it will absorb more carbon than it emits," said co-author William J. Riley, a senior scientist in Berkeley Lab's Earth & Environmental Sciences Area. "But will it be more or less of a sink? Our next study will quantify the carbon and surface energy budgets. This study focused more on how vegetation types are expected to change."

Changes in forest cover type will affect many important ecosystem processes. For example, an increase in deciduous broadleaf trees, which lose their leaves every year, unlike evergreens, could result in more rapid microbial decomposition and increased transpiration (the loss of moisture through leaves); both of these processes introduce amplifying feedbacks to climate warming. On the other hand, higher surface reflectance may have a cooling effect when more snow is exposed because of fewer evergreen trees; what's more, deciduous trees are less flammable than evergreen trees. The researchers predicted modest effects on net carbon budgets and will analyze that further in future work.

Riley added that the study included many steps to confirm that the results from ecosys were valid. "We evaluated model performance against many current observations of forest cover and carbon cycling measurements, and against long-term changes under natural climate variation," he said.

Climate change is hitting the northern latitudes especially hard due to the phenomenon of [Arctic amplification](#), a positive feedback that causes temperatures to rise faster than the global average. While average global temperatures are projected to rise about 4 degrees Celsius by 2100 in a "business as usual" scenario, some recent studies are predicting much larger increases for the Arctic.

The extent to which fires will increase is even more uncertain. So the researchers modeled four scenarios, from a zero increase in burn area up to a 150% increase by 2100. The scenarios were taken from published studies that accounted for factors such as warmer temperatures and increases in lightning strikes.



Deciduous broadleaf trees increase, and evergreen conifer trees decrease in interior Alaska between now and 2100 because of warming and wildfire in the boreal forest. (Credit: Berkeley Lab)

What is known about fires are the impacts they have on the forest ecosystem. “Fires deepen the active layer, which is the zone of soil that remains unfrozen,” said Riley. “That leads to an increase in soil nutrients available for plants. Increases in soil nutrients favor deciduous plants, which is one reason why we predict they will do so well under a warming climate. Higher deciduous tree cover has happened under previous climates; paleoecological studies of the last 10,000 years suggest that Alaskan forests have undergone similar shifts in dominant tree species.”

Another factor that favors broadleaf deciduous over evergreen conifer trees is that their leaves decompose more rapidly, leading to more rapid carbon turnover, which determines the available nutrients in the ecosystem. “As you get more rapid turnover, you get more deciduous plants,” Riley said. “It’s a self-reinforcing mechanism.”

Although previous studies have examined how climate change will impact boreal forests, Riley said this was the first to consider the complex interactions among plants, soil, and nutrients – both above and below ground – and how they evolve over time. “This study is a more detailed and mechanistic explanation of these processes,” he said.

Other factors that favor broadleaf deciduous trees in a future warmer climate are their greater ability for post-fire seedling regeneration and their ability to grow fast and thus compete for light. "Plants have different strategies to survive under different environmental conditions," Mekonnen said.

The study found that both climate change and increased fire were required to produce broadleaf deciduous trees' dominance. Across the fire scenarios tested where fires increased, that shift was projected to occur around the year 2058. If warming occurred without increased fire or vice versa, the model found that evergreen conifers remained the dominant Alaskan tree type through the 21st century.

Another forest component that will be affected is wildlife. "Broadleaf deciduous trees have a large canopy which covers underlying vegetation, potentially decreasing herbaceous plant cover. Those plants, especially moss, are very important forage for wildlife," Mekonnen said.

What's more, the modeling technique can be used to study how climate change and fire will affect other geographic areas. "Our modeling approach is applicable to other northern regions because the fundamental mechanisms that control these dynamics are similar everywhere," Mekonnen said.

Reproduced from: News Release [Julie Chao](#) (510) 486-6491 • August 26, 2019 Berkley Labs  
<https://newscenter.lbl.gov/2019/08/26/wildfires-could-permanently-alter-alaskas-forest-composition/>

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## Air Temperatures in the Arctic are Driving System Change

A new paper shows that air temperature is the "smoking gun" behind climate change in the Arctic, according to John Walsh, chief scientist for the UAF International Arctic Research Center. "The Arctic system is trending away from its 20th century state and into an unprecedented state, with implications not only within but beyond the Arctic," according to lead author Jason Box of the Geological Survey of Denmark and Greenland in Copenhagen.

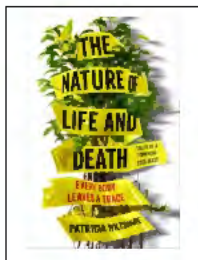
Several University of Alaska Fairbanks researchers are co-authors on the paper, which says that "increasing air temperatures and precipitation are drivers of major changes in various components of the Arctic system." The study is the first to combine observations of physical climate indicators, such as snow cover, with biological impacts, such as a mismatch in the timing of flowers blooming and pollinators working. Climate indicators are key pieces of information that capture the essence of a system, according to Walsh. An example would be September sea ice extent, which summarizes the effects of things like temperature, winds, ocean heat and other variables.

"I didn't expect the tie-in with temperature to be as strong as it was," Walsh said. "All the variables are connected with temperature. All components of the Arctic system are involved in this change." "Never have so many Arctic indicators been brought together in a single paper," he said.

The authors correlated records of observations from 1971 to 2017 of nine key indicators: air temperature, permafrost, hydroclimatology, snow cover, sea ice, land ice, wildfires, tundra and terrestrial ecosystems, and carbon cycling. All the indicators correlate with rising temperatures, pointing to a warming climate and a fundamental change in the Arctic.

"The Arctic system is trending away from its 20th century state and into an unprecedented state, with implications not only within but beyond the Arctic," according to lead author Jason Box of the Geological Survey of Denmark and Greenland in Copenhagen. "Because the Arctic atmosphere is warming faster than the rest of the world, weather patterns across Europe, North America and Asia are becoming more persistent, leading to extreme weather conditions. Another example is the disruption of the ocean circulation that can further destabilize climate: for example, cooling across northwestern Europe and strengthening of storms," said Box.

The paper is part of a special issue on Arctic climate change indicators published by the journal *Environmental Research Letters*. ON THE WEB: The paper is available online at <https://doi.org/10.1088/1748-9326/aafc1b>



## FROM OUR BOOKSHELVES



### The Nature of Life and Death – Tales of a Forensic Ecologist

by Patricia Wiltshire

2019 G.P. Putnam's Sons

*"The Nature of Life and Death"* by Patricia Wiltshire is a blend of science writing and true-crime narrative that explores the valuable, but often shocking, interface between crime and nature—and the secrets each can reveal about the other. From mud tracks on a quiet country road to dirt specks on the soles of walking boots, forensic ecologist Patricia Wiltshire uses her decades of scientific expertise to find often-overlooked clues left behind by criminal activity. Here is what the reviews have to say:

- **Washington Post:** "... one of those extraordinary books that will appeal to almost everyone. If you're a Mary Roach fan, fascinated by the macabre and grotesque, you'll get to follow Wiltshire into mortuaries and watch her pick apart cadavers. If you're a *Lab Girl* fan, inspired by stories of women blazing new trails in science, that's Wiltshire's entire career. If you're a gardener, you will love knowing how often botany has saved the day. And if you're a crime fiction fan — well, you've found your new favorite sleuth.
- **Science Magazine:** "In today's world of scientific specialization, Wiltshire laments the movement away from the traditional fields of science, biology, chemistry, physics, and math. Experiences as a generalist in biology served her well as she developed her expertise in the complex field of forensic ecology. But it is ultimately her scientific mind and inquisitiveness that have been most beneficial to her forensic career. Enjoy this book. It will leave its trace on you."
- **Shelf Awareness:** "Those interested in plant and animal sciences or forensics will be particularly rapt at the microscopic levels of proof Wiltshire obtains. Even as she writes for a broad audience, Wiltshire comes across as enigmatic as her subject matter. She writes from a self-centered but somewhat aloof point of view and in a straightforward manner befitting a lecturer. Wiltshire is under no obligation to share herself; her credentials and the case studies speak for themselves."



### Making Eden – How Plants Transformed a Barren Planet

By David Beerling

Oxford University Press 2019

*Making Eden*, by David Beerling is part of the Oxford Landmark Science range: 'must-read' modern science and big ideas which have shaped the way we think. It draws on the latest exciting scientific findings, including Beerling's own field work to piece together how the first land plants survived and spread, with the help of fungi.

Few of us stop to consider the origin of the plant kingdom that turned the world green and made our lives possible. And as the human population continues to escalate, our survival depends on how we treat the plant kingdom and the soils that sustain it. Understanding the evolutionary history of our land floras, the story of how plant life emerged from water and conquered the continents to dominate the planet, is fundamental to our own existence. Plants have profoundly molded the Earth's climate and the evolutionary trajectory of life. Far from being 'silent witnesses to the passage of time', plants are dynamic components of our world, shaping the environment throughout history as much as that environment has shaped them.

In *The Emerald Planet*, David Beerling puts plants center stage, revealing the crucial role they have played in driving global changes in the environment, in recording hidden facets of Earth's history, and in helping us to predict its future. His account draws together evidence from fossil plants, from experiments with their living counterparts, and from computer models of the 'Earth System', to illuminate the history of our planet and its biodiversity. This new approach reveals how plummeting carbon dioxide levels removed a barrier to the evolution of the leaf; how plants played a starring role in pushing oxygen levels upwards, allowing spectacular giant insects to thrive in the Carboniferous; and it strengthens fascinating and contentious fossil evidence for an ancient hole in the ozone layer. Along the way, Beerling introduces a lively cast of pioneering scientists from Victorian times onwards whose discoveries provided the crucial background to these and other puzzles.

# 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 indicated 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	E-Mail Newsletter	Snail-Mail Newsletter	Both Mail Deliveries
<input type="checkbox"/> Full-time Student	\$12	\$22	\$22
<input type="checkbox"/> Senior Citizen	\$12	\$22	\$22
<input type="checkbox"/> Individual	\$15	\$25	\$25
<input type="checkbox"/> Family	\$20	\$30	\$30

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Telephone: (Home) \_\_\_\_\_ (Cell) \_\_\_\_\_ E-Mail: \_\_\_\_\_

PLEASE RENEW OR JOIN TODAY!  
ANPS Membership is on a calendar-year basis, so  
if you renew today you'll be covered throughout 2020!