

Refuge Notebook

Volume 3 • 2001

This volume was compiled in 2015 by Jennifer Peura from the Kenai National Wildlife Refuge's archive of *Refuge Notebook* articles. Formatting has been improved, some hyperlinks (URI's) have been updated, and minor edits were made, but the articles have mostly been unchanged.

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New Year's resolutions for the Peninsula homeowner

by Doug Newbould

As if Y2K could get any stranger—the Yukon Delta National Wildlife Refuge experienced a 15,000 acre wildfire last week! I don't know about you, but I am glad to see the year 2000 in my rear-view mirror. From a firefighter's perspective, it was the worst year I've ever experienced, and I don't want to see its re-enactment in 2001 either. Looking back, a useful motto last January might have been, "Expect the unexpected in 2000." As a firefighter and fire manager, I have made that motto my creed: "Always expect the unexpected." And I can say truthfully, it has served me well throughout my firefighting career.

As a homeowner here in Alaska, I know there are many practical things I can and should do to prepare my home and property for the next natural or man-caused disaster—be it wildfire, earthquake or volcanic eruption. We can mitigate or reduce the impacts of disasters, improve our survivability, and decrease the time and resources needed to recover from a catastrophic event if we plan ahead for the unexpected.

So here are some practical New Year's resolutions for the Peninsula homeowner:

- I will install, replace and/or inspect my smoke alarms, carbon monoxide detectors, fire extinguishers and home sprinkler system.
- I will clean my chimney or stovepipe at least twice this year.
- I will review and practice fire escape and earthquake plans with my family.
- I will prepare/inspect survival kits in my home and vehicles.
- I will strap the water heater and tall furniture/appliances to the walls, install safety latches on the cabinets and make sure the house is properly anchored to its foundation.
- I will install 'safety shield' window film on my windows and keep a supply of plastic and plywood to cover windows that break out.

- I will create a defensible space around my house and outbuildings.
- I will install a visible address sign at my house and make sure the local street signs are clearly labeled.
- I will make sure emergency vehicles can use my driveway and can turn around safely.
- I will establish an emergency water supply for power outages.
- I will retrofit/remodel the exterior of my home with fire-resistant materials.
- I will get to know my neighbors and talk with them about disaster mitigation and preparedness.

This list of resolutions might be more than a person or family could handle in one year, depending on their current level of preparedness, their financial resources and their level of commitment. And this is not meant to be a complete list. I'm sure you can think of other things you can do to prepare for the unexpected. Whatever you do, try not to be intimidated by this list. Many of these resolutions can be accomplished without a lot of effort or expense. You know there is only one way to eat an elephant—one bite at a time.

If you would like more information about disaster mitigation measures for your home, contact the Kenai Peninsula Borough's Office of Emergency Management, your local fire department or me. Let's expect the unexpected and make ourselves ready. 2001—Here We Come!

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. He is currently serving on two Kenai Peninsula Borough Project Impact committees and is a member of the Kenai Peninsula Fire Chiefs Association. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

A snowy owl visits the Kenai Peninsula

by Elizabeth Jozwiak

If you spent your summers on the windswept plains of the Arctic, where would you spend your winters? How about the Kenai Peninsula? Well surprisingly that's where one juvenile snowy owl landed last November. The "snowy" was found along the bluffs north of Kenai by a good Samaritan who noticed it wasn't able to fly. After being examined by a local veterinarian for injuries and given a clean bill of health, the owl is now fattening up on voles, lemmings and other small mammals as it recuperates from its travels.

Two other snowy owls made an appearance in Sitka in November, giving local birders an opportunity to observe one of the most striking and distinctive of the world's 146 species of owls.

So why are these large, mostly white owls showing up in areas outside their usual winter range? Like most other Arctic-breeding raptors, the movements of this species are sporadic in nature, rather than consisting of regular migration routes. Some biologists believe the availability of their main food source (which is primarily lemmings and voles) dictates where they decide to winter. Other owl researchers believe that their wintering grounds are influenced by a combination of large scale weather events in addition to the variable abundance of their prey. Snowy owls are a common sight in northern Alaska above the Arctic Circle but are rare visitors to Southcentral and south-coastal Alaska. They breed in the summer along the north slope of Alaska, the Arctic tundra of Canada, and along the northern coast of the continent from the Yukon to Labrador.

Some snowy owls remain over the winter in the areas where they nest. Others migrate to more southern latitudes, wintering on the prairies of western Canada, southern Ontario and Quebec, the northern United States, and sporadically as far south as central California and the Gulf states from Texas to Florida. It is mostly first-year birds that visit these less frequented areas, with relatively few adult owls appearing. On average immature males winter farthest south, adult females farthest north, with adult males and immature females in between.

The heaviest of North American owls, the snowy owl stands almost one half meter tall. The female is larger and heavier than the male and can be slightly darker in color than the male, which may be almost pure white. The ear-like feather tufts characteristic of many species of owls are greatly reduced in snowy owls and are rarely visible, giving the head a typically rounded outline. This is one of only a few species of owls which is active during the day.

Years ago when I just graduated from college and worked one summer for the Arctic NWR on the Arctic coastal plain, I was fortunate to see snowy owls nesting on their breeding grounds. The nest was just a shallow depression scraped in the ground by the female. Most nests were located up on a knoll or tussock on the tundra, which provided the incubating females with a commanding view of the surrounding terrain.

The breeding success of snowy owls is very dependent on the lemming population in regions where owls depend on this small chunky mammal for food. When lemmings are very abundant, the owls respond by laying as many as 11 or 12 eggs. When lemmings are less numerous, clutch size is reduced to four-six eggs. Snowy owls may not nest at all for a year or two if the lemming population crashes, or they may move 50-100 kilometers and breed in another area where lemmings are more numerous.

Snowy owls seem to be well adapted to cope with changes to their environment and their food supply. While food shortages may be a danger, their mobility permits them to move to areas where food supplies are sufficient. Some immature, inexperienced birds that wander beyond their normal winter range (such as our recent visitor) may suffer from starvation, but human activities probably still pose the greatest danger to owls that winter in settled areas.

Elizabeth Jozwiak is a wildlife biologist at the Kenai National Wildlife Refuge. She studies a variety of species, but enjoys every opportunity to work with owls. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Winter months mean training and summer preparation

by Bill Kent

Those of us on the Visitor Services staff at Kenai Refuge stay busy through the winter even though the throngs of visitors are not around as in July. This is the time of year we tackle the never-ending paperwork that is part and parcel of working for the government, attend training courses, and continue with the ever-present preparations for our summer programs.

At times, it would seem there is a specific office somewhere in Washington, D.C., whose sole purpose is generating reporting requirements. Although I am sure each of these reports fulfills an important accountability function, there are times when you just have to wonder... how many times can you count the number of vehicles, boats, toilets, or other pieces of equipment? Is there someone back there on the east coast who thinks we lost a toilet, or misplaced the grader during the past year? I can assure them (and you) that we would let someone know if either of those incidents occurred. My guess is, because we are funded by Congress, these reports are probably used to reassure our elected representatives that we are actually using the equipment purchased with those appropriated funds.

The winter months are also when we complete a great deal of mandatory training in such areas as supervision, pilot accreditation, law enforcement, first-aid and CPR refresher, aircraft safety, interpretation, and education outreach. Personally, I am a firm believer in training in order to keep employees' skills and enthusiasm at a high level, both for the employees' benefit and our visitors. It is the policy at Kenai Refuge that each year, everyone gets one training opportunity which helps them professionally; this is in addition to whatever mandatory training is scheduled. Some of the training opportunities my staff has taken advantage of over the past years are interpretation skills development, wilderness stewardship, various law enforcement skills development courses, environmental education curriculum development, training for qualification as an aircraft safety instructor, and other disciplines. By attending these various types of training, we are better able to deliver better quality visitor

services to you and others and to make a visit to Kenai Refuge a safe and enjoyable experience. We also use this time to review the training we provide to our seasonal employees so they are prepared to assist you when you visit the Refuge this summer.

A great deal of our time in the winter is used to prepare for the upcoming "busy season." Currently, one of the projects we are busy with is working with a contractor to develop and produce interpretive and information signing for the new visitor facilities at Moose Range Meadows, along the south bank of the Kenai River on Keystone Drive. We plan on having information there regarding riverbank protection, visitor safety, sockeye fishing techniques and other topics. Our law enforcement staff continue their patrols throughout the winter, checking on fishermen, trappers, and other Refuge users to insure compliance with laws and regulation and to assist visitors who may need help with one problem or another. Another task is reviewing and selecting volunteer applications sent to us by the Student Conservation Association for positions assisting us with spring/summer/fall visitor services and environmental education programs. One of the bigger projects this year is planning the celebration of the 60th anniversary of Kenai National Wildlife Refuge; President Franklin Roosevelt signed the order to create the Kenai National Moose Range on December 16th, 1941. (With everything else on his mind at that time, I am amazed he took the time to take that action.) We will be providing more information on this celebration in future *Refuge Notebook* articles and other means in the coming months.

All in all, this time of year means we remain busy because the work doesn't take the winter off... it just takes on a different face.

Bill Kent is the Supervisory Park Ranger at Kenai NWR. He and his wife and daughter recently moved to Sterling after living in Soldotna for nine years. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Reflected heat warms Earth, man, and moose alike

by Ed Berg



A moose will typically seek thermal cover in the forest. Pictured here at Skilak.

By any standards this is a strange winter in Alaska. Fairbanks temperatures are about 18°F above normal this winter, and Anchorage is up about 10-11°F. My black Lab is shedding, garden perennials in Homer are sprouting, and the Refuge still hasn't been opened for snowmachining, due to lack of sufficient snow. What is going on!?

Meteorologists report that the Aleutian Low Pressure zone is lower than normal, and this has held cloud cover over Alaska since early in November, with few breaks. Due to the clouds we have missed several good aurora displays, a meteor shower, a Christmas solar eclipse, as well as the cold weather.

Clouds make a great blanket because they reflect infrared radiation (i.e., radiant heat) back to the earth. Infrared is invisible to the naked human eye, so it's easy to overlook its importance. We all enjoy direct infrared sources like woodstoves and heat lamps, but have you ever tried to sense reflected infrared heat? Here is a simple experiment, for kids of all ages. Stand in the middle of a room with a large thermopane window or two. Stretch out your arms together with your palms facing a wall. Shut your eyes and concentrate on your palms; think of them as heat sensors. Now turn slowly and sweep your heat sensors past a window. You should feel a slight cooling of the palms. Sweep further to another wall and feel the heat return.

The real test comes when you have someone spin

you around blind-folded, and you can still detect the windows even when you have lost your orientation to the room. The principle here is that your body radiates infrared rays; these rays are reflected and re-radiated from the wall, and returned to your palms where you sense them as heat. When you aim your rays at a window, most of them pass through the window glass and are lost to outer space (the sky) or scattered by vegetation, other buildings, etc., beyond the window.

It is possible to install transparent heat-reflective films on window glass, which reduce the infrared transmission (i.e., heat loss) through the window. These films actually work, and you can feel the difference with your palms if you compare windows with and without the film side-by-side. A room with reflective-film coated windows feels warmer, even at a lower air temperature, because the reflected heat warms your skin. The gold-windowed glass office buildings in Anchorage have taken this concept to near max; full max would be windowless rooms lined with shiny tinfoil, if one didn't mind the aesthetics!

Wild animals, especially large ones, know well the virtues of reflected heat. Moose for example seek "thermal cover" in the forest, where trees reflect back the moose's infrared heat, as well as re-radiate heat gained from the sun and sky. If we quantify heat energy in units of "Snickers bars" (at 290 nutritional calories per Snickers bar), a 1000 lb. moose on a calm night (2 mph breeze) will lose the equivalent heat of 1.57 Snickers bar per hour, or about 22 Snickers bars per 14 hour night. If the moose moves into the woods, it will lose only 0.31 Snickers bars/hour or 4.4 Snickers bars per night. Thermal cover thus cuts radiant heat loss for the moose by 80%. Imagine having your winter fuel bill cut by 80%!

A good burrow provides a three-dimensional heat reflector for burrowing critters. A burrow also reduces heat loss from wind (convection) and evaporation, and if the animal is resting on an insulating bed of grass or leaves, this reduces heat loss by conduction to the burrow floor.

It is possible, however, to overdue a good thing. Just as clouds (composed of water vapor) reflect back the Earth's heat and make our winter warmer, the in-

visible carbon dioxide (CO₂) gas in the atmosphere reflects back heat and warms both the ground and the air. As more CO₂ is added from fossil fuel consumption (beyond natural sources like respiration, volcanos, forest fires, etc.), the atmosphere is becoming a better reflector and we are experiencing global warming. In all fairness, however, we probably shouldn't blame this particular warm winter on global warming. Strong Aleutian Lows (and cloudy winters) come and go over the years and decades, but long-term warming trend is hard to ignore, especially in the northern

latitudes. Winters in Alaska have warmed over the last century, and not everyone would say that's a bad thing.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Information about Snickers bars and moose is from the excellent book "Winter: an Ecological Handbook" by James Halfpenny and Roy Ozanne, 1989, Johnson Books publisher. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

User fees finance refuge services

by Pam Ables



Raptor visits during the Refuge's open house are partially funded by a book from the visitor center via the Alaska Natural History Association.

Camping, boating, fishing, hunting, hiking, skiing, school field trips, etc... Public lands offer innumerable opportunities for all. I believe that no refuge in Alaska except the Kenai National Wildlife Refuge offers so much for so little. Have you ever wondered what happens to the 10 bucks that you pay each night you stay at Hidden Lake campground? Or what happens to the \$14.95 you pay for a book at the Visitor's Center?

Unlike the tax dollars we all pay, the fees collected for refuge services take a refreshingly short path through government red tape. We have three types of collections on the Kenai Refuge: a bookstore, campground fee collection, and administrative fees for guide permits. I'd like to take this opportunity to tell

you about each type and what happens to the money once the refuge has collected it.

Alaska Natural History Association (ANHA): When you buy a book or item at the visitor center or visitor contact station near Jim's Landing, you actually buy from ANHA, a non-profit organization dedicated to the education and understanding of Alaska's public landowners. There are many ANHA outlets throughout the state at other refuges, national forests and parks, state parks, and other visitor centers. Money spent at the ANHA bookstores has been helping the Refuge provide educational services and materials for more than 20 years.

The refuge newspaper *Refuge Reflections* printed with ANHA funding, serves as an excellent resource for visitors and new staff to learn about the refuge's recreational opportunities. ANHA also supports environmental education training for local teachers and helps to fund refuge environmental education programs during the fall months when refuge funds are in short supply at the end of the fiscal year. Have you joined us at the Refuge Open House in the fall? If so, you have probably seen our raptor visitors from the Anchorage Bird Treatment and Learning Center (TLC). ANHA funds the raptor visits and also helps the refuge to show our appreciation to the community by providing some of the food that is prepared and served by the staff.

Campground Fees and Golden Age Passports: Ten dollars at Hidden Lake per night! Ten dollars for a Golden Age passport for Senior Citizens to select campgrounds and other federally-funded facilities? What happens to the money that goes into staying at one of those fancy California-style campgrounds out on Skilak Lake Road?

The Kenai Refuge received money to build these beautiful campgrounds, but what about money to maintain them? Prior to 1999 the Kenai Refuge used 70% of the fee money to maintain the campgrounds; the other 30% went into a black hole called "overhead." Now the Refuge System is able to use the Fee Demo Program, which is available to other federal agencies that provide similar visitor services. This program returns 100% of collected fees directly to the Kenai

Refuge. This money comes to us as “no-year money,” which means it doesn’t go away at the end of the fiscal year (September 30); the money carries over for refuge campground maintenance and improvements in subsequent years. For example, in 1999, we collected \$30,328 in campground fees from our two fee campgrounds. This money was used for trash pickup, outhouse pumping, campground patrol, campground hosting, and maintenance in the summer of 2000. In 2000, we collected \$29,409, which will be added to the 1999 remaining balance for 2001 maintenance.

Permit Administrative Fees/Client Use Fees: “Administrative fee” sounds much like “overhead” to me, but this money really does have a functional destination. When guides apply for permits, they pay a \$100.00 administrative fee as well as a fee for each day they have a client in the field. These fees come to the refuge through the Recreation Fee Program. We get 70% of this “no-year” money. It is used to maintain guide permit information, hunting/fishing patrol, Law Enforcement issues, and maintenance. In years past all guides had to pay \$100 a year for their permits. In 1998 we issued the first 5-year permits charging the same administrative fee as the 1-year guides. This change accomplished four things:

1) It decreased the amount of administrative time spent on each permit, thus requiring less money to maintain a permit.

2) Guides who consistently fail to meet the requirements of the permit or receive a violation now pay four times more than the guides who are out there working hard to run a quality business.

3) It rewards guides who diligently submit all the documentation required to operate on the refuge.

4) Lastly, it provides incentive for guides to meet the requirements of the permit and the law. Qualifying for a 5-year permit saves a guide \$400 over the life of the permit.

So, drop by the campgrounds on Skilak Lake for a couple of days or stop by Refuge Headquarters for information before taking that hike. It’s yours...bought and paid for.

Pamela Ables has worked for the Refuge System since 1986. She is a IT Specialist and also supervises the administration of refuge funding each year. She lives in Kenai with her husband, Myke, and his daughter, Destiny. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Critters' fire survival instincts often better than ours

by Doug Newbould



Photo by John McColgan, Bureau of Land Management, Alaska Fire Service. Alaskan Type I Incident Management Team observed elk during a forest fire.

As a firefighter there is one question I have been asked repeatedly over the years, "What happens to all the animals during a wildfire?" Well, it's a good question, and I don't think there is one definitive answer. Some wildland fires have a drastic effect on wildlife, while other fires have little effect. Sometimes the effects are limited to certain species, while other times all species are affected in a given area. It depends on the fire's behavior—its size, its intensity and its rate of spread. It depends upon the types of forest fuels that are present, upon the terrain and upon the weather.

The effects of fire on wildlife can be seen on different scales of time and space. There are short-term effects like displacement, injury and mortality. And there are long-term effects on populations through the vegetation they eat; moose and hares for example thrive on fire because they eat the hardwood browse (birch, aspen, and willow) that comes in after a fire. Furthermore, fire effects can be limited to small geographic areas like the Echo Lake Fire (1969) or to large landscapes like the Greater Yellowstone Area (1988).

What amazes me are the instincts, abilities, and adaptations that wildlife use to survive wildfires. Many readers will remember the incredible color photograph from the Bitterroot River in Montana this past

summer. Two elk were standing in the middle of the river while fire consumed the mountain slopes above them. I don't think I'll ever forget that awesome scene. But it is indicative of the survival instincts and intelligence that animals possess.

Mammals such as moose, elk, bear and wolves can move swiftly when necessary, and they use that ability to escape an approaching fire. Smaller animals like badgers, mice and snakes can survive fire underground, in their burrows. Birds fly to safety. Of course, some wildfires are so large and move so swiftly that many animals and even people cannot escape. Fortunately, this doesn't happen often. Usually, there is time to evacuate an area before a fire gets large enough to entrap us, both people and critters.

I witnessed two examples of wildlife survivability at the Cave Gulch Fire near Helena, Montana last summer. There was a little sub-adult black bear in the Magpie Creek valley, more or less in the middle of 30,000 acres of fire-scoured forest land. And for several days after the fire roared up the canyon consuming almost everything in its path, my fellow firefighters and I saw that young bear limping gingerly around the valley bottom. Wildlife biologists were called in to capture the bear, but they were unsuccessful. One man said he saw the bear enter an old mine tunnel and the speculation around fire camp was that the mine became the bear's refuge during the "firestorm." Apparently, the little bruin burned the pads of his feet during his amazing escape through the flames and hot ashes. If you stood in that valley today, you would wonder how anything could have survived such devastation. There is nothing left but naked black trees, crumbling cabin foundations and gray ash.

One morning while I walked along Magpie Creek, marking burned out snags that might fall on the road, I heard a very distinctive sound directly behind me. It was something like the sound my mother used to make when I got a little rambunctious in church, "Shh-hhhh!" I'd only heard that sound once before in my thirty or so years of walking in the woods, but my instincts told me to move Now! The next thing I knew, I was standing on the other side of the creek, facing in the opposite direction. To this day, I don't remember

how I got from point-A to point-B without getting my feet wet in the creek. But I think I would have won the gold medal in the standing broad jump that day.

After I started breathing again, I went back across the creek to find the critter that pushed my “launch button.” There, beneath an undercut root wad was a little three-foot timber rattler, all coiled up and chittering his little cold-blooded heart away. I had just been standing about two feet in front of his shelter when he had issued his warning, “Don’t tread on me!” To think I had been walking across a seemingly sterile landscape, my boots six inches deep in white ash, with no idea that something could still be alive in that

place. I stood there, a safe distance away this time, and thought about the paradox, “How can life be so strong and yet so fragile on this wonderful planet we live on?” And I thought about the instincts that saved me from a rattlesnake bite. Perhaps we humans still possess some of that same survivability that critters use every day.

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Concern for wilderness caribou

by Rick Ernst

The Kenai National Wildlife Refuge is home to five different herds of caribou. The herd most visible in summer is the Kenai Lowland herd which roams the muskeg areas between the Kenai gas fields and Kenai airport. This herd migrates east onto the refuge to spend the winter in the Moose River flats or the Funny River area. The Kenai Mountain herd ranges in the mountains north of the Sterling Highway and west of the Seward Highway. These animals may also be seen by hikers, bikers, or snowmachiners. But the other three herds—Twin Lakes, Killey River, and Fox River herds—roam wilderness areas in the middle Kenai Mountains between Skilak Lake and the Fox River which enters Kachemak Bay. These caribou are seen only by pilots who fly overhead or those hardy types that venture into the backcountry on horseback or foot.

Many small caribou herds across Alaska are declining in numbers, such as the Mentasta, Chisana, Beaver Mountain, and Southern Alaska Peninsula herds. On the contrary, the Killey River herd is increasing, to the point that biologists and game managers are concerned that the caribou are damaging their habitat. Most ungulate species are limited by their winter habitat, i.e. their population size is controlled by the amount of winter food available. If there is less food, or less nutritious food, the numbers will decline, as juveniles and weaker animals die off. For caribou, the main winter food is lichen. I have had the opportunity to hike around the high country the past several summers and hunting seasons. I am concerned about the damaged lichen beds, especially when I compare the range to areas south of the Fox River where caribou are absent. Where there are no caribou, the lichens are bushy, thick, and more numerous; they are so abundant that I hate to walk on them.

Lichens are composed of two separate organisms, an alga and a fungus. The alga has chlorophyll to manufacture food, and the fungus is made up of spongy threads that support the alga and protect it from drying out. Lichens are most suitable for northern climates and are able to produce food in low temperature and low light conditions. Lichens are divided into three groups or shapes: “crustose” which form a crust

on rocks, “foliose” leaf-like forms, and “fruticose” or miniature bushy forms. The fruticose type is often used as shrubs for Christmas train displays, and this same type is the most important food for caribou in winter. Caribou can smell lichens beneath the snow and will paw down to get them, in a process called “cratering.”

Lichens are slow growing and are vulnerable to overgrazing and trampling. The Killey River herd confines itself to a very limited range in the high alpine at the headwaters of the Killey and Funny Rivers. As the population grows, the animals tend to trample in summer the very plant life they need during the winter. Most caribou herds have separate summer and winter ranges; unfortunately, the Killey River caribou spend the entire year on the same range. There is some evidence that the Killey River herd is expanding its range, which would be good news. This past May I found several small groups and individual caribou giving birth on nunataks (isolated peaks projecting through the Harding Icefield). I observed some cows walking out on the Icefield itself several miles from “land.” It is possible that some of these roaming animals may have ventured into new areas for the summer. It is also the first time caribou have been located in the Kenai Fjords National Park, which shares the Harding Icefield with the Refuge.

This past November, biologists with Alaska Department of Fish and Game (ADF&G) counted over 600 animals in the Killey River herd. This is the largest number ever counted, and it is remarkable considering that presumably all of these are descendents of the original 60 or so animals we airlifted into the mountains in 1987-88.

We want to keep the Killey River herd under control so they don’t destroy the habitat and cause a population crash. Predation from wolves, bears, wolverine, and eagles helps to remove some animals from the herd, but apparently not enough are taken to stabilize the numbers. Human predation in the form of hunting is also needed, and we hope that with sufficient natural predation and hunting, the herd can be maintained at a sustainable level. With luck we can keep it from following the all too common declining path of other

small caribou herds in Alaska.

The Refuge has joined with ADF&G and the U.S. Forest Service in a Cooperative Management Plan for the Peninsula's caribou herds. The plan goals are to maintain caribou populations at optimum levels in conjunction with habitat protection, to provide the opportunity for herds to expand into new areas, to provide for hunting and non-consumptive recreational use, and to provide for scientific research.

To meet these goals we currently have thirteen radiocollars to monitor caribou winter and summer

movements, and we will be undertaking some surveys of lichen range condition this summer. From these data we hope to make some estimate of how many caribou the limited range can sustain before the population would crash, so that hunting quotas can be set to keep the population below this maximum level.

Rick Ernst is a Wildlife Biologist/Pilot at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Winter use of Kenai National Wildlife Refuge cabins

by Rick Johnston



The cabin at Caribou Island

This is a good time of year to visit one of the public-use cabins on the Kenai National Wildlife Refuge. The longer hours of daylight and moderate temperatures of late February and March make a cabin trip a great family outing. Refuge cabins are open to the public on a first come, first serve basis. There are no charges or reservations; maximum stay is seven days. Most of the cabins have saws to cut firewood and if you're fortunate, the previous user will have left enough stove wood to get you started.

Although these cabins receive some maintenance from Refuge staff, users, and volunteers, this care is infrequent and low key. Users should plan to bring all necessary supplies, including a back-up tent, in case the cabin is in use by another party. Eight of the nine public-use cabins have some type of stove, but the stove and chimney should be carefully inspected before lighting any fires, and monitored closely during operation.

The number of public-use cabins is considerably less than the number of cabins present on the Refuge. There are other structures, historical in character or otherwise, that hikers, skiers, snowmachiners, or others may come across while traveling on the Refuge. A 1984 cabin inventory documented more than 30 existing cabins and several others that were only partially standing. There are probably still a few old historical structures out there that have not yet been discovered.

Structures of relatively recent origin often have finished wood (plywood) or plank construction and are probably trespass structures, whereas historical structures usually have log construction.

Cabin users should remember that historical cabins and any artifacts within or around them are legally protected from disturbance and removal. Refuge regulations and other federal laws are designed to preserve historical information and objects, and forbid any souvenir collecting.

There are also cabins on private inholdings within the Refuge, such as along the northeast shore of Tustumena Lake, which are privately owned and are not generally open to the public.

One of the most accessible public-use cabins is the Finger Lakes cabin, which can be reached by hiking, skiing or snowmachining the Finger Lakes Road. The Finger Lakes Road is closed to public vehicular traffic, but can be used as a trail. The cabin can sleep four in a pinch, and is less than two miles west of Swanson River Road. A Refuge gate blocks the road and serves as a trailhead. The cabin can also be reached by ski plane, and the area has average to good ice fishing. The cabin is located near a small island of large trees within the 1969 Burn, where one often sees moose, lynx, coyote, hare and other wildlife (or at least their tracks). The last time I was there overnight, I heard both coyote and wolves calling. The Finger Lakes cabin was originally built by the Refuge for a scientist doing grouse research. It is of log construction and looks and feels like an Alaskan cabin. I should mention that recent vegetation clearing and other activities associated with the construction of a natural gas pipeline between Wolf Lake and Beaver Creek may put some truck traffic and noise on the otherwise sleepy Finger Lakes Road. Cabin users parking at the Finger Lakes gate should not block the road at the trailhead.

Caribou Island cabin on Tustumena Lake is another very nice destination in late winter. It normally has good ski and snowmachine access, but this year's moderate winter has left ice conditions on the west end of Tustumena Lake too thin for safe travel, other than by water skis. The cabin can still be safely reached by skirting the south shore of the Kasilof River and Tustu-

mena Lake. The log walls, roof and floor of this cabin are in fair to good condition and it can sleep four. The wood supply is relatively poor, and searching for stove wood is one of the pastimes to expect at this otherwise perfect location.

Two favorites for those with ski-equipped aircraft are the Vogel Lake and Trapper Joe Lake cabins. Both are approximately a 30-minute flight from the Kenai-Soldotna area, and several local air taxis with skis can get you there and back safely. The Kiwanis Club of Anchorage and other volunteers maintain these two cabins for public use.

The Trapper Joe cabin looks and feels more like a historical Alaskan cabin because of its earlier period of construction and low-to-the-ground style. It is smaller in size and is easier to heat by stove, and sleeps three to four. The Vogel Lake cabin sleeps four to six. Both lakes have ice fishing and are great places to search for winter wildlife sign. Some snowmobilers have also recently discovered these cabins.

The other Refuge cabins have their own unique locations and challenges. The Doroshin Bay cabin is located in Doroshin Bay on the far northeast side of Skilak Lake and is reached via Skilak Lake or by Hidden Creek Trail in combination with Skilak Lake. When the ice is thick it is easily accessible. Trouble is, even in a cold winter, the upper Kenai River dumps into Ski-

lak Lake and causes either open water or thin ice for a half mile from the mouth. Travelers must skirt the open area toward the main lake to find safe ice. Caution is essential, and I recommend checking with the Refuge before making this trip. Skilak Lake is deep and cold.

The Doroshin Bay cabin can also be accessed by boat in the late winter when Skilak Lake is ice-free. During a moderate winter such as this one, Skilak will remain ice-free for most of the winter, but the Upper and Lower Skilak boat ramps are terribly slick and their use is dicey at best.

Other public-use cabins include Big Indian, Lake Emma, and Pipe Creek. Information of their location, condition and access options is available at Refuge headquarters.

Refuge cabins can give visitors a chance to experience the Refuge during winter months when tent camping seems a little intimidating. The Refuge has a rich and interesting human history, and visiting the cabins can be a great taste of Kenai Peninsula history.

Rick Johnston is a Ranger/ Pilot for the Kenai National Wildlife Refuge. For more information on Refuge public-use cabins call Refuge Headquarters at 262-7021. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Unsolved mystery: deformed-bill black-capped chickadees

by Ted Bailey



A black-capped chickadee with a deformed maxilla and mandible. Photo by USGS http://alaska.usgs.gov/science/biology/landbirds/beak_deformity/index.html.

Most of us like to believe that in “pristine” Alaska we are immune from the ecological problems of the “Lower 48.” There is increasing evidence, however, we are not exempt from such problems, as the following strange puzzle will illustrate.

In the last several years, Southcentral Alaska has seen a dramatic increase of black-capped chickadees with deformed bills. Recently such birds have been seen in the Strawberry Road and Poppy Lane areas. Biologists from the Alaska Biological Science Center in Anchorage have been collecting these reports and are trying to discover the cause of the deformities. Kenai Refuge biological technicians Todd Eskelin and Stephanie Rickabaugh are capturing, leg-banding, and collecting blood samples from black-capped chickadees on and near the refuge.

The chickadee bill deformities range from barely detectable to grotesque. Sometimes the top bill curves in a long U-shaped arc back towards the head. Such birds are unable to pick up food in a normal fashion and must twist their head sideways to pick up food with the side of the bill. Normal birds carefully preen their feathers, but deformed-bill birds often look ragged and unkempt because they can't properly groom themselves. Usually, deformed-billed birds are observed at bird-feeders. Could bird-feeders or commercial bird food be responsible for the deformities? But, if so, why are few other bird-feeder species simi-

larly affected?

We don't know why black-capped chickadees are the most affected birds. Their cousins—boreal chickadees—rarely have bill deformities, and other species such as red-breasted nuthatches are seldom affected. Nevertheless, there are some interesting patterns that may or may not be relevant. Black-capped chickadees are year-round residents; they don't migrate to spend winters in, say, California or Central America. This suggests that the deformity cause is restricted to Alaska, specifically, so far as we know, to Southcentral Alaska.

Why are only black-capped and not boreal chickadees affected? Boreal chickadees prefer spruce forests, while black-capped chickadees utilize more diverse habitats including deciduous forest. Could the deformity cause somehow be associated with their different habitats?

Black-capped chickadees store food, primarily seeds, in trees under bark, in crevices between limbs, and in other “secret” places for later retrieval. This storage includes food from birdfeeders, such as sunflower seeds and suet. Chickadees typically remove the shell from sunflower seeds before caching them. At peak activity, a chickadee will store hundreds to thousands of food items per day. In Norway, a related species stores 50,000 to 80,000 spruce seeds each autumn. Could this food-caching behavior somehow be related to the deformed bills? With the recent spruce bark beetle outbreak in Southcentral Alaska and the spraying of trees in certain areas for protection against the beetle, one might suspect that chemical spraying could be a potential factor. But again, there is no “smoking gun” in the form of solid evidence for a chemical cause; it is just another hypothesis to be evaluated.

Peninsula Clarion readers can help us address this major “unsolved mystery.” If you observe a deformed-bill chickadee or any other species, please report it to the refuge at 262-7021, and report it to Colleen Handel at cmhandel@usgs.gov of the Alaska Biological Science Center in Anchorage. A small number of chickadees were banded near Soldotna last week. Normal chickadees have an aluminum band on their foot. Po-

tential deformed-bill chickadees have a color band. If you see a leg-banded chickadee (of either type), please report it to us at 262-7021. This will show how far local chickadees travel. A leg-band number would also be helpful, but the numbers are small and difficult to read unless the bird is close by or you have a pair of binoculars or a spotting scope. We will keep Clarion readers informed as this story unfolds.

Ted Bailey is a supervisory wildlife biologist and has

been responsible for the Kenai National Wildlife Refuge's biological programs for over 20 years. He and his staff monitor and conduct studies of ecological conditions and wildlife on the refuge. Excellent photos of chickadees with deformed bills can be seen at http://alaska.usgs.gov/science/biology/landbirds/beak_deformity/ For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Little guys of the plant world area hidden treat

by Ed Burg

One of the secret joys of nature study is the raw appreciation of the myriad forms of living creatures. At times this appreciation is like listening to music—a physical or sensory experience that delights the eye as music delights the ear. For me a visit to a botanical garden or the lichen-carpeted alpine is much akin to listening to a symphony orchestra, being awash in the variety of sounds and their endless combinations. When I put an insect or a flower under the microscope, it's like putting on a CD of music. Sometimes the melody is familiar and I recognize an old friend, but often I am learning a new tune, which can be both exhilarating and frustrating, like a student at the piano bench. Were I a trained musician, I would hear much more in music than I do. A trained ear can name the notes, recognize the chord progressions, and repeat complex rhythms. Musically, I am like the casual hiker in the woods who sees only trees, but not white spruce or black spruce, not aspen or birch, or who sees only green ground, but not fire moss, feather moss, or liverworts.

With nature study, more than music, it is necessary to know the names of things and the names of their parts. Most of us who lack a photographic memory simply can't accurately remember something if we don't have a name for it. Furthermore, it is hard to tell the difference between two similar things if we don't know the names of their parts and characteristics. Beginning botanists usually find plant vocabulary intimidating, but these technical words are used in the identification keys and must be patiently mastered, like a foreign language, if one is to fully appreciate the great variety of plant life.

Some twenty years ago I set myself the goal of learning the names of all the plants on the Kenai Peninsula. I soon realized that I had to collect each plant in order to learn it. From Boyd Shaffer's botany class at the Kenai Peninsula College, I learned to mount plants on 5 x 8" index cards with clear contact paper. I now have more than 600 of these cards, and add more every summer.

In the last several years I have turned to studying the mosses and lichens—the little guys that most people barely see and couldn't begin to name. Studying

the little guys is mostly done under the microscope. Actually, I use two microscopes: first a 10-20 power schoolroom dissecting scope, and then a 40-400 power laboratory scope for looking at the cells of moss leaves and for counting lichen spores.

Visiting the microscopic world is like going to another country with an entirely new set of plants—a new flora. There are probably many more species of mosses and lichens in Alaska than there are species of the large (flowering) plants. Exact numbers mosses and lichens are hard to pin down, and hitherto unreported species are being found every year in Alaska, as are brand new undescribed species.

Many of the little plants look very similar and are tricky to identify. For mosses it is usually necessary to gently pull off some leaves with a fine tweezers and examine them under a microscope. The leaf cells can be long and skinny, or short and fat. Some cells have one or more pimples; some have thick walls, thin walls or pitted walls. For lichens it necessary to use simple chemical tests. A drop of bleach may turn a lichen red or pink; a drop of sodium hydroxide may turn it yellow, blood red, or purple. Ultraviolet light in a dark room may display a drab brown lichen as bright icy blue-white. These quick tests reveal the chemical differences between visually similar species, much the way our taste buds distinguish wines that look identical but have interesting chemical differences.

It is necessary to have good books when studying plants, be they large or small. Eric Hulthen's *Flora of Alaska and Neighboring Territories* (1968) is still the bible for the large plants. For the little plants of our area the best general book is Vitt, Marsh and Bovey's *Mosses, Lichens and Ferns of Northwest North America* (1988), which has excellent color photos and good keys. Readers with a green thumb will appreciate George Schenk's *Moss Gardening, Including Lichens, Liverworts, and Other Miniatures* (1997), also with many striking color photos. The two best lichen books for our area can be downloaded free from the Canadian Forestry site at <http://www.for.gov.bc.ca/hfd/pubs/docs/srs/srs08.htm> and [srs09.htm](http://www.for.gov.bc.ca/hfd/pubs/docs/srs/srs09.htm). (See srs01 to srs04 for flowering plant manuals.) The website of the American Bryological and Lichenological Soci-

ety is another rich source: <http://www.unomaha.edu/~abls/>

I will be giving a talk on mosses and lichens at 7pm next Tuesday (March 13) at River City Books (near the Soldotna Y). I'll bring my plant collections, and a pile of good plant books for show-and-tell, and we'll spend

the evening with the little guys of the plant world.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Kenai to host Alaska Regional FireWise Workshop, April 25-27

by Doug Newbould

We Alaskans have been quite fortunate. Despite all of the major wildfires this state has experienced in the past century, only one destroyed homes to the magnitude we saw in New Mexico and Montana last year. In 1996 the Miller's Reach Fire destroyed 454 homes west of Wasilla. Amazingly, no humans lost their lives during the chaos of that incident. We may not be so lucky next time. As a member of the wildland fire community in Alaska, I have heard it said many times, "It's not a question of—if a major wildfire will devastate a community somewhere in the state, it's a question of—when."

As the population of Alaska grows and development expands, more and more people are building their homes and businesses out in the wildlands, where they can experience the natural tranquility, the beauty and the wildness of this great land we live in. It's just the American way. It happened in California, it has happened in the Rockies and it's happening here. This condition of the landscape—where development occurs in traditionally natural areas, is known as the Wildland/Urban Interface or WUI.

Nationally, the occurrence of wildfire in the WUI is increasing, and many homes are lost each year. But there is hope. We have seen many homes left standing, basically undamaged after the passage of a wildfire. These survivors generally possess some common characteristics: defensible or survivable space, fire resistant building materials and design, a reliable water supply and adequate road access. Fire prevention and mitigation efforts around the country are beginning to make a difference. That is what the FireWise Community Action Program is all about.

FireWise is a new paradigm, a new standard, a new way to approach development in the wildland/urban interface. It is a way that homeowners and business owners can take responsibility for their own lives and property, a way they can survive and quickly recover

from the devastating effects of wildfire. It is a process that city planners and real estate developers can use to design a fire-safe community. It's a way that villages can retrofit their structures and treat the surrounding vegetation to survive those massive black spruce fires in the Interior.

This is where you come in. The Alaska Wildland Fire Coordinating Group has partnered with the Kenai Peninsula Borough, to host the Alaska Regional FireWise Communities Workshop in Kenai on April 25-27, 2001. This sixteen-hour workshop is designed to bring homeowners, planners, architects, builders, insurance professionals, financial institutions and fire managers together to learn the process, to interact with each other and to build people networks. We hope to have one hundred Alaskans participate in the workshop, which will be held at the Pacific Rim Institute of Safety and Management in Kenai.

To register call Sharon Roesch at (907) 260-4222. The cost of the workshop is \$100, which includes meals. If you need lodging, the total cost of the workshop with room and board is \$275. There are limited scholarships available. The workshop is filling up quickly. Only about fifty slots remain. There are plenty of "idealistic" Alaskan fire professionals planning to attend. We need more homeowners, especially those who would be willing to share FireWise with their neighbors. We also need more builders, developers, planners, insurance representatives, financial institution professionals, business owners, landscape companies and environmental professionals to make the workshop the best it can be. Will you join us?

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. For more information about the Refuge, fire management or FireWise, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Kenai Peninsula has its ups and downs

by Ed Berg

The Kenai Peninsula is a dynamic landscape in the quite literal sense of moving up and down. Like the stock market, the Peninsula is constantly on the move, but whether you say it's going up or down depends on your time scale of reference. The stock market has generally risen since 1929, but it has had down periods, such as the last twelve months. But even within the down periods the stock market has rising days and months, all of which makes stock market analysts perpetually argue about whether the market is really going up or down.

On the geologic time scale, the steep sea cliffs on the south side of Kachemak Bay and the southern tip of the Kenai Peninsula indicate that the coast has generally risen over the last 2-3 million years. This rise is typical of the west coast of North America; it contrasts with the generally subsiding east coast with its long shore bars, spits, and sand-clogged embayments, such as one sees along the coast of the Carolinas and Georgia. On a much shorter time scale, say, the 16,000 years since the last glacial maximum, the mouth of the Kenai River appears to have risen at least 440 feet and possibly much more. Most of this uplift is elastic rebound from the unloading of the glacial icesheet; the weight of the ice depresses the crust of the Earth, and the crust rebounds when an icesheet melts. An additional component of uplift could be added by the subducting Pacific tectonic plate, which is being pulled under the Kenai Peninsula and generates many of our earthquakes.

Even within a generally rising land surface, there can be "fast spots." The Swanson River oilfield for example lies within a very distinct oxbow of the Swanson River. When you fly over the main oilfield, you can see a long shallow lake and wetland (Hungry Lake) across the neck of the oxbow on the northwest side. This is the original river channel, before the river bulged out to the southeast. The layered bedrock has bowed upward (in an "anticline," as the geologists say) under the oilfield to form a domed trap for the oil. This upward bowing has continued since the icesheet retreated and has forced the river to cut a new channel around the southeast side of the uplift. (There are geologists who are paid big bucks to sit all day looking at aerial pho-

tos to pick out just this kind of clue to a potential oil-bearing structure.)

On a timescale of hundreds of years the Kenai Peninsula has suffered a number of downward jerks, like singular bad days on the stock market. The most recent bad day was March 27, 1964 with the Great Alaska Earthquake. In a matter of seconds the Kenai Lowland dropped as much as two feet. Areas with thick sand and gravel deposits, such as Cook Inlet beaches, experienced additional compaction (like shaken sand in a coffee can) which further lowered the ground surface. The tip of the Homer Spit dropped about five feet, with two feet due to tectonic lowering of the bedrock and three feet due to compaction of the 300 feet of sand and gravel underlying the Spit.

Like a recovering stock market, the Kenai Peninsula has been rising since 1964, but some areas are rising faster than others are. The area north of Skilak Lake, for example, is the fastest spot, having risen about 90 centimeters (three feet) since 1964, according to benchmarks along the Sterling Highway. The head of Kachemak Bay is the second fastest spot, with a 60-centimeter (two-foot) rise in this time period.

It appears that the Kenai Peninsula has experienced six to nine of these dips and rebounds in the last 5000 years, due to slippage along the underlying subduction zone. Rod Combellick with the Alaska Division of Geological and Geophysical Surveys studied ancient peat layers in a well core in Portage Flats in Turnagain Arm and at other sites around Cook Inlet. He noticed that after the 1964 subsidence, mud and sand were deposited on top of the marsh vegetation around Turnagain Arm, and that a new marsh began to grow on this recent layer of tidal sediments. He reasoned that in time the new marsh vegetation would form a peat layer, which could be buried in a future subsidence event. In the well core he observed periodic thin peat layers sandwiched between thick layers of tidal mud and sand. Using radiocarbon dating of the peat layers, he found an average interval of 600-800 years between peat layers, and inferred that this must represent the timing of very large earthquakes (greater than magnitude eight) in southern Alaska. (Unfortunately, the peat layers were not evenly spaced; some

occurred within a few decades of each other. One thus can't conclude that the next 1964-size earthquake won't happen for 600-800 years, so don't cancel your earthquake insurance!)

In Combellick's well the peat layers get older as you go deeper in the well. Does this mean that the land has been going down, at least for the 5000 years recorded in the well? No, it does not, because sea level has risen steadily by 120 meters (390 feet) since the last glacial maximum 16,000 years ago. If there hadn't been any earthquake-generated subsidence events, the peat would have grown thicker and thicker as sea level rose. Each mud- and sand-covered peat layer indicates a local "rise" of the sea level and flooding of the marshes. But sea level doesn't rise or fall locally (except for the tide), because the oceans of the world rise and fall together. So, a local flooding of the marshes and burial of the vegetation must mean that the land

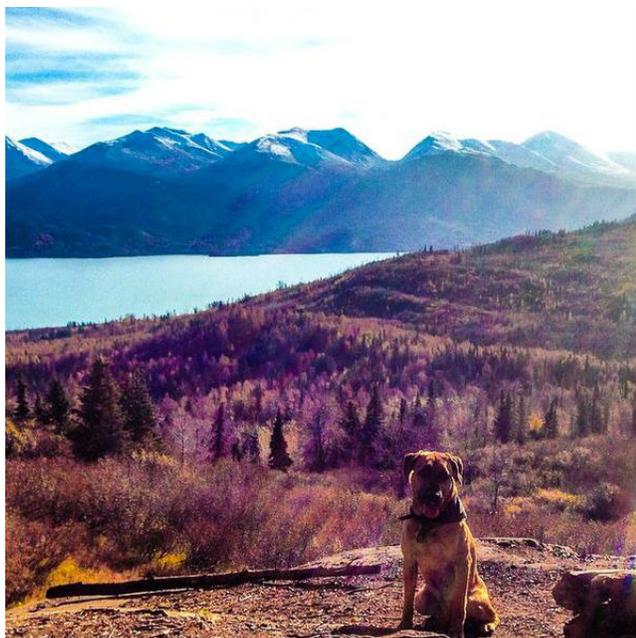
surface itself suddenly dropped, as it did dramatically in 1964.

It is hard to imagine a better geological laboratory than the Kenai Peninsula. I have been privileged to teach my "Geology of Kachemak Bay" course for many years at the Kenai Peninsula College in Homer, and more recently in Soldotna. This is a 1-credit class with five evening classes and two Saturday field trips to Kachemak Bay. The class starts next Tuesday (March 27) at the Soldotna campus and Friday (March 30) at the Homer campus. Call the College for registration information (262-0300 or 235-7743).

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Dogs on the Wildlife Refuge

by Candace Ward



A canine companion on a hike up Bear Mountain

To dog or not to dog, that is the question. Whether it is nobler to leave “Spot” home or take him on an outing—that is a perpetual quandary that all dog owners face.

When heading out for adventures on Kenai National Wildlife Refuge, we need to remember that the refuge was established to conserve wildlife and the habitat it needs to survive. I often hear dog lovers say, “but dogs are people too!” Well, not exactly, though your dog is an animal, it is as a domestic one and is therefore a guest visiting the Refuge. Like all guests there is acceptable behavior when visiting someone else’s home (in this case the home of wild animals). Here are some helpful guidelines for outdoor experiences with your dog on Kenai National Wildlife Refuge.

Areas Closed to Dogs—The Keen Eye Nature Trail and Cross-Country Ski Trails at the Headquarters/Visitor Center are closed to dogs. One of the major purposes of these trails is to promote wildlife observation while hiking, skiing, and snowshoeing. These trails experience periods of heavy usage, and the no-dogs policy reduces conflicts and safety problems between dogs and people, and gives trail users a better

chance to see wildlife.

Refuge Campgrounds—Dogs are required to be on a leash no longer than nine ft. in all refuge campgrounds. Campgrounds are high-density use areas. Noisy, uncontrolled dogs can cause safety problems and serious strife between campers. Leashed dogs make good neighbors in these busy places and give the smaller wildlife like squirrels and hares the space they need to live.

Areas Open to Dogs with their Owners—The rest of the refuge is open to dogs, but they are required to be under the control of their owners. It’s important to assess your dog’s training when choosing the method of control that works best in an outdoor setting. Many hikers find that using a six-ft. leash and harness combination works well for dogs accompanying them. Others suggest if you have a well-trained dog that responds consistently to voice command, the dog should stay by your side to avoid surprising bears, people, horses, porcupines, and other wildlife on the trail.

Uncontrolled dogs are easily injured by porcupines or moose. A dog encountering a bear will often aggravate it and even attract the bear back to its master. It goes without saying that dogs should not be allowed to chase, disturb, or injure wildlife; moose-chasing dogs are best left at home or else kept on a stout leash.

Here are some tips that make your dog happier on any outing. Be sure to give your dog opportunities to drink water during increased physical activity. It may be difficult to find water in upland areas (for both dogs and humans) during dry periods in the summer, so you may need to carry extra water.

Dogs with high metabolisms and those out on cold days often need to be fed more frequently than usual, so bring appropriate amounts of food for them.

Think about your dog’s first aid as well as your own. A clean sock in your first aid kit makes a great bandage to hold a dressing in place on a dog’s cut footpad. Since many of us humans care for our dogs like they were our kids, remember to think about hazards that can hurt our dogs: Devil’s club spines, cow parsnip sap (on the nose), and sharp talus rock all pose hazards for dogs as well as people.

In the final analysis, when planning an outing that includes your dog, think about whether what you have in mind really fits your dog's personality and training. Is your dog happy around boats and water? If not, a trip on Skilak Lake may not be a good experience. Does your dog bark or whimper for long periods when other dogs are close by? Then a camping trip to a busy campground may be misery for both of you, as well as other campers. Does your dog tend to run off and get lost? This can be a real heartbreak on any trip, especially if the dog can't be found or gets caught in a trap.

On the flip side, does your dog love to hike, following your instructions and staying close by you on

the trail? If so, go out and enjoy your adventures on the almost two million acres of the Kenai National Wildlife Refuge open to you. Just remember to follow the Refuge's dog policies and regulations, and please put wildlife first!

Candace Ward has worked as park ranger at the Kenai National Wildlife Refuge for over 15 years specializing in refuge information and education programs. She enjoys outdoor adventures with her husband Walter and chocolate Lab, Taiga. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

International Conference of Fire Service Women

by Alicia Duzinski

I recently had the pleasure of attending the International Conference of Fire Service Women in Atlanta, Georgia hosted by Women in the Fire Service (WFS). WFS started back in 1982 as an organization of 200 women firefighters scattered throughout the nation. Since those early days WFS has grown almost 600 percent, with over 100 women firefighters joining annually, as well as supportive male firefighters, fire departments, college fire science programs and other institutions contributing to overall membership.

WFS produces two newsletters and provides resources on recruitment, physical abilities testing, sexual harassment and discrimination, and other issues important to fire departments and wildland fire agencies. They also provide advocacy for women fire fighters on a national level.

The biennial conferences are educationally valuable and lots of fun. The first afternoon we were treated to tour of the Martin Luther King National Historic District and a special talk from a minister who marched and preached along side Reverend King during the civil rights movement. We also toured the first fire department in Atlanta and got a historic perspective on fire history in the city.

During the opening ceremonies, we were treated to a full firefighter parade with a bagpipe band and flags for each country represented. Firefighters traveled from New Zealand, Australia, Japan, Taiwan, the Netherlands, Germany, Canada, and from all over the U.S. It was fascinating to talk to people from other countries and to see what techniques and strategies they used to fight fire.

Teresa Edwards, five-time Olympic basketball champion, was the keynote speaker. She related how firefighting required exceptional teamwork and strength of character, very similar to playing world-class basketball. She also said that in any situation you are only as strong as your weakest link and that by working together and mentoring we work to maximize our strengths.

Once the conference got underway we chose from multiple seminars with a wide variety of topics important to both wildland and structural fire fighting. I attended sessions about firefighting opportunities

overseas and learned about fire programs in Indonesia and Russia. Other seminars discussed recruitment, physical fitness, leadership and supervisory roles, giving constructive feedback, creative confrontation and mentoring. There was also a full day recruitment fair where wildland and structural firefighters demonstrated to possible recruits how they shine in their different fire environments.

I attended a forum for wildland firefighters and it was such a rewarding experience to be in a room full of female firefighters. Usually there are just a few of us in fire camp and it is so rare to have so many women in one place. We learned that no matter where we come from we all have similar concerns, issues and a common love for our jobs.

For me the most powerful session was about internalized sexism—basically how as women we are taught to behave a certain way from the time we are little girls. The class leader asked some very pointed questions about how we thought of ourselves and interacted with others and then demonstrated how this is all learned behavior and that boys are actually taught to be different than girls. The leader also showed how these self-actualizing stereotypes can be quite harmful both personally and professionally in a male-dominated work environment. The saddest thing about this seminar was when the leader asked who in the class had ever been sexually harassed, assaulted or discriminated against at work, and almost every single person in the class raised their hands. I believe that as women firefighters we have made great strides to progress in gaining the respect of our male counterparts. However, if in a room of 40 women almost everyone had experienced these problems, then we still have room for improvement. The leader was quite helpful in giving us the tools to deal with future problems in constructive ways. The most important thing to remember is that no matter what, male or female, we are firefighters who need to work together to survive in this potentially dangerous career.

Overall the WFS Conference provided an excellent opportunity to network, build friendships and learn about how other agencies and fire departments deal with the issues facing firefighters in the new millen-

nium.

Alicia Duzinski is a Fire Program Technician at the Kenai National Wildlife Refuge. She spent most of last summer working on wildland fires in New Mexico and

Montana. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Proof of woolly mammoth presence on refuge land lacking

by Jim Hall

Managing any national wildlife refuge has its ups and downs, as does managing any land (even your own two acres). Sometimes, everything you want to accomplish goes exactly as planned, but sometimes it does not.

Occasionally, weird things happen that disrupt your normal rhythm, and then excitement is added to your life! Imagine finding the large bones of an extinct animal on your property. What would you do? Who would you ask? Can you get into trouble if you dig them up? (If it's on the Kenai National Wildlife Refuge, then yes, you can definitely get into trouble. Removal of articles of this nature would be punishable under 16 USC, 50 CFR.) Would you be destroying something if you did dig it up? Is this something "bigger" than anything ever discovered here before? What if those bones were a woolly mammoth?

I moved to the Kenai Peninsula in August of last year. Since that time, I have heard at least three times of mammoth parts being seen or found here on the peninsula. The problem with this information is that there has never been a documented find of a mammoth skeleton on the Kenai.

Teeth can be carried from point A to point B. Tusks can be moved the same way. Until a mammoth is excavated by a "card-carrying" paleontologist, there will never be any mammoths on the Kenai. That is the truth of science. If you doubt my word, then fly to Miami, visit the store "Art by God," buy a mammoth tusk, carry it back to the Kenai, bury it in your backyard, dig it up in front of friends, and say you found it here. Wow! Were mammoths really here? We don't know.

I am a wildlife manager by training, and I have managed seven national wildlife refuges in four states over the last 12 years. I am not a paleontologist. I am not an expert on things such as extinct woolly mammoths, but folks seem to think I DO know about these things because they keep telling me about them. I overhear conversations at dinner of skeletons being seen in ravines, tusks on display in front of the bank, folks in planes seeing tusks, and skeletons washed out to view by the ocean.

What am I to think of these things? Years from

now, will my co-workers call me "Mammoth Hall" because of these "fables?" Or, will someone come forward with a real story of a mammoth?

If someone were to come forward with a verified report of a mammoth on the Kenai refuge, then what would happen? Well, first of all, the appropriate museums would be notified, so that qualified personnel could be brought forward to professionally evaluate and excavate the skeleton. Then it would be properly preserved and displayed for the benefit of all Alaskans and other Americans, not just for one private collector. The value of a find of this nature to science would be tremendous, for mammoths (if found here) could even be a separate sub-species from those found in other parts of the world.

These creatures once roamed the northern half of the Earth, including Alaska, grazing the tundra in large herds during the Pleistocene ice age. Sometime around 10,000 to 12,000 years ago, something happened to erase them from the face of the earth. There are many different ideas on how this occurred, including one that puts human hunters at fault.

This is evidenced by skeletons of mammoths with stone points embedded in the ribs. I doubt those points got there by accident. In fact, I would bet that our forefathers harvested these animals for food. We know that mammoths were abundant up in the Interior, along with bison, horses, and saber-tooth tigers, because their bones are often washed out by hydraulic gold mining operations. Indeed, frozen mammoth carcasses, complete with tissue, skin and hair have been found in many places in Siberia.

Did these animals ever wander down through the Chugach Mountains (which were probably covered by glaciers at that time) and onto the Kenai Peninsula? According to the Pratt Museum in Homer, single mammoth teeth have been found on two occasions. One tooth was found in a glacial deposit near Homer, and the other was found loose on the beach of the Homer Spit.

This indicates that mammoths were found here, or at least parts of them were carried here during the past. I'm sure that even the early human inhabitants of the Kenai would have found a mammoth tooth "cool," and

could have possibly carried them here as a keepsake. Until someone comes forward and says “There’s one!”, then it is just possible that folks are seeing moose skeletons, not the bones and tusks of a woolly mammoth.

Jim Hall is the deputy refuge manager of the Kenai

National Wildlife Refuge. One of his hobbies is flint-knapping to make arrowheads and other stone tools. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Mysterious ‘black-ring condition’ on birches confounds biologists

by Ed Berg



The black-ring condition pictured on a few birches.

We don't have any Loch Ness monsters or abominable snowmen on the Kenai National Wildlife Refuge, but we do have one perennial enigma: the “black-ring condition” on birch trees. This is the time of year we start watching for it.

Chuck Schwartz, the former moose biologist with Alaska Department of Fish and Game, first pointed this out to me in 1995 in the birch trees around the gate at the end of Swan Lake Road. A quarter-inch strip of bark on the trunks of young birch trees had been peeled back in a coil; the chunky inner bark was gone, and you could see the wood underneath. The scars appeared to be several years old, because two lips of black scar tissue had formed on either side of the gap.

These black lips made the larger scars quite visible even when driving by on the road. Birch often

shows a black inverted V-pattern around a limb, but these scars were distinctly horizontal and quite different, once you developed an eye for them.

When the scars go all the way around the stem, the stem is effectively girdled and dies above the scar. Indeed, we found a number of dead and broken off tree tops about 1 inch in diameter. On larger stems the scar often doesn't go all the way around, and the tree continues to grow, forming the black scar tissue that will ultimately seal off the wound. Most scars are on trees less than 3 inches in diameter.

At first we thought this scarring might be due to a fungus, so we sent samples to the Forest Products laboratory in Madison, Wis. They cultured pieces of the bark and scar tissue but didn't find any fungi that don't normally grow on trees. We consulted several insect specialists and plant pathologists, but they had never seen anything like this.

We next investigated the idea that sapsuckers might be responsible. Both red-breasted and yellow-bellied sapsuckers, for example, often drill distinctive horizontal rows of holes in trees. Various ornithologists were consulted, but no one had seen this particular pattern of foraging, in sapsuckers or any other kind of bird.

A visiting Russian grouse expert, Alexander Andreev from Magadan, however, pointed out that the groove in the inner bark was just the width of the two front teeth (incisors) of a flying squirrel. He suggested that flying squirrels might peel back the papery outer bark, and then chisel the brittle inner bark with their teeth. Sugars are concentrated in the inner bark (or phloem). Birch branches are often scraped by hares, porcupines and moose to get at the sweet inner bark. In spruce trees the bark beetles (and bears) go for inner bark for precisely the same reason.

One key fact about the black-ring condition is its highly localized occurrence, initially seen at the end of Swan Lake Road. This fact makes the flying squirrel hypothesis plausible. Supposedly, flying squirrels have been seen on the Kenai, but we have never been able to confirm any actual sightings. A single family of

flying squirrels might explain the localized occurrence of the scarring.

In May 1996 we made a breakthrough: we discovered fresh scars on birch trees along Finger Lakes Road, west of Swanson River Road, 14 miles southwest of the Swan Lake Road site. We could see the curls of birch bark, the neatly chiseled inner bark, and fresh wood in the eighth-inch grooves. Lips of scar tissue had not yet formed, so there were no “black rings,” such as we had seen at the end of Swan Lake Road. When we checked this area in 1997, we could see last year’s scars but no new ones. Whatever was eating these trees apparently had moved on.

In April 1997, refuge biotech Todd Eskelin photographed some nice examples of the black-ring condition in Anchorage along the Tony Knowles Coastal Trail. Our last definite sighting of fresh scars was in July 1999 near the end of Marathon Road. This January, however, Todd noticed some birch in the Wolf Lake area where the outer bark was peeled back in narrow strips, but the inner bark was unbroken. The Wolf Lake area, north of Finger Lakes Road, has extensive older scars with well-developed black rings of scar tissue.

In 1999, Mal Furniss, a retired entomologist, sent us a 1956 article from the *Journal of Forestry*, entitled “Damage to paper birch by red squirrels in Alaska” by Prof. H. J. Lutz of Yale. (The Sitka-white spruce hybrid “Lutz” spruce on the Kenai is named after Prof. Lutz, who contributed much to early forestry research in Alaska.) Lutz’s paper described extensive girdling of birch on the north side of Turnagain Arm (Bird and Indian Creek valleys) in 1952, in the Eagle River area in 1954, and also reported a few damaged birches near Bedlam Lake south of Point Possession. Several excellent photos convinced us that Lutz was describing precisely what we had been seeing in the 1990s.

The problem with the Lutz paper, however, is that it contained no evidence whatsoever that red squirrels are the culprit. Lutz checked red squirrel skulls and found that the incisor teeth fit the scars very well, as our Russian visitor Andreev had suggested for flying squirrels. Lutz, however, reported no behavioral observations of red squirrels doing the damage.

We certainly have lots of red squirrels and lots

of birch on the Kenai (and in the Anchorage area, as well), so why is this girdling so rare? We have collected enough observations of this phenomenon on the northern peninsula to feel confident that this is not just one smart red squirrel or family of red squirrels who have discovered a good thing. Lutz reviewed the published literature of red squirrel feeding behavior and found much discussion of tree injuries, such as removing strips of bark 4 to 12 inches long from sugar maples, but nothing quite like what he and we have seen on birch trees.

So, could it be flying squirrels, instead of red squirrels? Flying squirrels are famously hard to see. They come out at dusk and, on rare occasions, are seen flying from trees to bird feeders around Fairbanks and Anchorage. A serious objection to the flying squirrel hypothesis, however, is that we have been able to find no one up in the Interior who has seen such scarring patterns. There is lots of birch in the Interior, and one can imagine that the sweet inner bark might be just the ticket for nocturnal flying squirrels up north. Furthermore, flying squirrels are typically found in mature forest habitat, whereas most of our scarred trees are in the relatively young 1969 burn or 1947 burn areas.

Todd Eskelin suggests that there may be a several-step process here, and that we shouldn’t bank on finding the missing flying squirrels to explain this phenomenon. Perhaps there is a disease or insect that occasionally gets into the birch and then squirrels (of whatever type) or birds or whatever feed on that diseased site or insect by peeling back the bark to expose it.

In any case, we need more examples of this scarring to put some of these speculations to the test. I encourage readers who have seen such scars (especially fresh ones) or, for that matter, who have seen any flying squirrels, to please give me or Todd a call at 260-2812. We need some more breakthroughs!

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Awaiting the return of the loons

by Elizabeth Jozwiak

One of the great signs of spring is watching the ice leaving the lakes and the loons returning to nest and raise their young. This summer you may see lake residents observing loons on some of the local from Kasilof to Nikiski, and on the Kenai National Wildlife Refuge.

These newly dubbed “Loon Rangers” are participating in the Kenai Loon Watch project. They will be monitoring loon behavior and biology from a non-obtrusive distance as part of the Alaska Loon Watch Program. The data collected by Kenai Loon Watch volunteers will give biologists baseline information on the status of loons and their nesting success on lakes in our area.

Participation in the Loonwatch program for the Kenai area has increased substantially. In 2000, there were 16 loon watchers who reported their observations of loons on 36 area lakes as well as the Kenai River. Thirteen lakes had breeding common loons, and 10 lakes had loons whose eggs made it to the hatching stage. Seventeen chicks hatched and 16 chicks survived through the summer. Only two lakes reported finding reproductive pairs of Pacific loons. One lake had a Pacific loon pair that hatched eggs, and one of the two chicks survived.

Although Alaska has healthy populations of loons statewide, there are some concerns about the future of loons in areas that are heavily used by people. Fortunately, studies in other states have shown that loons and people can coexist if care is taken.

Ingestion of lead fishing sinkers is the single largest cause of mortality for adult loons in New England. Little information is known on how lead affects loons on the Kenai Peninsula, and more research is needed. But we do know that bald eagles on the Kenai Peninsula have become poisoned from ingesting lead. Ecologically safe alternatives to lead sinkers such as steel and bismuth are now readily available at cost-comparable prices to lead sinkers and can be pur-

chased in a variety of styles, shapes, weights, and sizes to meet every type of fishing need.

Entanglement in fishing line is yet another hazard to loons. I removed a ball of monofilament line from a loon last summer, and tried to get a fishhook out of the leg of a common loon on the Kenai River two summers ago. There are several things you can do this summer to help keep Kenai loons healthy and productive:

- Pick up discarded fishing line and tackle.
- Enjoy loons from a safe distance. If you see a loon rising out of the water, running and splashing across the surface, you are too close. If the adult loon has been scared off its nest, the eggs can chill and die or be eaten by a predator.
- Stay clear of loons and their nesting areas while boating, canoeing, or water skiing. Wakes can destroy their shoreline nests and drown chicks.
- Keep dogs leashed and confined. Loose dogs and other animals can destroy nests and eggs along lakeshores.
- Join the Kenai Loon Watch project and become a “Loon Ranger.” Contact the Kenai National Wildlife Refuge at 262-7021 for more information.

Tamara Mills, the Alaska Loonwatch Coordinator will present a slide show on the biology, behavior and life history of loons at 7:00pm, Friday, April 27 at the Kenai Peninsula College, Room 132. Please join us!

Elizabeth Jozwiak is a wildlife biologist at the Kenai National Wildlife Refuge. She also coordinates the local Kenai Loonwatch effort. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Reminiscences of a game warden

by *Chris Johnson*

I have worked on the Kenai National Wildlife Refuge for the past 12 years as a law enforcement officer. My actual title is 'Refuge Officer' but I am often referred to as a "Game Warden." As you can guess, I have all sorts of tales from my adventures and have heard all kinds of excuses and reasons from people about why they have broken the rules. I will share a few of my stories with you. As I sit down to write this article I have to laugh and shake my head as I recall some of these incidents, and this in turn reminds me of other incidents. I will try to keep this article to just a few stories and if readers enjoy the topic, I am sure that I can find a few more to tell in a future article.

It was late fall on the Kenai River just below Skilak Lake. It was spitting snow and about 20°. I was hiding in the bushes, and I observed a man land a large rainbow trout. I watched him kill the fish and put it in his boat. I decided to contact the man at Lower Skilak boat ramp. The season for rainbows was open and the only requirement was that if you retained a rainbow over 20 inches, it had to be recorded on the back of your fishing license. Well, I contacted the man at the boat ramp, and he told me he had not caught any fish. I searched his boat high and low because I knew he had kept the fish. While I was searching the boat, the man was squirming around a lot. I thought he was really nervous about something or real cold. Well, after about 15 minutes the guy couldn't handle it anymore and told me the fish I was looking for was down his pants. The man opened up his pants and pulled a 24-inch rainbow trout out of his pant leg. He had failed to record the fish on his license and was afraid that I was going to take the fish from him. I gave him a pen.

In this next story the moose gets its revenge and shoots back. I responded to a call about a sub-legal moose found dead off of Marathon Road. I hiked into the kill area with a state protection officer and the reporting parties. The protection officer and I proceeded to start quartering and skinning the moose in the hopes of recovering a bullet. As we finished with each quarter of the moose, we moved it out of our way. We finished skinning and examining a hindquarter with the hoof attached and moved it over to our pile of already examined meat. About three feet from that

location, one of the reporting parties had set his rifle down against a tree stump. We set the examined quarter down and then started working on another quarter. About two minutes later a shot rang out and tree bark splattered all around us. One of the reporting parties dropped to the ground like he had been shot. My first thought was that one of the reporting parties had shot at us. My next thought was that we were under fire from somebody claiming the moose. After several minutes we were able to sort out that the rifle leaning against the tree stump had gone off, after the hoof of the moose quarter we had just moved fell and hit the safety and the trigger. The man that dropped like he had been shot actually had been hit by tree bark and was OK. After that I got down on my knees and prayed.

I was working in the Kenai Russian River Ferry area, and I was in uniform standing right behind this guy that had a snagged fish on his line. The man landed the fish and then clubbed it. He took the hook out of its tail and put the hook in its mouth. He then unhooked the fish and turned around to put the fish in his backpack. Well, when he turned around and saw me standing there, his eyes got as big as saucers and that fish went about twenty feet in the air and came right back down on top of the surprised snagger.

To combat the illegal and dangerous practice of hunters shooting from their vehicle or on or across a road, I use a decoy grouse set up just off the road. When a hunter comes along and shoots at my bird, I pop out of the trees and have a little meeting with the hunter and we discuss the merits of shooting from their vehicle or from or across the road. One afternoon I set my decoy up on Swanson River Road; along comes a car and out pops a guy with a .22 rifle. He stands right in the center of the road and opens fire on the decoy. I come out of the trees yelling, "Game Warden, put your gun down!" The guy does not hear me. He's got tunnel vision, and all he can do is keep shooting at this bird like it was coming to eat him. He fires 14 rounds and then starts to reload before I can get him convinced that the bird was not going to eat him.

It has been fun reminiscing about old times.

Retelling these stories has jogged my memory of other incidents. Other officers have reminded me of other stories and similar situations, in which they have been involved. Until next time, remember to bring a child hunting or fishing. Share the experience. They are our future!

Chris Johnson has been a law enforcement officer on the Kenai National Wildlife Refuge since 1989. He and his wife Pam live in Sterling with their three children. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

“Why firewise?”—1996 Crooked Creek Fire

by Doug Newbould

Five years ago, something happened here on the Central Peninsula that should strike fear into the heart of every property owner who has a home or business in the wildland-urban interface. Late on the night of June 6, 1996, a wildfire was reported about fifteen miles east-northeast of Ninilchik. At 10:00 p.m. the fire had burned about five acres in a logging area. The weather was warm and dry with an air temperature of 70°F and a relative humidity of 27% (very warm and very dry!). Winds were out of the south-southeast at 4-14 miles per hour.

Within fifteen minutes of the fire report, the Alaska Division of Forestry sent a helicopter with five firefighters to initial-attack the fire. When the helitack crew arrived at the scene, they found the fire had doubled in size and was “running and spotting.” In other words, the fire was moving rapidly to the north and wind-carried burning embers were igniting spotfires out ahead of the flaming front. Additional firefighting resources including two engines, a medium helicopter with a bucket, a third helicopter for aerial reconnaissance, and five firefighters were soon on their way to the incident. Other resources were not readily available because of the lateness of the hour and the large number of resources already committed to the Miller’s Reach Fire at Big Lake.

When the additional help arrived that night to assist the helitack crew, the fire had expanded considerably and fire behavior was so intense that direct attack methods (such as attacking the edges of the fire directly) were not possible. The fire continued burning actively throughout the night and into the next day. On June 7th, in one burning period, it became the largest wildfire the Peninsula had seen since the Swanson River Fire in 1969. By the end of that day the fire perimeter encompassed 17,510 acres (that’s over 27 square miles of forest). The fire behavior was most extreme on that first full day of burning. By the time an incident command team arrived and began to build a firefighting organization, the show was mostly over; most of the damage was already done.

Before the fire was officially contained on June 13th, over 400 fire personnel had been assigned including four hotshot crews and thirteen hand crews. Five engines, seven dozers, two excavators and five heli-

copters also saw duty on the Crooked Creek Fire. Total suppression costs were over two million dollars.

Three factors kept the Crooked Creek Fire from becoming a major disaster:

- the head of the fire ran into Tustumena Lake, stopping the forward spread
- the weather changed for the better, diminishing the fire’s extreme behavior and allowing firefighters an opportunity to gain the upper hand
- there were no homes in the fire’s path on June 7th. (Only one recreational cabin was lost.)

The frightening thing about Crooked Creek is that it could happen again...and it probably will. If the same weather conditions existed say in May, June or July, and a fire started near Ninilchik for example, literally hundreds of homes could be lost. And who can say how many lives could be lost as well. A fire could start in Clam Gulch one evening, and twenty-four hours later it could be burning up your house in Kasilof.

So the question is, “What can I do about it? How can I protect myself and my family?” The best answer is, “Be FireWise.” Take the responsibility to make your home and personal property safe from the ravages of a wildfire. Create a defensible and survivable space around your home. As Crooked Creek and Miller’s Reach showed us all five years ago—you can’t simply rely on the suppression resources of Alaska to save your bacon. As much as any dedicated and professional firefighter in this great state would like to save every person and home from a wildfire, someday there is going to be another fire that we can’t stop. Do yourself and us a favor. Be a survivor instead of a statistic. Call me, your state forester, or your local fire department for more information about FireWise. We will do our best to help.

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. He and his wife Pam live in Sterling with their three children. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

What happened to my campground?

by Bill Kent

When this piece was written and published last spring, I was surprised at the number of folks who stopped me in town, or took time to call, to express their agreement. I think the message remains valid, for all public and private facilities on the Kenai Peninsula, and deserves another perusal. Also, I want to thank all those who have called to provide information regarding vandalism or other violations they have witnessed... Remember, without your assistance vandals will continue to practice the behavior which may deny you the complete use of the facilities your tax dollars have paid for.

This is the time of year when the acts of a very few visitors to Kenai Refuge come into sharper focus for me. Perhaps the spring weather makes my aging eyes a little sharper, or maybe it's just because I am outside more... who knows? What becomes more evident as the snow melts is the destruction of, and total disregard for the facilities and resources (public and private) of the entire Kenai Peninsula practiced by a small but active segment of the population. They seem to think the campgrounds, signs, toilets, trails, sheds, mailboxes, fences, and other structures are erected with the intended purpose of being shot, burned, torn apart, stolen, or generally defaced.

Please understand, I was born and raised in Georgia where, as in most of the South, destructive vandalism is a way of life learned at an early age by many. So, this behavior is not unfamiliar to me. Nor is it limited to the South; I have seen similar situations in every part of the country where I have worked and lived. But, those examples pale in comparison to the magnitude of the havoc wreaked throughout Alaska, not only on the Kenai Peninsula. Do I notice the vandalism more because I live here? Of course I do; my family made a decision to make Alaska our home, and it seems a thoughtless few are trying to tear it apart or burn it down, and I don't like it.

As a test, consider any single mile of the Sterling Highway (outside the limits of Soldotna, Cooper Landing, or Sterling) where signs have been punctured or defaced with various caliber bullets, shotgun pellets, or spray paint; or where trash (sometimes entire bags) is strewn along the roadside.

I would like for you to understand the monetary cost of this destruction. Many of our signs are made of wood with routed lettering. If you've done any construction work around the house, you know that lumber and paint are expensive. Our carpenter who makes these signs is paid a fair hourly wage for his skills. The total cost of a three ft by four ft sign is about \$400. Repairing gunshot wooden signs is time consuming and not inexpensive. We also use aluminum signs which, depending on the size and lettering, may cost anywhere from \$10 to \$500, or more. Replacing these signs after they are shot or otherwise vandalized is a serious drain on our budget each year, and many signs cannot be repaired.

Besides the time and tax dollars spent replacing signs, there is a real image problem portrayed to the Kenai Peninsula visitor. And even more important, sign shooting is done with total disregard for public safety. When you shoot along a road, it is only a matter of time before some motorist, bicyclist or pedestrian gets injured or killed.

Occasionally someone thinks burning wooden outhouses and picnic tables is great fun, or takes a picnic table out to the middle of a lake during ice-fishing season. This is why we have been replacing our wooden outhouses and picnic tables with ones made of concrete. Every once in a while there may be a little justice: a couple of years ago someone shot up the inside of one of our new concrete outhouses. I can't imagine that this person had too much fun immediately after pulling the trigger from inside four concrete walls.

"Well," you might say, "Why don't you catch them?" That is a desire of everyone on our staff, no doubt. The biggest barrier to catching someone vandalizing a campground or shooting a sign is being in the right place at the right time. Our best help comes from people who witness something happening and provide information about vehicles or descriptions of the vandals. We cannot be everywhere at once and are grateful when someone concerned about their Refuge provides information, which we can use to bring charges against those who destroy facilities that belong to all of us.

If you would like more information about the vandalism problem or would like to provide us with information about vandalism that you have witnessed, give me a call at Refuge Headquarters (262-7021). You can also phone in anonymous tips to Crime Stoppers in Kenai at 283-8477, or to Wildlife Safeguard at 800-478-3347.

Bill Kent has been the Supervisory Park Ranger at Kenai National Wildlife Refuge since 1991. His wife Lisa is a pre-school teacher, and their daughter Riley attends SOHI. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Years of knowledge and experience go out the door

by Rick Ernst

Though often a quiet scholar, supervisory biologist Ted Bailey has had a profound impact on the wildlife and people of the Kenai Peninsula. He will be retiring after almost 24 years of service to Kenai National Wildlife Refuge. His career has spanned the globe with its greatest accomplishments here in Alaska.

Ted was born in a rural area of southeast Ohio. He went to school in a one-room schoolhouse and after high school, enlisted in the Air Force. The military provided the opportunity to “see the world” and for almost four years he traveled to Europe, the Middle East and Africa. Ted began his college education through extension courses while in the military before enrolling at Ohio State University. He received his bachelor’s degree in Zoology in 1965. His first job with the Fish and Wildlife Service was as a fish biologist in northwestern Nebraska, where he happened to meet his wife, Mary. Mary was a schoolteacher in a one-room country school, who brought her class to the fish hatchery for a field trip. After a year of hatchery work Ted decided to return to graduate school at Ohio State University where he received his Master of Science degree in 1968.

Ted then wrote to many universities including the Wildlife Coop Unit at the University of Alaska Fairbanks interested in doing some research on wolverine. Unfortunately, that didn’t work out. But fortunately he went to work instead under Dr. Maurice Hornocker, the Wildlife Coop Unit leader at the University of Idaho, studying bobcats. Ted liked the atmosphere at the University of Idaho because it was a much smaller school than Ohio State University, and “professors actually talked to their students”. Ted earned his Ph.D. on bobcat ecology in 1973 and also worked on a wolverine feasibility study during the 1972-73 winter near Hungry Horse, Montana. An opportunity to study leopards in Africa came later in 1973, so Ted, Mary, and their three children: Becky, Kim, and Brian headed for the “Dark Continent.” Ted worked at Kruger National Park in the Republic of South Africa for two years studying leopards but had opportunities to assist in other studies such as capturing white rhinos. He still carries a scar from getting hit in the face while on a capture team driving after a

rhino at 30mph through the thorny brush. Mary also helped with leopard work as well as caring for and teaching their children.

In 1975 the family returned to Idaho where Ted worked as a research associate for the University of Idaho summarizing the data from his African study. He eventually wrote a book entitled “The African Leopard” which is still considered a classic on the ecology of leopards. In April 1976 the family moved north to Alaska as Ted was hired by the Alaska Department of Fish and Game to work at the Moose Research Center (north of Sterling). In September 1977 Jim Frates, then refuge manager, hired Ted as a wildlife biologist at the Kenai National Moose Range. In 1980 with the passage of the Alaska National Interest Lands Conservation Act, the name and purpose of the Moose Range was legally changed to the Kenai National Wildlife Refuge, the major purpose of the refuge was for the conservation of not just moose but was expanded to a variety of fish and wildlife populations and habitats.

Ted was excited and proud to work on a diverse program: studying brown bears with Chuck Schwartz from Alaska Department of Fish and Game, which led to the formation of the Interagency Brown Bear Study Team (included ADF&G, U.S. Fish & Wildlife Service, the U.S. Forest Service and the National Park Service); wolves (continued studies initiated by Rolf Peterson, Michigan Technological University); and trumpeter swan surveys (initiated by former refuge manager Will Troyer). Other species that were monitored and researched included lynx, hares, marten, caribou, passerine birds, loons, beavers and wood frogs.

Ted was instrumental in helping people realize that the Kenai National Wildlife Refuge is important to a lot of critters, in addition to moose. Ted helped initiate the 1985-86 caribou reintroduction (in cooperation with Alaska Department of Fish and Game) which has been a big success. Ted lead the refuge’s 18-year lynx/hare monitoring and research program. He plans to complete a final report on the work after retirement.

As the supervisor of the biology staff, Ted truly put “wildlife first” and his dedication to the natural resources of this refuge is an example for the rest of us to follow. Ted and Mary plan on remaining on the Ke-

nai Peninsula. While Ted plans on traveling, writing and generally relaxing, Mary wants to continue working for a few more years as a teacher. Ted has enjoyed working with people dedicated to wildlife conservation, and we as a staff will greatly miss his years of knowledge and experience gained at this refuge. We

congratulate him on reaching this milestone in life, and we wish him good health so he can enjoy his retirement to the fullest! Good luck and best wishes Ted!

For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Ch..Ch...Ch...Changes

by Brenda Wise

When I was tasked to write an article for the Refuge Notebook Series, I had something specific in mind. Like things normally happen, something comes up to change the 'best laid plans of mice and men.' Fortunately, you learn to go with the flow and the many changes it brings. This article was originally going to be about some of the refuge staff that has been around for many years, but it too has changed.

After talking with a few of the 'old geezers,' anyone that has been here over 17 years, I discovered they are a wealth of information and have witnessed many changes over the past 17 to 31 years. The one obvious change was the refuge's name. The Kenai Moose Range, established in 1941, became the Kenai National Wildlife Refuge in 1980, but many residents of the Peninsula still refer to it as the Moose Range.

In the 'old days,' the Refuge Headquarters was located on five acres of land in downtown Kenai. Today, it is located on 160 acres on Ski Hill Road in Soldotna. The permanent staff has gone from 10 to 39. During the summer season, the staff grows to almost 80 and includes temporary employees, volunteers, Youth Conservation Corps enrollees, and student interns. The number of visitors has certainly changed too, from a few thousand, to over half a million each year. Our fleet of vehicles has grown from 10 to 150, including heavy equipment, dump trucks, flatbeds, fork lifts, snow machines, and boats. The maintenance area grew from a two door mechanic stall to one with four doors, a wood shop, and storage buildings to house all the equipment. There are also now approximately seven miles of trails at the current headquarters area for cross country skiing and nature walks.

Life was simpler then as well. Technologically speaking, the office had an old Xerox machine that literally 'burned' copies. There were no fax machines,

no computers, and no reliable two-way radio communications.

Campground and road maintenance was all handled out of the shop and crews went out daily to collect trash from the garbage cans located at the pull outs and campsites. The outhouses were placed over excavated pits and when the pit was full a new pit was dug and the outhouse was moved. Now we have contracts with local businesses to pick up the dumpsters and pump the outhouses in the campgrounds. During winter, it would take two very long days in the road grader with an overnight stay, to maintain Swanson River and Swan Lake Roads compared to current seven hours in a dump truck with a plow.

Over the past 25 years, glaciers have retreated up to ½ mile and the retreat of Skilak Glacier has given birth to a large lake at the front of the glacier. The contracting and melting of the Harding Ice Field has exposed barren rock and mountain tops that used to be snow-covered during summer but are now free of snow. Seasonal water levels are lower, small ponds have dried up, lake shorelines have shrunk and new islands have been formed as water levels lowered. The effects of logging activities, wildfires, and bark beetles have also impacted trees and other vegetation.

This summer will begin a time of change as some of our 'old timers' leave the Refuge to enjoy the rewards that retirement will bring. We will miss them and their dedication to the Refuge that they have given throughout their many years of public service. New names and faces will join the staff over the next year and bring about a new era of change.

Brenda Wise has been employed at the Kenai National Wildlife Refuge as a Refuge Clerk for the past 12 years. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Refuge plans prescribed fire projects at Mystery Creek and Funny River

by Doug Newbould



Fire management staff with glowing embers from a burn.

Every spring the fire management staff at the Kenai National Wildlife Refuge prepares to implement certain prescribed fire projects. This year our plans include continuing work at Mystery Creek and along Funny River Road, plus two new projects.

The Mystery Creek project area is located about five miles north of the Sterling Highway and ten miles east-southeast of Swan Lake, between the Mystery Creek Road and the Enstar natural gas pipeline right-of-way. There are five contiguous burn units in the 5000-acre project area, much of which was burned by wildfire in 1947. The existing forest fuel type is best described as a black spruce-lichen woodland, with scattered stands of white spruce, bluejoint grass meadows and muskeg wetlands.

Two years ago, we successfully burned one unit and part of a second for about 500 acres or 10 percent of the project area. Last year the extreme fire season in the Lower 48 precluded the completion of planned fire projects at Mystery Creek and elsewhere on the Refuge, as we joined the national effort to fight those fires. Hopefully, this year will be different.

Our fire management objectives at Mystery Creek are hazard fuel reduction, habitat enhancement, research, and training. The prescription is to burn the units when fuel moistures are relatively low, so as to remove black spruce and expose mineral soil for

the propagation of hardwood (deciduous) shrubs and trees. This will produce the double benefit of reducing hazardous fuels and improving browse production for moose and hares. Like most prescribed fires, this burn will provide us opportunities to train firefighters in the use of fire tools and equipment and to observe fire behavior in different Alaskan fuel types.

Ongoing research at Mystery Creek includes wildlife studies, fire effects monitoring, and a special study conducted by the Pacific Northwest Research Station (US Forest Service) relating duff consumption and particulate emissions.

For the past three years, travelers on the Funny River Road have noticed changes to the forest along the south side of the road where we have been thinning the trees. The goal here is to reduce the wild-fire hazard in the “wildland-urban interface,” by a defensible fire break and escape route for residents from Funny River to Soldotna. We are doing this by removing hazardous fuel concentrations of black spruce and beetle-killed white spruce.

We have allowed the plastic-covered slash piles along Funny River Road to cure over the winter and planning to burn them this fall. We will complete the cutting phase of the project this summer, and all pile burning should be completed by the fall of 2002, resulting in a 6.5-mile fuel break.

New fire management projects for this year include an interagency cooperative research prescribed burn on state lands 5 miles southeast of Ninilchik and a cooperative wildland-urban interface project with Funny River Emergency Services. Of course, the completion of any or all of the projects I have mentioned depends upon the kind of fire season we have here on the Kenai Peninsula, in Alaska and nationally, and upon the weather. Fortunately, I don’t have to predict the severity of the fire season or the weather, I just have to prepare for the challenges both might present.

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Dad's day on the Russian River

by Rick Johnston



Fisherman in close proximity at the Russian River. Photo by USFWS.

Ouch!!! That really hurt! I had been hoping to get through Father's Day with no injuries and a shred of dignity. I figured that taking the family fishing at the Russian River was a relatively safe and problem-free undertaking, but.... I had just made the beginner error of putting too much pressure on a southbound sockeye salmon. The line gave way below the sinker and the one-ounce weight became a slingshot projectile, hitting me on the ankle. Being a hockey player for 40 years, I'm no stranger to a sharp blow on the ankle, but that weight really smarted. I could only imagine what it would have done to an eye or face. Every year the Central Peninsula Hospital becomes an unplanned tourist stop for "Combat Fishing" casualties. I should have known better, having observed fishermen with salmon fishing wounds for over twenty five years and having performed more than a few stream-side surgeries on fisherman who refused medical attention in lieu of continuing to fish: "Just push it through and snip the barb!"

Fishing in really crowded situations...so-called "combat fishing"... is a cultural phenomenon mostly

unique to salmon streams where fish, people, and wildlife share a common real estate for a few brief weeks. Most of us were probably taught to fish in slightly more solitary situations, where neighboring fisherman are unwelcome. Approaching another's fishing spot closer than 100 yards would be down right unthinkable. I got my first exposure to Russian River combat fishing while working for Chugach National Forest in 1976. The Kenai-Russian River confluence was the craziest thing I had ever seen, and I swore I would never fish there. In those days most people didn't know how to fish for red salmon. A veteran Alaska Department of Fish and Game befriended me, and with a vow of secrecy he agreed to show me how to fish for sockeyes. I became perhaps the fourth or fifth person to not cast for sockeyes, but to dabble a fly by fly rod and therefore increase my success.

It had not been that many years since fresh water snagging had become illegal or that fishing with single hook flies had been implemented. The technique of dabbling one's line close to shore without casting was known only to a very few persons. No one at the Kenai-Russian River confluence used this technique. Most preferred to cast their fly way off shore. "The further the cast, the bigger the fish," a tourist from Nebraska once told me. Today, any second-day Russian River veteran will tell you, "... the only thing you'll catch that way is an unlucky gull traveling overhead."

In those days everyone seemed to be slow learners and though the catch per hour ratio was much less than that of today's highly efficient experts, it was still the most productive legal fishing around. Russian River and it's confluence with the Kenai River had been one of the most productive wild salmon harvest locations in Alaska and North America since the 1950's, and it remains so today. Until relatively recently almost everyone believed that sockeye salmon could only be caught legally (in the mouth) at the Russian River. Fisherman would wait until one of the two Russian River runs reached the Russian River confluence before the fishing frenzy began. At that time the belief that sockeyes could only be caught at the Russian served to enhance the mystique and the fishing pressure.

As fishing techniques and run size improved though the 1980's, fisherman discovered that for the second and larger salmon run, the main stream Kenai River was also a productive place to bank fish for sockeyes. Hard-core combat fisherman learned to follow the second run from several-less-than-secret locations on the mid-Kenai River all the way to the Russian as the salmon moved upstream.

Shoulder-to-shoulder fishing brings fishermen together in very tight quarters for a common purpose. In many ways it is not unlike the situation at the McNeil River Brown Bear Sanctuary where bears that would not otherwise be caught dead so close to so many other bears set caution and normal social distance aside in the interest of maximizing their salmon catch. I've seen the most finicky wilderness recreationists loose all crowd inhibitions in the interest of catching a limit of Russian River salmon. Kind of like me on Father's Day being at the Russian River, when I own all kinds of equipment capable of transporting me into the backcountry far from the maddening crowds. But, on that particular day the salmon were in at the Russian, and I was on a mission.

There are all sorts of interesting social and behavioral interactions occurring at south-central Alaska combat fisheries. Persons that otherwise wouldn't give their neighbor the time of day turn into good Samaritans with a ready dip net for a netless stranger. Others who are generally social and friendly react like solitary grumpy brown bears that encounter a crowd of bears fishing at McNeil River. Persons who ordinarily wouldn't dream of littering, discard monofilament line in the river like sowing grass seed. Or the guy I saw drinking a beer, who set it down and then got dragged downriver by an eight-pound sockeye. The fish got away, and so did the beer can. About 20 salmon got away near where we were fishing, but so did a dozen beer cans.

On my Father's Day fishing expedition, a foreign-speaking lady of apparent northern European origin was fishing just downstream and caught five salmon to my one salmon. I was beginning to feel more like the mean bear than the Samaritan. My six-year-old daughter kept asking why, a storied ranger like myself who according to my stories had practically invented the Russian River fishing technique, couldn't catch as many fish as the lady downstream had caught.

This brings up another thing about Russian River fishing; despite long term experience or knowledge about catching sockeyes, if you haven't got your fish-

ing mo jo working, you might as well go home. My dad on a Father's Day long ago said, "You have to hold your mouth just right when you fish, son." Staying focused yet indifferent to time and space is essential for Russian River fishing, as is reducing distractions like kids and fishing companions who lack patience and would rather be somewhere else. A Zen master would probably make a good Russian River salmon fisherman, if it weren't for the clubbing part.

The phenomena of taking maximum advantage of a renewable salmon resource including harvesting a bunch of salmon in a short period of time is nothing new, but probably just as frenzied today as it was historically. Archeologist has documented numerous periods of early native encampments and salmon harvest at the Kenai-Russian River confluence.

Social scientists, recreation managers and biologist have been trying to manage and understand combat fishing for about as long as I've been familiar with the Russian. Much like present biologists, early state biologists focused mostly on insuring salmon spawning escapement in order to insure the future of the run.

The Sportfish Division of the Alaska Department of Fish and Game has been actively involved in counting escapement and "managing" the fishing effort since the early 1960's. Emergency openings and closures based on stream counts and escapement projections are their primary tools. Kenai Refuge involvement began somewhat reluctantly with public safety and regulatory concerns. The early Russian River Ferry was the first recreational special use permit on the Refuge and certain instances of trespass construction on Refuge lands at the confluence were among the first documented law enforcement actions on the newly established game range.

Basic access and permit issues in the 1950's gave way to housekeeping (refuse disposal), campground maintenance, public safety, and wildlife conflict concerns as crowds increased in the 1960's after the opening of the Sterling highway from Anchorage.

As crowds continued to increase and the term "combat fishing" was coined, managers wondered out loud if such socially dense fishing was appropriate on a National Wildlife Refuge. Managers were caught between wanting to maintain a certain quality experience and providing opportunity to all that sought it. One recreational staffer even proposed mandatory numbered stations (posts) along the riverbank to insure quality control spacing for fisherman. State fisheries biologists seeking maximum opportunity (har-

vest) were often not on the same page with Refuge staff who were more concerned with where such crowds fit into the concept of a National Wildlife Refuge.

In the 1980's the concept of streamside social engineering gave way to more pragmatic concerns, such as reasonable limits on parking area, conflict reduction (like controls on upper river motorboats), litter reduction, and resource protection. Management since the 1990's has focused on further refinement on previous visitor management strategies and the establishment of professional concession contract. Bank protection, habitat protection and bear-human conflict reduction will probably be the next major concerns. There is still much to achieve in reducing brown bear-fisherman conflicts at Russian River. Annually, there are several near misses and incidents between bears and fisherman, even on the lower portion of the Russian River. On one hand, the 30,000 plus anglers annually seem collectively too important to displace for a few hungry bears, yet on the other hand...it is a National Wildlife Refuge and any loss of prime feeding areas can be significant.

For the average fisherman, the behind-the-scenes fisheries management, escapement, wildlife, crowding, litter, public safety, and budget issues associated with the Russian River are of little concern. Like me on Father's Day, it's enough to think about, just try-

ing to out fish European visitors and keep a one-ounce weight from hitting important body parts.

And what of the crowds and the future of Russian River fishing? Then and now there has been what social scientists refer to as "invasion displacement." In other words, whenever the combat fishing experience and crowding reaches an individual's limit, there is always one.... perhaps two more newcomers with more crowd-tolerance to take the displaced person's spot. Thus goes the never-ending cycle of happy crowds and departing unhappy ex-fishermen. When I first arrived at Kenai National Wildlife, for example, I met several persons that said that they had reached their limit at the Russian about 1969; "It's too crowded for me," they said. And now each era has people saying the same thing with the crowds each year increasing. Some people from international big cities like New York, Tokyo or Berlin may never reach the "too crowded" situation. Then again desperate persons like me on Dad's Day who have no shame will probably always sneak a trip or two in semi-annually.

Rick Johnston is a Ranger/Pilot at Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Hmmmmmm....was that a hummingbird?

by Todd Eskelin



Rufous hummingbird photographed by Andrew Reding
<http://www.inaturalist.org/photos/1917761>.

I am often asked, “What is the smallest bird in Alaska?” That’s easy, the Rufous Hummingbird. Your typical Rufous Hummingbird is less than four inches long and weighs 3.25 grams, only slightly heavier than a penny. People next want to know where they can see a hummingbird. That is a tougher question. Rufous Hummingbirds breed from Northern California up the coast through Prince William Sound. They are known to breed in Portage and have been documented breeding along the south coast of Kachemak Bay. They have not yet been found breeding here in the central Kenai Peninsula, but I am convinced there is a good chance that they might.

Rufous Hummingbirds may be small, but what they lack in size they compensate for with one of the most amazing migrations known in the bird world. During late July these little adventurers leave Alaska and head south to Mexico. If one measures the distance in body lengths, this is a greater migration than the famed Arctic Tern, which flies over 11,000 miles to its wintering area in Antarctica. Many Alaskans head to Mexico for the winter, but we fly in a 737. Pound for pound it would take 78,000,000 hummingbirds to match the weight of one 737 commercial jet.

Chances are you will never find a hummingbird nest, even if it is in your own back yard. Most Rufous Hummingbird nests are made of lichens, moss and fragments of bark, bound together with strands of spider web and lined with soft downy plant ma-

terial like cottonwood fluff. Typically, nests are located in the droopy branches of a large spruce tree about 8 to 12 feet above the ground. In Southeast Alaska they have been known to build nests in ferns and vines overhanging embankments. So, if you can’t find a nest, how do we know where they are breeding? The best way is to watch for them at your flower garden or hummingbird feeder and look for young birds. Soon after they leave the nest, the parents will take the youngsters to their favorite feeding areas and teach them how to find nectar. The parents will collect some nectar while the fledglings are watching nearby. Then you will see the parents go over and regurgitate the nectar to the fluffy little fledglings. So if you have hummingbirds in your yard, pay special attention in the end of June and early July to see if there are any fluffy young birds that do not fly very well. This is a sure sign that there was a nest in your area.

There are several things we can do to attract hummingbirds to our yards. The best way is provide them with plenty of nectar. Hummingbirds require one half of their body weight a day just to stay warm. During late summer they need to store fat for the long migration so they will eat/drink even more. Approximately 85% of their diet is nectar, but they do supplement it with small insects and an occasional spider. Planting the entire yard with showy tubular type flowers like paintbrushes, mints, larkspurs and honeysuckle is a good start at bringing in hummers. Bright red flowers are often favorites for most hummingbirds. Fireweed is also a preferred food in our area. If gardening is not your forte, try hummingbird feeders filled with artificial nectar. These feeders require a lot of maintenance, as they are very susceptible to fungus and mold. It is recommended that these feeders be cleaned at least once per week with soap and hot water. Another problem is that they attract unwelcome visitors like bears and bees. The bear problem can be avoided by hanging the feeder where it is unreachable by bears. If you have a bear visit, take the feeder down and put it away for another year. A well-kept flower garden does a good job at attracting and keeping these tiny birds around.

So the next time you are in the yard and you think you hear a bumblebee buzzing around in the flower

patch, take a second to check and see if it isn't a hummingbird grabbing a bite to eat before a long journey south. There have been a couple of accidental sightings of other hummingbird species in Anchorage like the Costa's Hummingbird a few years ago and Anna's Hummingbird has been seen. If you see any hummingbirds on the Kenai Peninsula, please take a picture, and report your sightings to Todd Eskelin at the Kenai Na-

tional Wildlife Refuge (262-7021).

Todd Eskelin, a Biological Technician, has conducted bird studies throughout the state specializing in songbirds. He recently accepted a position at the Kenai Refuge where he plans to continue his work with birds. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Jim Frates retires, was former Moose Range Chief

by Samantha Bartling



Jim Frates, Kenai National Wildlife Refuge Operations Specialist, at the Swanson River Field discovery well. USFWS Photo by Tiffany A. S. Parson.

With two radio stations, no fast food establishments, no stoplights, and soon after the “glaciers had retreated from the Kenai lowlands,” Jim Frates arrived on the Kenai Peninsula in 1977 as the new Manager of the Kenai National Moose Range. He is now retiring, after seeing the Moose Range re-named Kenai National Wildlife Refuge in 1980, and with a total of 34 years with the US Fish and Wildlife Service (USFWS).

Jim’s departure marks the end of an outstanding

career and leaves a space in the Refuge’s organizational chart that will be tough to fill. His jobs have ranged from Refuge Manager to his current job of Refuge Operations Specialist, where he oversees mechanical and facilities operations, as well as oil and gas activities on the refuge. Oil and gas operations on a National Wildlife Refuge are a delicate matter. Since 1957, oil companies have had a Congressionally-mandated right to explore and develop petroleum resources on the non-wilderness parts of the refuge. Jim’s job was to assist oil and gas activities, so that the work could be done without compromising the Refuge’s purposes of protecting wildlife habitat. As one can imagine, this is no easy task. Years of experience, a personable style, and a quick wit have served Jim well in this balancing act. Brian Millyard, a Marathon Oil Field Operator, says that “I really appreciate all Jim has done; he is just a really good guy.” Jim’s co-worker, mechanic Al O’Guinn, echoes Millyard’s comments, “He is one of the nicest guys I’ve ever worked with. He is highly respected and will be greatly missed.”

Jim’s path through the USFWS to Alaska’s Kenai National Wildlife Refuge started in the Lower-48 where Jim graduated from Colorado State University in 1963. Upon graduation he worked as a pheasant research biologist for both the Nebraska and South Dakota Game Commissions, moving in 1965 to District Game Manager for a seven-county region in northeastern South Dakota. This job led to his 1966 entrance into the US Fish and Wildlife Service as an assistant refuge manager at the Tamarac NWR in Minnesota. Between 1968 and 1973, Jim served as Refuge Manager on the Lostwood, Desoto, and DesLacs Refuges. Four years later, in 1977, Jim saw his first moose, outside of a zoo setting. “Oddly enough, (the moose) was the first local resident I saw after entering the Kenai city limits,” which began his 17-year stint on the Kenai National Wildlife Refuge. Jim was Refuge Manager from 1977 until 1980 when he transferred to the USFWS’s Anchorage Regional office to participate in developing long-range conservation plans for Refuges in the Bristol Bay/Aleutian Islands region. In 1985 Jim returned to Kenai Refuge to undertake his current position.

As Jim takes a look back on his career, he notes: “Working with people who passionately care about the resources and critters with which they are charged with protecting and managing was kind of personal ‘glue’ which kept me so attached to my job for so many years.” One of Jim’s most memorable moments was initiating the construction of the new headquarters/visitor center; the building atop Ski Hill Road would not be the hub of the 1.92 million-acre, without his efforts.

Upon retirement, when the beginning of the workweek approaches, Jim plans on sleeping a bit later and enjoying the fact that an alarm clock will no longer be a trigger to the start of the day. He plans on staying in the Kenai-Soldotna area where his wife Marlene will continue working with the Kenai Peninsula School District. Jim’s son Brad works for Phillips Petroleum

on the slope, and son Bobby is Director of Parks and Recreation for the City of Kenai, while daughter Barbara lives in Boise. Jim expects that writing, photography, and yard work will be taking the place of meetings, e-mails, reports, and deadlines. With honor, accomplishments, and years of dedication in his wake, Jim exits the Service noting that “Even though it’s sometimes a staggering concept, I’ll miss the feeling going to work each morning with the recognition that the entire public was my employer.”

Samantha Bartling is an intern with the Student Conservation Education Program at Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Did beetle-kill forests burn in the past?

by Ed Berg

We have a lot of dead beetle-killed spruce forest on the Peninsula, and we have had two scary fires in these forests in recent years. The 1996 Crooked Creek Fire northeast of Ninilchik spread quite rapidly with a strong wind and covered 17,510 acres in a remote area. The 1998 Hutler Road fire east of Homer could have burned up many homes, but fortunately homeowners generally had prepared good defensible spaces, and quick response by the firefighters prevented a major disaster.

If however we look further back into the past, can we see evidence of beetle-killed forests burning? This question has puzzled me for several years, and I am tentatively prepared to argue that over the last two hundred years, we have at this point no evidence of fires in beetle-kill. We have looked at tree-rings in 17 stands on the Peninsula, from Kachemak Bay to the Swanson River oilfield northeast of Kenai. We see evidence of bark beetle outbreaks over the whole in the Homer area Peninsula in the 1810's–1820's, and regional outbreaks on the southern Peninsula in the 1870's–1880's, and the northern Peninsula in the 1970's. We also see evidence of local outbreaks at various other times, such as the Mystery Hills in the early 1980's. In none of these sites do we see any evidence of a stand-replacing fire after a beetle outbreak.

There are two areas that would seem to be particularly good candidates to find evidence of fire after beetle kill: the Tustumena benchlands and the forests south of Deep Creek to the Anchor River. The Tustumena benchlands experienced a series of burns, dating at 1871, 1891, and 1910 reburn, according to trapper Andrew Berg who lived in the Tustumena Lake area from the 1890's until his death in 1939. The tree-rings show that the central and southern Peninsula forests near the coast experienced heavy beetle kill in the 1870's, so the timing is right for the 1871 benchlands fire.

Up on the benchlands one can still find a lot of dead and partially burned wood in certain areas, which probably escaped the 1910 reburn of the earlier burned areas. On two trips we have examined a lot of this wood for beetle scars, but have never found any sign of them. In the Homer area, however, we have found old

(unburned) snags, which died in 1884 with good beetle scars. (We look for the maternal galleries, which are 3-4 inches long and a quarter inch wide, lying parallel with the axis of the tree. These can be quite visible on old barkless wood.) The absence of evidence, of course, proves nothing, but is possible that benchlands escaped the 1870's beetle infestation because of the higher elevation (above 1000 feet) and cooler environment.

The second area for a possible beetle kill-and-fire connection is the broad forested zone from Ninilchik to Anchor Point. This forest is predominantly continuous white spruce with not much hardwood. It has experienced 90-100% mortality of the mature spruce, and has been heavily logged in recent years. Last month we looked in detail at an uncut stand on East Road, southeast of Ninilchik, which is being considered for a prescribed burn next year by the Alaska Division of Forestry. This stand is representative of the area, but it is only one sample of a large area and our results must be considered tentative.

This stand had a somewhat “even-aged” mature look, where the largest trees are about the same size, i.e., 15-20 inches in diameter in this case. Even-aged stands are typically formed after a fire; the largest trees are all about the same age and were recruited within 10 years or so after the fire. Appearances can be deceiving, however, and we were definitely fooled by this one. The largest trees dated from the late 1700's to the 1850's, indicating that they only appeared to be of similar age but really were not. Furthermore, we found no burned wood in the stand, which one would expect from a 19th century burn. We took Pulaskis and opened up old moss-covered logs on the ground, hoping to find charcoal (or beetle scars) on these logs as evidence of fire, but only found thoroughly rotten wood. These unburned rotten logs indicate that at least one generation of trees has come and gone on this site before the present generation of trees.

We did find locally abundant charcoal-covered wood in the soil, especially among exposed roots in throw mounds of blown-over birch trees in an adjacent logged area. This charcoal shows that the stand did burn at some point within the 8000 years that spruce

forests have been on the Peninsula. We are getting a radiocarbon date on this charcoal, but we expect that it will show that the stand has not burned for at least 400-500 years.

In the tree-rings from this site we can see a growth release in the 1880's, which is typical of our southern Peninsula sites, and we can say with reasonable certainty that this forest was thinned by the bark beetles during the regional outbreak of the 1870's. So once again, we see that a forest that did not burn after a beetle outbreak.

To sum up, in the Tustumena benchlands we had a fire in 1871, but apparently no beetle-kill, whereas in the Ninilchik East Road site we had beetles but no fire afterward. The East Road site is thus typical of the 16 stands, which we have previously studied, which show beetle outbreaks at various times but no evidence of fire.

Should a homeowner draw consolation from these

studies? Unfortunately, no. The climate is warmer and drier today. Basically, it is drought, not beetle kill that creates the real fire hazard. A drought-stressed live spruce next to your house is every bit as flammable as a beetle-killed spruce. We have had an unbroken run of warm summers since 1987, which has increased evapotranspiration and caused a regional drying of the landscape. This drying can be seen in falling water tables in wetlands and closed-basin lakes. Dead or live, our spruce trees burn just fine when they are dry. Residents in the 1996 Big Lake Fire no doubt remember how that fire burned so destructively in well-dried black spruce that was quite alive and had no beetle-kill in it.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Refuge bird expert shares birding knowledge and skills

by Candace Ward



Refuge bird expert Todd Eskelin will be sharing his knowledge on August 28th

Whether it's bird watching at your home feeder or traveling to exotic places in search of a rare "life list" bird, birding represents one of life's most fascinating pleasures. Have you ever realized that much of our knowledge about birds is a result of skilled bird capture and banding work? Biological Technician Todd Eskelin will share just how important such work is in a program, *The How and Why of Bird Banding*, at the Kenai National Wildlife Refuge on Saturday, August 28, at 11:00 a.m. Todd will set up mist nets and live capture birds demonstrating banding techniques first hand.

Todd has traveled the length and breadth of Alaska researching seabirds, songbirds, and migratory waterfowl. Since 1993 he has worked on a variety of bird research projects in north central Alaska, the Gulf of Alaska, the Alaska Peninsula, Kodiak Island, and on the Kenai Peninsula. In addition, Todd has also flown long hours in a Cessna 206 conducting sea duck surveys for the U. S. Fish & Wildlife Service on the North Slope, over the Bering Sea, and from Scammon Bay to False Pass.

Todd grew up on the Kenai Peninsula. He credits his fascination for birds from his college days at Lewis & Clark College in Oregon. He studied ornithology under Dr. Don McKenzie and found he was fascinated by what could be learned from the delicate birds he handled during bird banding sessions. He also enjoyed teaching other students bird banding techniques. Todd has given banding demonstrations to hundreds of students throughout Alaska. He has also trained numerous professional resource agency staff in banding techniques.

Todd has experienced some interesting bird encounters over the years. He banded a redpoll on the Alaska Peninsula that he later recaptured in Soldotna along Funny River Rd. When observing the Kenai River Flats for distant migrants, he spotted a semi-palmated sandpiper with a distinctively colored leg band and found it had originally been banded in Ecuador.

Besides his many biological duties, Todd enthusiastically helps visitors with precise and technical birding questions. Numerous times he has expertly identified an unknown bird that has everyone else stumped. Since Todd cannot always be available, he collaborated on the creation of Refuge specific guide, *Birding the Kenai National Wildlife Refuge*. This booklet helps birders to locate birds by habitat on refuge trails and adjacent to roadway areas. This guide is available for purchase at the Refuge Visitor Center. At Todd's Saturday program, *The How and Why of Bird Banding*, there will be a free drawing to win the guide along with other birding items. Join us for a fun and eye opening program.

Candace Ward has worked as a park ranger at Kenai National Wildlife Refuge for seventeen years in the refuge education and visitor service programs. She is an avid backyard birder and enjoys expanding her birding horizons. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

How will beetle-killed forest look in 40 years

by Ed Berg

My crew and I have just returned from a trip of 40 years into the future. Our time machine was a Cessna 185 which dropped us off at Barabara Lake on the far northern end of the Kenai Peninsula, five miles south of Turnagain Arm. I and refuge biotechs Candy Godin, Doug Fisher, and Pam Russell came to study a forest which was heavily hit by spruce bark beetles in 1958-59. We wanted to see how well this forest has regrown after 40 years. Will the present beetle-killed stands of the Kenai Peninsula look like this forest 40 years from now?

The 1950 aerial photos show this area as a closed canopy mixed white spruce and birch forest—classic Kenai Peninsula old growth forest. The post-beetle 1975 aerial photos show much less live spruce. Viewing the 1975 photos stereoscopically (in three-dimensions) we could see dead spruce trees sticking up everywhere like little toothpicks. In the 1996 photos the toothpicks were all gone, and more birch was present. When we hiked through this area we saw that the photos had not lied. In three days we couldn't find a single standing dead spruce tree from the 1958-59 beetle-kill; every tree of that vintage was down on the ground. Many down trunks were moss-covered and quite rotten; others had fallen more recently and still had 20-30% of the bark on the trunk, and the old beetle scars were quite visible. This forest definitely answers the often-asked question: how many years will it take for all the beetle-killed trees to fall down? Answer: 40 years.

We took more than 100 increment core samples from the largest spruce trees, and counted stems of all woody plants along a 300 x 4 meter transect. The wide tree-rings in the increment cores showed that the trees had grown rapidly since the 1960's. These trees were the "little guys" that survived the beetle attack and were released from competition by the death of their larger neighbors.

We could also see earlier periods of wider rings in many of the trees, suggesting beetle thinnings in the 19th century. This pattern of periodic thinning and release is typical of the 18 stands that we have previously examined in detail around the Kenai Peninsula and Cook Inlet. We often see releases every 75 to 100

years in the same stand.

Viewed from the air this forest has an open texture, because the big trees are fairly widely spaced. This openness gives the forest a park-like appearance, if one can ignore the dense devil's club understory. You don't walk or run through this park, because you are constantly climbing over rotten logs hidden in the grass, while fending off the devil's club with leather-gloved hands. Nevertheless with all the live trees the forest has a lush moist feel to it, and we thoroughly enjoyed working in it. I have never seen so many red current bushes, and had to take frequent berry-picking pauses as part of the vegetation sampling protocol.

When the devil's club berries are ripe in the fall this forest should be Valhalla for black bears. We didn't see any bears, although one visited our camp while we were gone. It clawed my tent rainfly, and bit through an aluminum lid on a pot, but didn't go after our plastic food barrel or get into our tents.

Our 300 meter transect showed good amounts of winter browse for moose and hares (especially birch, red current and highbush cranberry), but the shrubs were lightly browsed compared to shrubs in the central Peninsula. The area could probably support many more moose, but predators such as bears and wolves may be keeping the moose population in check.

I am pleased to report that this forest is reproducing itself quite nicely. We found young white spruce of all sizes flourishing in the understory, often growing on rotten stumps and logs ("nurse logs"), which we describe as "germinating up in the air." This is the typical mode of seedling recruitment in an old growth forest, and it contrasts with recruitment after a fire where the seeds germinate on exposed mineral soil. We could see that the parent trees had also been recruited up in the air. Virtually every large spruce had a forked base, not uncommonly with a hole between the root knees. (If you don't mind sticking your hand in these holes, you can often pull out some old rotten wood from the nurse log, even after several hundred years have passed since the tree germinated.)

The key to the success of this forest after the 1958-59 beetle outbreak was the survival of a cohort of smaller trees (which were as much as 150-200 years

old). These trees grew faster and account for most of the present timber volume in the stand. More importantly, they are the seed parents for the crop of new seedlings and saplings which will create the next generation of trees.

Many of the present beetle-killed stands on the Kenai Peninsula look the way this stand looked 40 years ago; they have a good crop of smaller surviving trees which will regenerate the future forest. There are stands, however, which have very few surviving trees (big or little), and are pretty much wall-to-wall dead mature spruce with very little hardwood. Ideally, these stands should be burned, or harvested and replanted. With no seed parents, these dead stands will be taken over by dense bluejoint grass (*Calamagrostis*). This grass forms a thick sod and lowers the soil temperature, which makes it difficult for seeds to germinate and take root.

On a Peninsula-wide scale we have studied how forests have regrown after the beetle outbreaks of the 1810's-1820's, 1870's, 1910's, and 1970's. The forests

have always grown back, some faster than others, and generally not on the scale of one human's memory. With our present warmer climate we can expect more chronic low-level beetle infestation, and it will occur in smaller trees. With the spruce not living as long, we should see a greater proportion of hardwoods like birch, aspen, and alder in the forests, because these species are not bothered by the beetles. More hardwoods should reduce fire risk, and will certainly be to the liking of moose and hares, and everything that eats moose and hares. For many of us the present beetle outbreak has been a trauma, but it is all part of the natural process, and life will go on. The future of our forests looks bright indeed, if we step back and take the longer view.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

The Mystery Hills Fire offers us a snapshot

by Doug Newbould

The big, lumbering thunderheads marched single-file northeast along the western foothills of the Kenai Mountains. These were no ordinary Peninsula storm cells—these were the “real deal,” with the characteristic anvil shape, dark bottoms and snow-white tops at 30,000 feet. Storms like these always inspire a sense of awe in me as I have witnessed their power so many times in the western half of the United States. No, these weren’t the monsters of eastern Colorado with 50,000-foot tops, softball-sized hail, spin-off tornados and microbursts that flatten mature forests. These were a kinder, gentler variety. Here on the Kenai, thunderstorms tend to be wet. On those few occasions when lightning connects with the ground here, resulting fires tend to get “rained out.” On this day however, there were only a few showers—these were essentially dry thunderstorms—a rarity on the Peninsula.

It was Thursday, June 28th, about 6:00 in the evening. I was driving along K-Beach Road when I heard the radio traffic on a State Forestry frequency. One of Forestry’s engine patrols, while driving east on the Sterling Highway, spotted lightning strikes in the Mystery Hills—a few miles north of the highway. A few moments later, a smoke column appeared in the same area. From the firefighter’s description of the smoke column and its location, I knew the fire was on the Refuge. So I pointed my truck at the Division of Forestry office, just as my cell phone began to ring. (NOTE: Under the Alaska Interagency Wildland Fire Management Plan, the Alaska Department of Natural Resources—Division of Forestry has wildfire suppression responsibility on National Wildlife Refuges in Southcentral and Southwest Alaska.)

Little did I expect at the time—that the next ten days of my life would be consumed, as the Refuge and State Forestry joined forces to manage a wildfire in the Mystery Hills. The phone call (as expected) was from Forestry, to notify me (the land manager) there was a fire on the Refuge, and to find out how the Refuge wanted to manage the fire. I said I would be there in ten minutes. In the meantime, we agreed that Forestry should go ahead and launch their helicopter to fly over the fire and do a size-up: get a precise location; describe the fire size, the rate of spread and fire behavior;

and describe the surrounding fire environment (local weather, fuels, terrain features and values at risk). This information would be critical to our decision-making process.

Even as I drove to Soldotna Forestry, and as the helitack ship was on its way to gather fire information, I was already thinking about some of the known factors that would influence our decisions. The fire was likely in a Limited Suppression Zone which does not mandate initial attack (as would a fire in a Full or Critical Suppression Zones), but essentially allows a fire/land manager to use an appropriate fire management strategy from the full range of options—from a monitoring (no suppression) strategy to a full or total suppression strategy, or something in between. The keys to this decision process would be gathering good information, making sound management decisions, and documenting the reasons for those decisions. For example, if a fire or land manager decides to suppress a fire that is in Limited, the Alaska Interagency Wildland Fire Management Plan requires the preparation of a Decision Criteria Record to document the rationale for the decision.

Another known factor was the drought conditions we were experiencing on the Kenai Peninsula. We use the Canadian Forest Fire Danger Rating System (CFFDRS) here in Alaska to monitor fire weather and fuel conditions. All of the CFFDRS indices including the Drought Code, the Fire Weather Index and the Build-up Index were at extreme fire danger levels at all of the local weather stations on June 28. One of the lessons we fire managers learned from the fires at Yellowstone (1988) and Los Alamos, New Mexico (2000), is that wildfires quickly become uncontrollable during drought conditions. I was on one of those Yellowstone fires (Clover/Mist) in 1988 and many other large project fires in my career, and I know how difficult wildfires are to control—when forest fuels are impacted by drought.

A third factor to consider in deciding how best to manage the Mystery Hills Fire, was the availability of fire suppression resources. The Kenai Lake Fire had already drawn a number of Alaskan firefighting resources including two Kenai Refuge fire engines, sev-

eral hotshot crews and aircraft, and a Type-1 incident management team from the Lower 48. Many other Alaskan crews and aircraft were committed to the large fires in the Alaskan Interior. So even if the decision was made to initial attack or suppress the Mystery Hills Fire, there was no guarantee that the right types or numbers of firefighting resources would be available.

A fourth factor was the approach of the holiday week (Fourth of July) and the thousands of Refuge visitors that would be traveling the Sterling Highway, recreating in the Skilak Lake area and hiking or canoeing on Refuge trails. The prospect of evacuating a neighborhood or a campground is daunting enough, but evacuating back-country recreationists is even more problematic because you don't really know where people are located.

By the time I ran the gauntlet through Soldotna construction and tourist traffic, and pulled into the parking lot at State Forestry, the helicopter crew was over the fire and sending size-up information to Forestry dispatch. As it turned out, there were two fires burning in the Mystery Hills. The southern fire (Mystery Hills) was about 2 miles north of the Sterling Highway and 1.5 miles east of the Mystery Creek Road. Downdrafts from the thunderstorms were pushing the fire rapidly through black spruce to the south and west. The northern fire (Thurman Creek) was several miles to the northeast, near the confluence of Thurman Creek and the Chickaloon River. It was burning hotly upslope to the east in mixed forest fuels.

When Ric Plate (the Fire Management Officer for the Kenai-Kodiak Area Office of the Alaska Division of Forestry) and I got together, we laid all of the known and collected information about the fires and their respective environments out on the table, consulted with our superiors and then made the decision to initial attack the Mystery Hills Fire. Considering the factors I've described above, I hope the reasons for that decision are fairly obvious. Additional considerations included: the large tracts of continuous black spruce forests to the south and west; the fire's proximity to the Sterling Highway, the Skilak Lake recreation area, and powerlines; and the potential for the fire to get very large in a short period of time if no suppression action was taken. Once the decision was made to suppress the fire, additional air attack resources were immediately ordered—including a second helicopter with a water bucket and a State air tanker. We also agreed that no ground forces would be sent into the fire un-

til we could provide adequate escape routes and safety zones. That evening we would have to settle for an air attack and the next day we would reassess the situation and develop a new plan of attack.

Friday morning, because of our decision to suppress the Mystery Hills Fire and because of the fire's potential to exceed the capabilities of our local resources, Ric and I completed what's known in fire circles as a Awoofsah or WFSA, an acronym for Wildland Fire Situation Analysis. A WFSA is a standardized tool used by fire managers nationwide to document critical information about a wildfire incident and to help fire managers develop a management plan for the incident. A WFSA is a "living document" that is adjusted as new information is collected or to meet any new challenges as the incident changes. In hindsight, this was an important exercise for me and for Ric, since it was our first "project fire" working together as fire management officers.

While Ric and I completed the WFSA, the aerial fire suppression efforts continued on the Mystery Hills Fire. The Thurman Creek Fire continued to be monitored from the air; but its position, the surrounding fuels, and its fire behavior were such that no suppression efforts were deemed necessary at the time. An Extended Attack Incident Commander (ICT3) from State Forestry in Palmer supervised the suppression efforts that day. By the end of the day, Mystery Hills had grown to about 600 acres and Thurman Creek covered about 10 acres. Because Mystery Hills continued to grow and the weather forecasts gave us little hope for a change, we decided to order a Type 2 Incident Management Team to help us manage the Mystery Hills fires.

Fortunately for us, the Division of Forestry had already ordered a Type 2 Team to be pre-positioned or staged in Anchorage. This saved us at least a couple of days in getting the incident management team to the Kenai Peninsula. As it turned out, this was the second of three fortuitous circumstances that allowed us to bring the Mystery Hills Fire under control. The first was the aerial retardant lines that were laid down on Thursday and Friday—in front of the advancing fire fronts on the south and west flanks. Ultimately, these lines are what kept the fire from reaching the Sterling Highway and Mystery Creek Road. Alaska Division of Forestry fire managers deserve a lot of credit for pre-positioning a retardant ship in Homer these last two years and developing a retardant-loading site at the Kenai Airport this year.

The third fortunate circumstance was the favorable weather change that occurred on July 4th. By the time the incident management team from Oregon/California (also known as the ORCA team) was set up and fully functional at the Sterling Elementary ICP (incident command post), the cooler/wetter weather that is typical of July finally arrived. This allowed us to change our fire suppression tactics from a defensive indirect attack to an offensive direct attack. In other words, we were able to safely send firefighters into the fire to construct handlines and direct attack the fire's edge. By Saturday Hotshot crews from Alaska and the Northwest had the fire contained and well under control.

Having flown over the fire a couple of times, after walking completely around its perimeter, and after studying the satellite imagery provided by the Borough's Spruce Bark Beetle Office, I noticed a very interesting pattern—one that I think deserves our attention in the years ahead. The Mystery Hills Fire burned the same fuels and followed the same pattern as the 1947 Fire, which burned over 300,000 acres. The Mystery Hills Fire burned most actively in the black spruce woodlands which regenerated after the 1947 Fire. This

fuel type dominates the drier upland ridges in the Mystery Hills and throughout the western foothills of the Kenai Mountains. When the fire burned into the decadent remnant stands or stringers of beetle-killed white spruce, it tended to go out on its own. These white spruce stands exist in the wetter sites found in the valley bottoms and at higher elevations (about 1200 feet). In fact, at several locations within the fire perimeter the fire clearly jumped across these wet stringers of white spruce even with all that large dead woody material lying around, and burned the adjacent dry ridges of fifty-year-old black spruce.

There are at least two inferences we can derive from this information: the black spruce woodlands regenerated by the 1947 Fire are once again capable of sustaining wildland fire, and wetlands—even those dominated by old white spruce, can survive the effects of wildfire in some situations.

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Antlers, horns and their place in the Kenai National Wildlife Refuge

by Robin West



boy with moose antlers

Biologists, wildlife watchers, and hunters have always been fascinated with the antlers or horns that various wild animals possess. At this time of year, when many folks are out looking for a “spike-fork/fifty” moose, it seems like a good time to discuss this topic.

“Spike-fork/fifty,” of course, refers to the regulation about what a bull moose must have in the way of antlers to be legal game. Specifically, the antlers of the male (only male moose have antlers) must have at least one of the two antlers with only one or two points, or else the distance between both antlers at the widest distance is at least 50 inches.

Bull moose with at least three brow tines on an antler are also considered legal. Given the difficulty that can arise in estimating a 50-inch spread on a moose under hunting conditions, the conservative approach in determining legality of larger bulls has given rise to the saying, “Count to three or leave it be.”

Excellent advice to all hunters, of course, is to always be sure of your target, the safety of the shot, the legality of the animal, and the surety of your ability to make a humane kill before deciding to pull the trigger or release the arrow.

Unlike moose, both male and female caribou have antlers. Old caribou males have much larger antlers than females of any age, but yearling bulls frequently

have antlers that look very similar to those of older cows. Antlers are grown and shed each year, whereas horns grow for the entire life of the animal. Moose, caribou, deer and elk have antlers. Sheep, goats, musk oxen and bison have horns. About half of the bull moose in their second year of life will have a spike or forked antler. The remainder of these yearling bulls will have small palmated antlers.

Antlers, even though shed each year, generally are grown back larger each subsequent year for several years. This may change if an animal lives to be old, and often the antlers of very old animals are smaller than when they were in their prime.

Since horns continue to grow throughout the life of the animals that have them, the horns will get larger each year of life, unless broken off. Most growth, however, occurs within the first four or five years of life and then annual increase diminishes.

A legal Dall sheep must have a full-curl (360 degrees) horn, and this amount of growth will generally occur between age six and eight, although some rams never attain a full-curl horn. Sheep that are eight years or older, as aged by their annual growth rings, or with broken horns, are also legal game. Ewe sheep have horns as well, but they never grow very large. Like with caribou, it is easy to mistake a yearling male ram for an adult female sheep if you only look at what is growing on their heads.

The various horn/antler size and configurations provide good tools for game managers to provide hunting opportunity while protecting wildlife populations from overharvest. For example, the “spike-fork/fifty” moose regulation allows for large numbers of hunters to participate in a long hunting season while assuring that a significant number of bull moose will remain after the season to breed. Other ways to manage game, when faced with large numbers of hunters, are to have much shorter seasons or a limited number of hunting permits.

Antlers and horns are believed to serve primarily as a show of dominance for breeding males. Older bull moose and caribou tend to shed their antlers in the late

fall, while younger animals often carry theirs into the early spring. Within weeks of the shed antler coming off, a new velvety knob will appear, and antler growth will be rapid during the periods of lush vegetation in spring and summer. Around the first of September, the velvet will harden and will be scraped from the antler by rubbing on brush and small trees.

Looking for shed antlers in the spring is a hobby shared by many Alaskans. The “sheds” make great curiosity pieces and are good raw material for a whole host of wonderful crafts. General national wildlife refuge regulations (applying to all refuges in the United States) do not provide for the removal of antlers, bones, horns and other natural items without a permit.

However, as long as collection is for limited personal use and not for commercial purposes, we have used our discretion to allow shed collecting here at the Kenai refuge. Our logic has been that since we allow the hunting of these animals (and the removal of the entire beast—hide, hoof, horn and all), we will allow the limited removal of their parts that may be found.

This is an attempt at a reasonable interpretation

of the regulations that recognizes the ecological value that bones and shed antlers provide to critters such as voles, squirrels and porcupines, as well as the discovery value to visitors who stumble across an old moss-covered antler overgrown with wildflowers, and the value to individuals who take an antler home and display it on their mantle or make a belt buckle or knife handle for a special gift for a friend or family member.

The fragile ebony horns of a mountain goat, the rugged amber-colored horns of an old Dall ram, the polished mahogany of the majestic bull moose, all define a great deal of what these creatures are, how they live and how they are viewed by people. Horns and antlers, whether attached to living animals, as part of a cherished trophy, or discovered among bleached bones or as a shed atop the tundra, all contribute to the many treasures of the Kenai National Wildlife Refuge.

Robin West is the manager of the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Season brings memories of family hunts along Yukon River

by Mimi Thomas

Hunting season is in full swing, and fall is drawing near. I grew up in a small town in Alaska along the Yukon River, and this was always my favorite time of the year. The Yukon is a water highway to residents of the area and an important fish and wildlife habitat to numerous species.

Hunting along the Yukon River is more than a favorite activity; it is a way of life. By this time of year, the family would be preparing to journey by river for the annual hunt, usually in search of a moose or two depending on how many of us had harvest tickets.

Being unofficially excused from school for the first week or so always added to the excitement. Something I've always remembered my uncle saying to us as we sat around a campfire is that "people pay millions to do this." I believed him because it was such a good time, and each year's traditional hunt seemed priceless to us all.

My father was the oldest of six brothers, all of whom grew up in rural Alaska. Their home site was located at the fork of the Grayling River. They grew up in "the woods" learning how to live off the land, including hunting and fishing for food and trapping in the winters. Although the brothers live in other places now, the Grayling River home site is like an annual magnet and a reunion destination for all the family to gather during the hunting season.

These early outdoor experiences greatly influenced my understanding of and reverence for the land and Alaska's wildlife. In part, these experiences are the reason I've become a game warden, choosing wildlife protection as a career. Having lived in rural Alaska, where hunting is a way of life, I've learned a few inside tricks that have given me a better perspective on the local mind-set. I believe this has made me a better officer.

My family has always given me a hard time, saying things like "you became a game warden just to turn us all in; we see how you are." They all have taken their best shot at me regarding my line of work. It's been said that I can no longer go on these hunts, implying that I wouldn't like what I see.

These statements are usually followed with a wink and a smile. I know that deep down they respect my

choice, for I know I haven't regretted it.

It's always puzzled me why so few hunters utilize the meat on the head or some of the organs of big game animals. Probably some of the best parts of a moose are the heart and kidneys. A popular Yukon River recipe is to fry the kidneys up the morning after the hunt with some moose fat and serve them with pancakes.

Other parts of the moose I seldom see used on the Kenai Peninsula are the parts of the head. The meat and the marrow of the jaw bone are a favorite, not to mention the moose nose. Some along the Yukon say the nose is the best part of the moose.

One of the similarities between respected hunters along the Yukon River and those on the Kenai Peninsula is how they take care of their animal after the kill. One of the most important aspects of wildlife conservation in Alaska is the proper salvaging and utilization of edible meat from big game animals and other wildlife. In many ways, modern wildlife regulations reflect the traditional importance of game meat salvage.

Along the Yukon, like other places in Alaska, there is no greater "hunting sin" than leaving a whole animal to waste after shooting it. In fact, most game meat waste cases are successfully prosecuted due to timely reports by other hunters who either witnessed the incident or have information to report. Hunters who otherwise would have little contact with law enforcement make an exception to report the waste of game meat. Although many times we find the kill too late to salvage the meat, a successfully prosecuted waste case serves as an important deterrent to such abuses by hunters.

Many times big game animals are wasted due to lack of knowledge or preparation regarding transporting such a large amount of meat from a remote site. Other times, hunters may be too quick to judge an antler size or configuration, only to find they have shot an illegal animal.

Hunters should remember that fellow hunters and perhaps the magistrate may judge them less harshly for admitting a mistake and taking steps to salvage the edible meat for donation to charitable organizations,

allowing people that need the food to utilize it. The best advice however, is DON'T SHOOT unless you're absolutely sure that you have a legal animal.

Leaving a dirty camp is also a practice that is frowned upon by hunters along the Yukon, and in our family hunting circle, this was not respected or tolerated. Littering Alaska's public lands is like your neighbor littering your back yard. Who wants to begin a hunt or other activity by picking up trash after someone else?

I am the Kenai National Wildlife Refuge's representative for the Kenai Peninsula Crime Stopper's program. All law violations can be reported to the pro-

gram, including game violations. The Crime Stopper's telephone line is answered 24 hours a day, seven days a week. It is unrecorded and callers who wish to remain anonymous are not asked or required to identify themselves. The telephone number to call is (907) 283-8477 or toll free anywhere in Alaska at 1-800-478-4258.

Have fun on your hunt. And be safe.

Mimi Thomas is a law enforcement officer on the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

What are all those plastic-covered piles along Funny River Road?

by Doug Newbould

Even though we live in the so-called Information Age, and you can send or receive just about any information you want—around the globe, just by depressing a few keys on a computer keyboard—I am amazed at how poorly we humans communicate sometimes. The Funny River Road fuel reduction project is a case in point.

The fire management staff at the Kenai National Wildlife Refuge began work on the Funny River Road fuelbreak in the spring of 1998. The goals of the project are threefold: 1) to reduce hazardous fuel loadings (beetle-killed white spruce and black spruce) in the wildland-urban interface, between the wildlands of the refuge and private lands along the Kenai River; 2) to improve the effectiveness of Funny River Road as a public access/egress route in the event of a wildfire; and, 3) to maintain the visual quality values of the forest in the treated area.

To accomplish these goals, we first cut the dead and beetle-infested trees. We next thin the live healthy spruce to roughly a 20-by-20-foot spacing. Finally, we prune or limb-up the remaining live spruce. Hardwood (deciduous) trees and shrubs are left uncut to provide a seed source for natural regeneration and to maintain the forested appearance of the project area.

We pile useable firewood for removal by area residents (free of charge—no permit required). All of the slash is piled and covered with plastic for later burning. (We do not burn the plastic; we pull the covers off the piles prior to burning and re-use covers on other piles.)

The project area is a 150- to 200-foot strip of forest along the south (refuge) side of Funny River Road, from Mile 3.0 to Mile 9.6. The cutting phase of the project is nearly complete, after this summer's work, so all that remains is to burn the piles.

We have burned piles every year since the project began, except last year, when our firefighters went south to fight fires in the western United States. Later this month, weather-permitting, we plan to continue burning slash piles between Mile 3 and Mile 4. Those piles are cured and ready to burn.

The piles created this summer (Mile 5 to Mile 6) will cure over the winter and be burned next spring or fall, depending on weather and fuel conditions.

The refuge has had a lot of help with the fuelbreak these past three years. The Kenai fire crew has assisted us on numerous occasions, including about one mile of clearing this summer. They did a great job, too. The Alaska Military Youth Academy brought a crew of young men down from Anchorage last year to help us for a few days. Also, refuge YCC (Youth Conservation Corps) crews and SCA (Student Conservation Association) volunteers have been a big help to us.

In fact, the Funny River project has provided an excellent training ground for many young people and firefighters alike, as we use the cutting/piling/burning activities to practice chain saw, hand tool and fire safety. We have also used the project as an example of the FireWise Community Action Program.

You might think that with all this activity along Funny River Road these past few years—after several news releases, radio interviews and newspaper articles, and after talking with dozens of people about the project on the phone and in person—you might think that folks in the Soldotna area would know what we're doing by now. But that is simply not the case.

We frequently get calls or visitors asking us what the plastic-coated humps along Funny River Road are for all the time. I can understand the summer visitors not knowing, but I'm truly surprised when residents are still in the dark about the project. Usually, the word-of-mouth communications fill in the blank spaces left by my so-called media campaign.

I guess that communicating effectively, even in this day and age, requires a lot more person-to-person explaining. I'm OK with that, if that is what it takes. Perhaps we need a talking "Smokey the Bear" out along Funny River Road. Or at least a few signs.

Doug Newbould is the fire management officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Humble peat mosses store global carbon, show amazing variety

by Ed Berg

This is a story about some little plants with a big role. The plants in question are the humble peat mosses, collectively known as *Sphagnum* moss.

Gardeners apply “fossil” peat moss to improve soil water-holding capacity. Indigenous people of the North have diapered their babies with dry *Sphagnum* moss as long as babies have been diapered. *Sphagnum* was used as a wound dressing up through the First World War, because an ounce of dry *Sphagnum* can hold a pint of blood. Backcountry hikers, too, have long considered *Sphagnum* the TP of choice for its softness and absorbent qualities.

Sphagnum in the form of dry peat is the first step toward coal. Over millions of years, the application of pressure and modest heat converts peat to brown coal (lignite), then to soft (bituminous) coal, and finally to hard (anthracite) coal.

On the scale of years and decades, peat bogs are a potential ally in the Great Carbon War now under way. As modern society continues to burn fossil fuels (the solid forms of which are derived from peat) and pump more carbon into the atmosphere, some of this carbon is retrieved by living plants through photosynthesis.

The recent reforestation of eastern North America, for example, is helping to reduce some of the human-generated atmospheric carbon and its contribution to global warming. Unfortunately, trees are only a temporary carbon sink; when trees decay or burn, they surrender their carbon back to the atmosphere.

Peat bogs, on the other hand, are more stingy and are much better long-term carbon sinks than are forests. About 10 percent of the carbon fixed in a peat bog is permanently retained as accumulating peat deposits. During a growing season, *Sphagnum* moss in a bog typically grows 4 inches (and as much as 16 inches), but snow flattens it down over the winter, with a net peat accumulation of about 1 millimeter (1/25 inch). As the peat accumulates and is flattened by the weight of overlying layers, it is compressed to the point that an inch of dry peat moss represents about 80 years of bog growth.

On a global scale, it is estimated that 25 percent of

all carbon stored in land plants and soils is in peat deposits. Much of the other 75 percent is in trees, but as I said, the tree carbon returns to the atmosphere much faster than peat moss carbon. Since most wetlands in the North either are or will become peat wetlands, one good reason for preserving wetlands is to keep them as carbon sinks to help retard global warming.

On the Kenai National Wildlife Refuge, we have thousands of acres of *Sphagnum* peat wetlands (generally called “muskegs,” but more properly described as bogs and fens).

I recently had a delightful opportunity to get a close look at the *Sphagnum* mosses while squiring several of the top *Sphagnum* experts (called “sphagnologists”) around the Kenai: Prof. Kjell Ivar Flatberg and his doctoral student Karen Finthingsgaard, from the University of Trondheim in Norway, and Prof. Richard Andrus, of the State University of New York.

There are up to 300 species of *Sphagnum* worldwide, and they are tough to tell apart. Most botanists just call them “*Sphagnum*” and let it go at that. I always figured we might have a half dozen species on the Kenai, so I was amazed to see these experts find 27 species in the first muskeg that we visited, near Turnagain Pass. During the next three days, we found many more species, and they taught me to identify perhaps a dozen common species by sight (without a microscope).

We all collected many bags of samples, and I expect to spend some interesting weekends over the winter identifying them. It appears likely that we picked up at least one new species, from the muskeg south of Headquarters Lake, and possibly a second new species from a muskeg along Swan Lake Road.

The wetlands of the Kenai are beautiful open spaces, and they can be explored with only a pair of rubber boots. They have their own special plants, many with beautiful flowers, as well as those, such as the *Sphagnum* mosses, which only reveal their beauty and diversity to visitors with patience and a good hand lens.

Ed Berg has been the ecologist at the Kenai Na-

tional Wildlife Refuge since 1993. Further information on Sphagnum can be found at <http://members.nbc.com/temschi/index.html>, and in C. B. McQueen's "Field Guide to the Peat Mosses of Boreal North America," which has

good pictures. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Kenai National Wildlife Refuge concept born during 1897 hunt

by Gary Titus



Dall DeWeese, 1897

Most of us at some time or another have enjoyed recreational activities on the Kenai National Wildlife Refuge, be it hunting, fishing, hiking or snowmachining, to name a few. Some of us might know that the refuge was originally established as the Kenai National Moose Range, by President Franklin Roosevelt in 1941. But how many readers are aware that the Kenai refuge concept had its beginnings as early as 1897?

It all started when a wealthy big game hunter from Canon City, Colo., traveled to Alaska, checking out rumors of giant moose on the Kenai Peninsula. Arriving in Cook Inlet, Dall DeWeese was told he would be fortunate to find a hunter by the name of Andrew Berg to guide him.

DeWeese found Berg at a Kasilof cannery and secured his services. The hunt, in the Tustumena Lake region, was successful, with several trophy moose taken and the peninsula stamped indelibly on DeWeese's mind. On the steamboat journey home DeWeese was already planning his next hunt here.

Word spread of a new territory with giant moose and white sheep, and many hunters laid plans for the season of 1898. For those lacking the time and financial wherewithal for an Alaska hunt, other means of acquiring trophies were available. At that time, there

were no game regulations whatsoever in the Territory of Alaska, and wildlife could be openly bought and sold by anyone. Local Alaska hunters started market hunting by killing moose and caribou for their heads and selling them at good prices for shipment to San Francisco and other points.

Upon DeWeese's return in the fall of 1898, after an absence of only one year, he was surprised to see a marked decrease in game populations. On his southbound trip, he stopped in Sitka and voiced his concerns to the editor of the Alaskan Sitka newspaper. The next day the paper's headline read, "ALASKAN GAME DOOMED. DALL DE WEESE THE GREAT HUNTER TELLS THE REASON." In this article, DeWeese made a plea for game preservation in the form of hunting laws and established game preserves.

Another big game hunter, Harry E. Lee, traveled north in the fall of 1899 to hunt the Kenai Peninsula. Lee had a good hunt, yet he saw problems developing with the lack of game laws. In a magazine article Lee wrote: "I would like to suggest that the American sportsmen should by all means try to secure this tract of land from the Government as a game preserve, and I hope someone will take the matter in hand before another year, for the game is wantonly killed by market hunters every winter, and if this is not soon put a stop to, it will be entirely exterminated."

This call for preserving the Kenai Peninsula wild game was taken up by many subsequent visiting sportsmen.

Dall DeWeese returned to hunt in Alaska again in 1899 and 1901, and he continued his call for wildlife preservation. In a letter to the new president, Theodore Roosevelt, in December of 1901, DeWeese wrote: "This is a subject that appeals to every 'true-blue sportsman,' every lover of animal life, and all those who see beauty in nature, embracing forests, plains, and mountains throughout our entire country, and while the woods, plains, and mountains are naturally beautiful, we all agree that they are much more grand and lifelike when the wild animals and birds are present. There are now several organizations doing

work toward the preservation of wild animal and bird life. There is much yet for us to do; to resolve is to act. Let us be up and at it.”

Someone must have been listening, because Teddy Roosevelt’s new Forestry chief, Gifford Pinchot, sent a young forester named William A. Langille to make a reconnaissance of the Kenai Peninsula in 1904. Langille traversed the peninsula from Seward to Seldovia, and during this trip he realized the unique value of the land as a wildlife and hunting preserve.

In his 1904 report, Langille expressed the opinion that on the peninsula, “there is room for the frontier settler and fishermen on the shore land; there let them abide in peace and prosper, but keep out the fire and wanton game destroyers.”

Langille further recommended that certain portions of the proposed Kenai Forest Reserve be specifically designated as game preserves for perpetuating the game species of the region. He recommended that Sheep Creek at the head of Kachemak Bay be set aside for Dall sheep, and that the Caribou Hills be set aside for moose and the few remaining caribou. (In 1909 Langille headed up the new Alexander Archipelago Forest Reserve, which became today’s Tongass National Forest. Many historians regard William Langille as the father of forestry in Alaska.)

Following Langille’s recommendations, the Chugach National Forest was designated on July 23, 1907, with further additions in 1909. At its maximum

size, the Chugach National Forest extended from the Copper River on the east to Cook Inlet on the west, to Kachemak Bay on the south, and included all the Chugach Mountains to the north.

Throughout the 1920s and 1930s, hunters and conservationists continued to press Congress to designate part of this land specifically as a wildlife preserve, without logging, mining and other forms of development. Congress finally recognized these voices, and a second President Roosevelt—FDR—signed the enabling legislation for the Kenai National Moose Range on Dec. 16, 1941, just nine days after Pearl Harbor.

In December 1980, the moose range was renamed the Kenai National Wildlife Refuge, and its purposes were expanded to include all wildlife species.

We owe a great vote of thanks to the early hunters and conservationists such as Dall DeWeese, Harry Lee and William Langille, as well as their successors, who worked for so many years to protect the refuge lands that we all enjoy today. On Sept. 29 we will recognize this history at our 60th birthday celebration. Festivities will occur from 11 a.m. to 3 p.m. at the refuge headquarters on Ski Hill Road, and everyone is invited.

Gary Titus is the wilderness ranger and historian at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Kenai National Wildlife Refuge celebrates 60th birthday

by Bill Kent

Saturday we will be hosting a birthday party. Sixty years ago, President Franklin Roosevelt signed an Executive Order establishing the Kenai National Moose Range. President Roosevelt signed the order on Dec. 16, just nine days after the attack on Pearl Harbor. This has always been a source of amazement and some pride to me, because he must have thought that providing protection of the natural resources in Alaska warranted taking action, even though the nation was about to begin a prolonged period of war.

Our celebration will take place at the refuge headquarters/visitor center on Ski Hill Road in Soldotna. Activities will begin at 11 a.m. and end at 3 p.m. Food and music will be provided, and the Anchorage Bird Treatment and Learning Center will be on hand with its impressive raptors, including a golden eagle. A barbershop quartet, "4 on the Richter Scale," will perform at 12:30.

Scheduled activities include:

- A pictorial history of Kenai NWR that depicts different activities through the years;
- Biology displays of studies conducted over the last 60 years on eagles, swans, moose, wolves, caribou, and spruce bark beetles;
- A montage of aerial photos showing the changes in vegetation and glaciers;
- Fire equipment changes over the years;
- Activities of the Kenai Fisheries Resources Office through the years;
- Former employees and local citizens will relate their memories of the refuge;
- Kids activities from 60 years ago, with a "critter twist;"
- The reconstructed Andrew Berg cabin from the Tustumena Lake area.

- There will also be displays from Marathon Oil Co. and Unocal relating history of the oil fields on the refuge and what the future improvements will entail.

We hope that you will come and celebrate with us and take a few minutes to reflect on the similarities between now and 60 years ago. As I mentioned at the beginning of this article, President Roosevelt signed the Executive Order just nine days after the attack on Pearl Harbor. With all that must have been on his mind, he took time to provide protection for what is now the Kenai National Wildlife Refuge.

When he acted, he added to the fledgling National Wildlife Refuge System some 2 million acres of relatively undisturbed habitat for a variety of Alaska species, especially for the purpose of "protecting the natural breeding and feeding range of the giant Kenai moose on the Kenai Peninsula, Alaska, which in this area presents a unique wildlife feature and an unusual opportunity for the study in its natural environment of the practical management of a big game species that has considerable local economic value ..."

I am proud of what the Kenai refuge provides to the citizens of the Kenai Peninsula, Alaska and the United States. The National Wildlife Refuge system is a unique system with nothing else in the world to compare. No other nation has provided for wildlife and habitats the way America has.

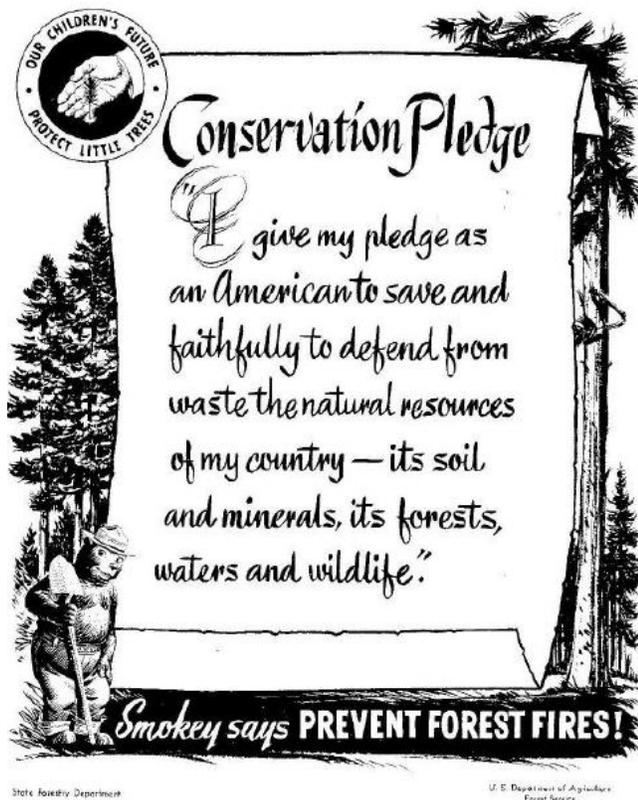
During these times of reflection on what America means to each of us, I hope you will give some thought to the foresight of President Roosevelt and the gift that he provided for every American.

See you Saturday.

Bill Kent has been the supervisory park ranger at Kenai refuge since 1991. He lives in Sterling with his preschool teacher wife, Lisa, SoHi student daughter, Riley, and an exchange student, Na, from Thailand. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Conservation pledge gives greater meaning to wilderness

by Doug Newbould



I'm not sure when or how it happened, if there was a seminal moment in my life, or maybe it was a learning process that occurred over a period of years, or perhaps it was my destiny. But somewhere along the trail of my childhood, I decided I loved nature. I loved being outdoors—escaping the confines of four walls (any four walls) and heading out “into the great wide-open,” as the Tom Petty song goes.

You know how it feels when you step through a doorway into the fresh air, and you naturally take a deep breath, and then there's the soft sigh of satisfaction? I find myself doing that all the time.

I'm not sure if it happened as a 3-year-old, when my parents pulled up the family roots out of that deep, rich, black Illinois loam and moved to Colorado. Or if it happened at the age of 8, when in search of work, Dad moved us back to southern Illinois.

Perhaps it was the great sense of loss I felt then—leaving a cabin on the Big Thompson River in the heart

of the Rockies. I can still smell that river and hear its song. I can still see the lush meadows of Estes Park ringed with a halo of shimmering gold—the quakies which seemed to endlessly tremble of their own volition. I can still feel the sense of awe and smallness I felt looking west across that beautiful landscape, nestled beneath the high peaks of Rocky Mountain National Park.

I remember reading issues of *Boy's Life* magazine, and thrilling at the advertisements that beckoned me to “Be a Conservationist.” By the time I reached high school, living on the Piedmont of North Carolina, I knew without a doubt what I wanted to be and where I wanted to live. I was going to be a forester, and I was going to live in the Rocky Mountain West.

Colorado seemed the likely place to start, so I enrolled in the College of Forestry and Natural Resources at Colorado State University. The rest, as they say, is history. The past 25 years have found me working on three national forests in Wyoming, Colorado and Alaska, and now on one of the true jewels of the national wildlife refuge system—the Kenai National Wildlife Refuge. Whether fate, choice or a combination of both, I don't know, but I can truly say I feel blessed to have lived and worked in some of the most beautiful places on earth, alongside some of the finest people one could ever know.

One of the hobbies I have loosely adopted during my career as a forester and wildland firefighter, is the collection of Smokey Bear memorabilia. My favorite piece is a 20-year-old, 8 1/2-by-11 Smokey poster entitled, “Conservation Pledge.” The first time I laid eyes on that poster, I knew it perfectly described my boyhood pursuit and my passion as a public servant—to be a conservationist.

The Conservation Pledge states, “I give my pledge as an American to save and faithfully defend from waste the natural resources of my country—its soil and minerals, its forests, waters and wildlife.” I can imagine that many of you who read the *Refuge Notebook* column every Friday, have taken this pledge. Maybe you have not said those words, but you have lived them.

I met many such Americans at the Kenai refuge's 60th birthday celebration last Saturday, people who

care deeply about public lands and natural resources, people who also want their children and grandchildren to enjoy the great wide-open. I know I can speak for all the wonderful employees of the Kenai NWR in saying, “Thank You” to all who have worked and supported and enjoyed the refuge for the past 60 years.

Thanks to all of you who joined us on Saturday.

And we give a special thanks to all those who helped us make the 60th birthday celebration a success: the “Refuge Memories” of Cal Fair, Jim Fisher, Bob Ritchey and Will Troyer, the Friends of the Kenai NWR, the Alaska Natural History Association, the

Bird Treatment & Learning Center, Marathon Oil, Unocal Alaska, “Four on the Richter Scale,” all the U.S. Fish & Wildlife Service employees who drove down from Anchorage to be with us—especially the four “judges” and Cathy Rezabeck, and the staffs and volunteers of the Kenai Fishery Resources Office and Kenai NWR.

Doug Newbould is the fire management officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Disappearing kettle ponds reveal a drying Kenai Peninsula

by Ed Berg



Photo of a kettle pond by the National Park Service.

When the glaciers left the Soldotna-Sterling area some 14,000 years ago, the glacier fronts didn't recede smoothly like their modern descendants, such as Portage or Skilak glaciers.

Rather, the flat-lying ice sheets broke up into numerous blocks, which became partially buried in hilly moraines and flat outwash plains. In time these giant ice cubes melted and formed the hundreds of lakes, ponds and shallow depressions of today's Kenai lowland. Geologists call this pitted landscape "kettle moraine" topography, and prime examples can be seen along Mackey Lake Road and along the Swanson River and Swan Lake roads on the Kenai National Wildlife Refuge.

I am trying to use the small kettle holes as barometers of global warming on the Kenai. I can see on the 1950 aerial photographs that many of the kettle small ponds are grassy pans today. Indeed, many kettles still had ponds on the 1975 air photos, and some even on the 1996 photos. It appears that the rate of drying is accelerating, especially in the 1990s.

In order to track this drying process, my vegetation crew and I started this summer to establish permanent survey plots in typical kettle holes on the refuge. We use a 5-meter-wide (16-foot) belt transect which runs from one side of the kettle to the other, generally 100- or 200-meters long. We describe the vegetation zones along the transect and collect all the plant species for identification and permanent voucher specimens.

A typical transect starts at the forest edge, passes through a grass (*Calamagrostis*) zone, into *Sphagnum* peat moss, and then into wet sedges, sometimes with pools of standing water, and then back through these same zones on the other side of the kettle. Three of the four kettles we surveyed this summer were quite wet in the middle (especially after the July rains), and we had to wear hip boots.

These plots can be resurveyed in future decades and, if I am correct, they will show a succession of drier and drier plants as the water table drops lower and lower, due to warmer summers and increased evapotranspiration. If I am wrong, and the climate trend turns around toward cooler and wetter, these plots will be under water again, as they were on the old aerial photos.

By far the most striking feature that we have observed in the kettles is a band of young spruce seedlings popping up in the grass zones. These seedlings can form a halo around the perimeter of a kettle. In a large kettle along the Funny River horse trail, we mapped the exact locations of 969 black and white spruce seedlings in the grass zones of the transect.

Seedling densities ran as high as 18 seedlings per square meter. The seedlings were mostly less than 1 foot tall, and were several years old. They probably represent a drop in the water table of several inches since the mid-1990s.

It would be nice to have some water level recording gauges in these kettles to observe seasonal water fluctuations, but woody plants like spruce and birch may be more dependable gauges in the long run. For example, July was a wet month, with rainfall being 45 percent above normal. In some kettles we could see sundew plants growing 6 inches under water. Sundews don't like this. They normally grow on moss hummocks several inches above the water, and this temporary flooding may damage or kill them.

Many tree species, however, can tolerate a few weeks of flooding with no problem, although they generally can't tolerate submergence for more than the entire growing season.

This last point leads me to an important obser-

vation about many climate-related processes on the Kenai Peninsula. I call this “the observation of unidirectional (or one-way) change.” The local glaciers are an excellent example: Kachemak Bay’s Grewingk Glacier has pulled back steadily from its 1858 terminal moraine by about two miles. It has never re-advanced in this period.

Similarly, as you approach spruce treeline in the Kenai Mountains, the trees become younger and younger. Treeline is rising, and seedlings can establish in places where it was too cold 100 or even 50 years ago. Furthermore, you don’t see any cohorts of dead trees near treeline, which would indicate that a cold period pushed treeline back down at some point.

Likewise, of the hundreds of seedlings that we mapped in four kettles this summer, we saw very few dead ones. The seedlings were all doing real well and had never been knocked back by flooding. On a larger scale, if you hike through the peninsula muskegs, you will see small stunted black spruce trees two to three feet high.

These runt trees are usually 20 to 40 years old with very tight annual rings, indicating that they are growing on the very edge of their water tolerance.

Nevertheless, they are alive, and you see only a few dead ones. This, too, is unidirectional change, and I think that it represents a steady decade-scale drying of the muskegs.

People sometimes object to my claim that the Kenai muskegs are drying out. “Isn’t this just a natural process of succession?” they ask. “Shouldn’t we expect lakes and wetlands to be constantly filling in with vegetation and soil, and ultimately becoming grassy meadows or forests, regardless of climate change?”

My answer is that muskegs on the Kenai have been available for 14,000 years since deglaciation. Why is the spruce moving in today, and not yesterday? If muskegs had been recruiting trees over the last 300 years, we would see old trees (dead or alive) out in the muskegs. But we don’t see them out there, and that is why I argue that something new is happening. We’re drying out, and it is a one-way process, at least for now.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Waterfowl hunting evokes early memories, creates new ones

by Rick Johnston

It is difficult to express in words the thrill of hiding in a thicket of riverside grass as 100 mallards circle warily overhead. That a grown man can be transported in an instant back 40 years in time and 2,000 miles south to an Illinois cornfield to a first hunt is almost otherworldly. But such is the magic of waterfowl hunting.

The smells of my grandfather's leather hunting jacket and the rich Illinois loam were as real on that November morning in 1999 as they were in 1959. The "whoosh" sound of 100 pairs of wings is a sound and experience like none other and blends in my mind and spirit with all the truly special moments of my lifetime.

I recall being head down in another Illinois field some years after that first hunt; there were at least 10,000 ducks, mostly mallards circling overhead. I never fired a shot that evening, but it remains my best duck hunt of all. The vibration of those thousands of wings was like being at the center of a tornado.

On the Kenai Peninsula, the annual waterfowl migration and hunting is much less a part of the popular culture than is big game hunting. But even so, I see many young hunters experiencing similar very special mornings in the company of a parent, friend or grandfather.

By definition, waterfowling is always more about the experience than the harvest. This can be particularly true at many fickle Kenai Peninsula waterfowl hunting areas. Yet year after year, I find the same waterfowl devotees on Opening Day at the Kenai River flats, at Skilak outlet in late November, or hopelessly stuck in a Mystery Creek Road mud hole, all in pursuit of ducks and geese. And it's common for them to have a wide-eyed youngster like me in tow. The Kenai National Wildlife Refuge has long been known for its resident wildlife, and it was concern for the habitat of the peninsula moose that led to the establishment of the Kenai National Moose Range in 1941. Somewhat less known, but equally important, is the refuge's contribution as a nesting and resting place for migratory waterfowl.

The Chickaloon estuary remains an important wa-

terfowl staging and feeding area, although somewhat diminished by subsidence after the 1964 earthquake. The importance of the Chickaloon and other refuge areas was recognized in 1980, when the Kenai Moose Range was renamed as the Kenai National Wildlife Refuge, and its purposes were broadened to include conservation of fish and wildlife populations and habitats in their natural diversity, including waterfowl.

Many refuges within the national wildlife refuge system, such as Horicon Marsh in Wisconsin and Yukon Delta in Alaska, were established primarily as resting and feeding habitat for migratory ducks and geese. To non-Alaskans, the national wildlife refuge system, whose symbol is the "Blue Goose," is probably more widely recognized for waterfowl than for big game, fish or other wildlife.

Good duck and goose hunting opportunities can be found at several locations on the Kenai refuge. Several species of ducks nest on refuge lakes and marshes, and an early season refuge hunt can be rewarding and include a wide variety of species. One late September morning at the outlet of Skilak Lake, two of us had a limit of ducks comprised of seven species, mostly young birds of local nesting origin.

The Skilak Lake outlet is always a great place for wildlife observations, even when the duck hunting is only so-so. One November day several years ago, I watched a goldeneye drake roll and tumble to the water from 30 yards in the air to elude a pursuing falcon. It was an incredible site. Skilak outlet is also a good place to see trumpeter swans, loons and other waterfowl feeding and resting before their journey south, not to mention an occasional brown bear or river otter.

In many ways, hunting on the peninsula is more about timing than location. Hunting in Alaska and Canada is far different from hunting farther down the flyway, where entire subcontinental populations of ducks and geese are concentrated along single river valleys. Migratory waterfowl populations coalesce into a great river system with many northern tributaries feeding into increasingly bigger streams and fi-

nally into a bigger river.

In the old days, waterfowlers would refer to a huge concentration of ducks and geese moving through an area as “A Grand Passage.” I observed “A Grand Passage” once in eastern Illinois. I must have seen a half million ducks fly over in a single day. Such a site is never to be forgotten, nor easily repeated.

Here on the peninsula, we are relatively close to the source, and we see only small flocks staging for the migration south.

In mid- to late September, it is not uncommon to see 10,000 to 20,000 pintails and mallards feeding in the tidal guts of Chickaloon Bay, most of which are gone by mid-October. Concentrations of 30,000 ducks or geese at Chickaloon are rare and occur only when very bad weather at Portage and Turnagain Arm briefly blocks migrating groups passing over the Kenai Peninsula.

One day, a large group of Canada geese was flying over. My small daughter asked me which direction they were going, to which I replied, “northeast.” She further inquired why the geese weren’t flying south like they’re supposed to do. In fact, it’s rare to see flocks of ducks or geese flying south over the peninsula. It seems that here, most migrating waterfowl are flying north and northeast, heading primarily for Prince William Sound, via routes through the Kenai Mountains, and then to the Gulf of Alaska or to routes over British Columbia.

Although many refuge hunters prefer to jumpshoot ducks, I have always preferred to hunt over a large spread of decoys. Knowing how to call ducks or geese certainly doesn’t hurt either, yet calling seems less critical here. Many Kenai hunters who would call further south prefer to let the decoys do most of the work, calling only briefly to attract distant flocks.

Anybody who has ever hunted late-season mallards at the Skilak outlet knows that these often-hunted and “educated” birds can be as wary as an East

Coast black duck. Their wariness can render calling and other tried-and-true methods totally useless.

A well-known Kenai River guide used to put his ordinary decoys and blind in one location, then move several hundred yards away and put out a single near-perfect decoy. He would then hunker down in the low natural vegetation by his lone decoy. The “educated” flocks of mallards would pass up his primary decoy spread and land (fatally) in the near distance by his gem decoy.

A successful hunt on the Kenai generally requires an early start, using decoys and building a good blind, as well as planning for tidal changes that can send flocks of ducks closer to decoy spreads. Good hunting can often be found when a cold snap freezes many of the lowland water bodies and leaves open water on the larger lakes and the Kenai River. A few ducks per lake displaced after freeze-up can amount to hundreds concentrated in ice-free areas. These open-water areas can be good hunting through late November.

Although refuge duck hunters of recent years have been well-informed about migratory waterfowl hunting regulations, it never hurts to re-read the migratory bird regulations, shooting hours and refuge access regulations. Common violations are forgetting to obtain and sign state and federal migratory bird hunting stamps, using lead shot, shooting before legal shooting hours, and shooting migratory waterfowl while under power.

For more information on the fall migration, hunting on Kenai National Wildlife Refuge and migratory bird hunting regulations, contact refuge headquarters at 262-7021.

Rick Johnston is a ranger/pilot at Kenai National Wildlife Refuge and is by some accounts a waterfowl hunter and poet. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

How chickadees thrive in the long, cold Alaska winters

by Todd Eskelin

As winter approaches, we realize that the chores around the house are not quite complete, and there is a mad rush to get things in order before the snow flies. The birds fly south, the berries ripen, the salmon fishers depart, and then it happens—the first snowfall. Just we hardy ones are left to enjoy the beautiful dark winters in Alaska.

Of all the creatures large and small that stay and brave the cold, the most impressive have to be the tiny songbirds that live here year-round. They have no warm house, no heated vehicles and little daylight for feeding. Yet, these fragile birds spend year after year surviving sometimes brutal winters, just to breed again next spring.

I was banding songbirds in Fairbanks one fall, and we caught a boreal chickadee that was already banded. We checked the records and found that Tom Pogson had banded the bird years earlier in Fairbanks. It was a new age record for this species. That chickadee had survived more than seven years from the time when it was first banded.

Living in Fairbanks, it had survived at least three cold snaps where the temperature fluctuated between minus 30 and minus 50 for three weeks at a time. There are many incredible cases like this where it seems unbelievable that birds could survive a single winter, and certainly not three such winters in their short lifespan.

How do they do it? There are several adaptations that allow them to make it through the cold periods. Due to the long dark periods, it is important that birds take in and store as much energy as possible for the long nights. They eat high calorie foods such as birch seeds. Chickadees are primarily insect eaters, so 60 to 70 percent of their daily diet consists of spiders and frozen caterpillars plucked from the underside of spruce boughs.

People often think the birds would not survive if we didn't provide them with a steady diet of tasty sunflower seeds. Actually, one study in Wisconsin found that even during the coldest periods, birdfeeders provided chickadees with no more than 25 percent of their daily energy requirements. Many northern species, such as common redpolls (but not chickadees), store

seeds in special pouches in their esophagus and consume the seeds during the night. Since chickadees are basically insect eaters and don't rely on this method, how do they do it?

A study of chickadees in New York found that they have a unique ability to reduce their body temperature during cold periods from the normal 107.6 to as low as 88. This requires less energy, so on cold nights they burn less fuel. (A similar 20-degree drop in body temperature will kill a human being.)

Heat loss is another important factor for our feathered friends. Many northern wintering birds compensate by having more feathers per square inch than their southern counterparts. Furthermore, birds do not have fleshy appendages like ears, tails and legs that can cause mammals problems in colder environments. Bird ears do not stick out, and they are covered with feathers to help maintain heat.

Bird legs are not fleshy, but consist of connective tissues and bones, so frostbite is not a common problem. Unlike mammals, many birds have veins and arteries adjacent to each other, so that the cooled blood in the veins is actually reheated by the warm blood in the arteries. As a last resort, many birds will shiver, which increases the amount of energy being burned by the muscles and helps produce heat.

When we get snow and cold weather this winter, take a second to watch the chickadees and redpolls coming to the birdfeeder. Ask yourself what your chances of survival would be if you were only given a jacket and some frozen food for the winter. These birds are truly amazing and enduring creatures for surviving Alaska winters.

And the next time you see the neighborhood chickadees sitting in the trees and not moving and looking really cold, don't worry—they are just chilling out!

Todd Eskelin is a biological technician at the Kenai National Wildlife Refuge. He specializes in birds and has conducted research on songbirds in many areas of the state. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Trapping then and now on the Kenai National Wildlife Refuge

by Gary Titus



Beaver trap with a 110 attached to the pole under water set up by Amanda Alaniz.

A cold north wind blew in the early morning light as I strapped on my snowshoes. My trail took me across a frozen lake and then into the woods where my trap line started.

As I approached my first set, my anticipation began to rise. Had a lynx been attracted into the set by the feathers that I hung in the surrounding branches?

Once again, the answer was “No.” Most of the time a trapper’s trap is empty, and that’s where the patience comes in.

I know that I am not the first to trap this stream. Nineteenth-century Dena’ina natives from the village of Kenai ran their trap lines by dog team along this route. The native trappers, and white trappers on Skilak and Tustumena Lakes, often ran long trap lines, mostly to supplement their meager winter cash supply.

Trapping has been around for a long time and, like today, it has never been a good sole source of income. The financial return is usually small; a season’s catch in 1912 would put a modest \$350 in a trapper’s pocket. During the rest of the year the early trappers worked in commercial fishing, mining, and big game guiding.

On my patrols through the wilderness of the Kenai National Wildlife Refuge I occasionally come across

signs of trapper activity from long ago. One summer I noticed an old spruce tree with its lower branches cut off. The long-dead branches, now brittle with age, had been stacked against the trunk to form a “cubby” set—a short tunnel—which probably still attracts an occasional lynx.

Looking down at the base of the tree I noticed a trap chain apparently growing out of a tree root nestled in the thick moss and spruce cones of a squirrel midden. As I stepped closer to inspect the chain, I felt two muffled thumps beneath my feet, and realized that I had inadvertently sprung two long-forgotten traps.

Following the chain with my hand and a stick, I carefully dug through several layers of spruce cones and moss until I found two rusted No. 3 leg-hold traps, the jaws still set until I sprung them.

Andrew Berg ran a trap line in this area around the turn of the century and had a small shelter cabin nearby. Was this a trap that he had forgotten?

Leaving a trap set after the close of the season has always been against the law. Berg served as a Territorial game warden in Alaska, and no doubt was quite familiar with this regulation. So I’d prefer to think that this wasn’t one of Andrew Berg’s traps, yet it was located right in the heart of his territory.

Trapping regulations in Alaska were a long time in the making, and probably arrived none too soon. An 1898 report on the preservation of fur-bearing animals stated that failure to apply restrictions would work “irreparable injury” to the Alaskan fur trade. The report described the rapidly declining furbearer numbers, and blamed this decline on indiscriminate trapping of animals all year long.

The first regulations protecting fur-bearing animals in Alaska were approved on April 21, 1910, and The Department of Commerce and Labor was to appoint “fur wardens” to enforce the law.

Trappers breaking the fur laws were to be fined not less than \$200 nor more than \$1000; in addition, they could be imprisoned for up to six months, and all of their equipment forfeited. The law also prohibited the killing of beaver until November 1915.

One of the first offenders to be cited under this law was King Thurman, an outlaw trapper whose checkered career has always intrigued me.

King Thurman had cabins and a trap line in the Chickaloon River region. During the winter of 1913 he was suspected of shooting a moose and poisoning the carcass to use as bait to kill fur-bearing animals. In March, Game Warden John C. Tolman along with Deputy Marshal Isaac Evans rushed into the Chickaloon area in an attempt to locate Thurman and place him under arrest.

They soon found a cabin being used by Thurman and, knowing his suspicious nature, Tolman stayed in the cabin and Evans departed.

Tolman waited in the cabin for two hours. When finally he heard a dog sled pulling up in front, Tolman opened the door and stepped out, only to find the dogs and an unoccupied sled.

Tolman then spotted Thurman about 40 yards away watching the cabin. As soon as Thurman saw the game warden, he turned and fled on foot into the forest.

Tolman was unable to catch him, and so he confiscated the dog team and Thurman's gear. The following July, Thurman turned himself in and pleaded guilty, arguing all the while that he was innocent. He was sentenced to 50 days in jail.

Nowadays, trappers running trap lines on the Kenai Refuge must have a trapping permit, and must attend a trapper orientation class in order to receive this permit. Each year they must register with the Refuge. In my opinion, most of our trappers hold themselves to a high standard of ethics and safety, and we would ask that visitors respect trap lines in their wintertime travels across the refuge.

Gary Titus is the Wilderness Ranger and Historian at the Kenai National Wildlife Refuge. Refuge Ecologist Ed Berg and Gary Titus will be speaking about tree-ring dating of old log cabins and climate change on the Kenai next Nov. 8 at the Kasilof Historical Society meeting scheduled for 7 p.m. at the McLane Center in Kasilof. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Firewood gathering can be a fun, family activity

by Doug Newbould



Teamwork with Personal Protective Equipment, photo by Todd Weston, USFWS

Some of you will probably think I'm crazy when I say, "Firewood gathering is fun." It can be a fun family activity... if you can get your family or a friend to join you, that is. I know that for many readers who use wood heat as their primary source, firewood gathering is a mandatory subsistence activity.

Laying up 10 to 20 cords every year can take its toll on a body. Even finding that much wood every year can be a difficult challenge. Though it may not bring you much joy, at least you can feel a sense of satisfaction and accomplishment when you get that last cord laid up for the long winter.

For people like me who use wood as a secondary heat source, firewood gathering is more of a hobby or recreational activity. I don't have to hunt or fish or collect wood to survive, but those activities enhance my life. I enjoy the physical activity, the hard work and the results of my labor.

I take pride in the skills I have gained over the years—the safe and effective use of a well-maintained chainsaw, the act of felling a 100-foot snag right where I aim it, the perfectly aimed swing of the maul as it halves the log in one stroke, and the neatness of my firewood pile. I enjoy the aesthetic qualities of a well-managed private forest or wood lot, as I remove dead trees to make room for the seedlings and saplings underneath. For me, four to six mixed cords of spruce and

birch or other hardwood will usually carry me through the winter.

I am fortunate enough to have a ready supply of firewood on my property, so I only supplement my woodpile from outside sources when an opportunity for some "easy" firewood presents itself. For example, I have helped more than one friend clear dead trees from around their homes, trading my labor for the free wood. And I really have a hard time passing up an opportunity to get some hardwood. Birch is best, but I like aspen and cottonwood too. Aspen, in case you haven't tried it, smells great in the wood burner and it burns hot.

If you're new to firewood gathering, let me offer a few pointers. Safety is the first key to a successful outing in the woods. If you are unfamiliar with the maintenance and safe use of a chain saw, you will need to get the right personal protective equipment (or PPE, if you like acronyms) and familiarize yourself with operator safety information. Whether you're bucking up wood on the ground or felling standing trees, you will need a hardhat (with a wire mesh face shield if possible), safety glasses or goggles, ear plugs or muffs, gloves, work boots (lug soles and steel toes are best) and kevlar saw chaps or pants.

You might think all this safety gear is unnecessary and expensive, but I guarantee you it will be cheaper and less burdensome than a visit to the hospital if you touch that running chain to any part of your body, or you get a splinter in your eye.

Learning how to maintain and safely operate a saw is the next step. Read the chainsaw operator manual that came with your saw, or order one from the manufacturer if you don't have it. Check with your local chainsaw dealer for saw-training opportunities or videos. Most of the top chainsaw manufacturers have excellent safety videos available. I did a quick search for "chainsaw safety" on the Internet and found several good sites. Check for them at the end of this column.

And, of course, experience is the best teacher. I've been using a chainsaw for 25 years and I haven't lost my respect for the tools of the trade or for the wood and trees I utilize. I always wear my PPE, and there

have been many occasions when I was thankful I did. If you are fortunate enough to get your family or a friend to help you get firewood, make sure you share your safety knowledge with them and get them the PPE they need.

Use proper lifting techniques and save your back. Try not to get overheated. Take plenty of breaks and stay hydrated. Always try to avoid cutting alone. The “buddy system” has saved many a woodcutter’s life.

Now that you’re properly trained and equipped, where can you cut some wood? Well, the best opportunities for “easy” wood are going to be found on private lands. Check with your friends and neighbors. It is best to have written permission before removing wood from private lands. Check the newspaper and local bulletin boards for other private sources. I have surveyed some of the public land managers for firewood opportunities, and there are currently two options.

Contact the Seward Ranger District at 224-3374 or 288-3178 for both free-use and permit-only firewood areas on the Chugach National Forest. The Kenai National Wildlife Refuge (262-7021) has a firewood permit area off Funny River Road. A five-cord permit costs \$25. Permits and maps are available at Refuge Headquarters on Ski Hill Road during business hours, Monday through Friday. Currently, the state does not have any designated firewood-cutting areas on the peninsula.

Have fun and be careful out there!

<http://www.oregonchain.com/safety.htm>

<http://www.carbidechain.com/safety.htm>

Doug Newbould is the Fire Management Officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Project Feeder Watch lets backyard birders assist in research

by Todd Eskelin

Winter discussion of birds in Alaska often centers on the bird feeder. Just imagine it's Saturday morning, the temperature is a whopping 3 degrees, and you are still in your pajamas sipping that first cup of coffee as the sun finally illuminates your back yard. You are watching the assortment of tiny birds wake up and make their way to your feeder, and you notice that there is a bird at your feeder that you have never seen before. You call up the neighbor and, after a lengthy discussion, it is confirmed that you have just seen the first red-breasted nuthatch at the feeder.

Now, try and imagine that this winter, this same experience happens to people all across Alaska and down the West Coast as far south as Klamath Falls, Ore. Everyone is seeing their first red-breasted nuthatches at their feeders. Without a network of pretty talkative neighbors, we would never know that this boom of nuthatches has spread over such a large area (which in fact it has).

Cornell Laboratory of Ornithology has created such a network with a program called "Project Feeder Watch." For 13 years the Cornell lab has been having participants survey birds at their feeders to document the distribution and abundance of winter bird populations across the country.

Last year, more than 15,000 people participated, but with only 86 contributors from Alaska (eight from the Kenai, Soldotna and Sterling area). Nationally, the project has documented many problems such as disease outbreaks, as well as population explosions of several species that expanded from interior Canada to the southern United States. In Alaska we need more survey participants to provide data on the deformed-bill chickadee problem that has spread across South-central Alaska.

One nice thing about this survey is the flexibility. Participants only need to count birds one day during

every two-week period.

Also, as a participant, you get to decide how long your survey period will last. You can count all day, or only count for an hour while you drink your coffee, as long as you count consistently. The excuse "the birds are coming and going so fast from my feeder that I could never count them," won't work using Cornell's survey methods. You count only the highest number of birds for each species that you see at any one time.

There is a \$15 fee to sign up, but it is well worth the cost. When you sign up, you get a bird identification poster, with most of the common birds at feeders in the winter, as well as a colorful calendar to help you keep track of your survey days. You also get a one-year subscription to Cornell's quarterly newsletter called *Birdscope*. Most importantly, you receive a neatly organized kit with data sheets and a handbook describing everything you ever wanted to know about feeders, from maintaining and cleaning to discouraging predators from hunting at your feeder.

This is a great opportunity to have a little family event every other weekend or give your budding junior scientists a chance to contribute to real research. They can track wintering bird populations across the country by entering their survey data on the Web site and viewing results from other surveyors.

If you would like more information about Project Feeder Watch, you can check out the Web site at <http://birds.cornell.edu/pfw> or contact me at the Kenai National Wildlife Refuge headquarters at (907) 262-7021.

Todd Eskelin is a biological technician at the Kenai National Wildlife Refuge. He specializes in birds and has conducted research on songbirds in many areas of the state. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Peninsula's magical winter wonderland awaits kids of all ages

by Nicole Johnson



Nicole leading a school group and helping the children experience winter at its finest.

Many people can't fathom why we choose to remain in Alaska during the winter months. Some folks see the season as a lifeless, dreary and depressing time of year. Yet, there are so many things to discover and explore.

Even with all the technology that surrounds us, we still seem to have a hard time entertaining ourselves. We simply retreat indoors and mimic the natural phenomenon of hibernation.

Whether it is renting movies, watching television or simply sleeping more, we are missing out. There is a thrilling world outside waiting to be discovered, explored and appreciated.

Everyone knows about the art of building a snowman. Some people have it down to an engineering feat that would impress the Egyptians. But there are plenty of other activities that can spice up the ordinary snowman.

You can, for example, add some creativity with an

ice sculpture. Start by cutting the tops off some old plastic containers and filling them with water. Leave the containers outside. When they freeze, you can become the Michelangelo or Leonardo da Vinci of the North, with an ice castle in your own yard.

With the abundance of snow, why not make some delicious snow ice cream? Collect four-five cups of clean snow in a bowl and place in the freezer. Mix a cup of milk, half of a teaspoon of vanilla, and half a cup of sugar. Stir until the sugar is dissolved. Then slowly add the snow and continually stir until it is as thick as ice cream. Enjoy!

My personal favorite is studying the uniqueness and beauty of snowflakes. I put a piece of black construction paper in the freezer, and when the flurries begin, I make a dash outside and collect the snowflakes on the paper. With a magnifying glass I can see the fine detail that explains the saying, "No two snowflakes are the same."

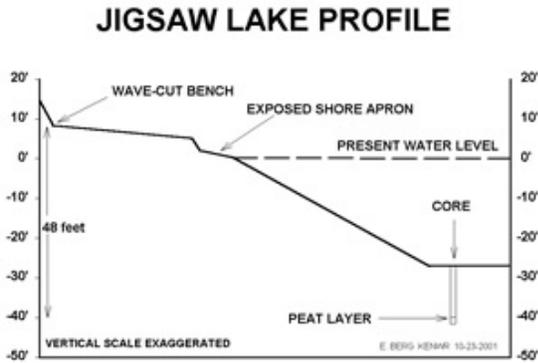
Other options include coming to the Kenai National Wildlife Refuge Visitor Center on the weekends for a variety of films, free of charge. The ski trails surrounding the visitor center can provide hours of good exercise and wildlife viewing. Feel free to call us at (907) 262-7021 for film schedules and trail updates.

So when the children are complaining "We're bored!" we can take them outside and show them firsthand the exciting world that surrounds us on the Kenai. For kids of all ages, the possibilities of discovery are endless if we dress warm and enjoy the magical winter wonderland.

Nicole Johnson is the environmental education coordinator at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Jigsaw Lake shows Central Peninsula was very dry 8600 years ago

by Ed Berg



Profile of Jigsaw Lake

Few people believe me when I tell them that we live in a dry climate here on the central Peninsula. The Kenai airport reports 19 inches of total precipitation per year, which is the same as Fargo, North Dakota. We are in a strong rain shadow from the Kenai Mountains, and less rain falls as you move toward the mountains. For example, the Moose Research Center northeast of Sterling gets 17 inches of annual precipitation, whereas on the other side of the mountains Seward get 67 inches and Whittier gets a 197 inches.

On this side of the mountains, however, the climate is getting drier. The dryness is due to less rain and snow, as well as increased water loss caused by warmer summers.

Water is lost both by direct evaporation from soil and water surfaces, and by the vegetation breathing out water (transpiration), which together are called “evapotranspiration.” I like to think of water in economic terms, viewing total precipitation as “income” and evapotranspiration as “expense” or loss. With money, the bottom line is the net difference between income and loss, i.e., the profit, which is available for spending. In hydrology the water remaining after evapotranspiration is what really counts. This is the “water surplus,” which is available to fund rivers and lakes, groundwater recharge, and biomass growth.

I have estimated the trend of annual water sur-

plus from Kenai airport data (back to 1944), and I can see that we shifted into a drier mode after the 1968-69 drought. Prior to this drought we had about 5.8 inches of available water surplus. After 1967, precipitation declined by 1.7 inches and warmer summers raised the evapotranspiration by 1.0 inches, which together reduced the water surplus to 3.1 inches. This is a 47% decrease in available water.

These calculations, I admit, are rough. A better approach is to look at water levels in lakes, as “meters” of water surplus. Only closed-basin or land-locked lakes (with no outflow) are suitable climate meters. Lakes with outlets are like over-flowing bathtubs; the level can stay the same, regardless of any variation in water flow through the lake (at least for small lakes). With closed-basin lakes, however, the water level reflects the local groundwater table, which depends on climate, i.e., on the annual water surplus.

On the Kenai National Wildlife Refuge we have for some time been watching declining water levels in various closed-basin lakes and kettle hole ponds, as readers of past columns may recall. We have seen water level drop several feet in closed-basin lakes, and many former ponds are now grassy pans with invading spruce.

It is interesting to ask if the present drying of the landscape is significant in the grand scheme of things. Is this drying large or small compared to past climate fluctuations on the Peninsula? Ordinarily, this would be a tough question to answer with any confidence, but a new study suggests that our climate could get a whole lot drier than it is now. In a word, we haven’t seen anything yet!

Last summer a team of geologists examined the sediments in Jigsaw Lake, a 144-acre closed-basin lake near the end of Swan Lake Road. Like most land-locked lakes, Jigsaw Lake is extremely poor in nutrients (due to a small watershed); it has very little aquatic vegetation and only a few stickleback fish. The water level has declined about two feet in the last several years. The exposed shore apron is revegetating with sedges, but no woody plants have become estab-

lished.

Geologists Al Werner from Mt. Holyoke College and Darrell Kaufman from Northern Arizona University and three students were coring lakes in the Anchorage area for volcanic ash layers. (They were pictured taking samples on their raft in the *Anchorage Daily News* in July.) As a side project they spent three days taking cores in Jigsaw Lake to look for evidence of past water level changes. The cores were taken with a sixteen-foot length of four-inch PVC pipe driven into the sediments. With this method one looks at series of cores from shallow to deep water. By tracing the layers from one core to the next, it is possible to see where a shoreline has retreated or advanced with falling or rising water levels.

In Jigsaw Lake, however, the answer was more obvious. Grad student Christian de Fontaine has so far analyzed the first core, and found a layer of peat 13 feet down in the core. This peat is from a peat bog or muskeg, with Sphagnum peat moss and sedges. The geology team took this core in 27 feet of water. This means that the water level in the peat bog was at least 40 feet below the present lake level! A radiocarbon date showed the peat was 8600 years old.

If the lake nowadays is up 40' from its low point, how much higher has the lake gone in the past? Geologist Dick Reger and I spent a day with a laser level shooting old shoreline elevations around the lake. The highest level was a wave-cut bench at 8.4 feet above the present water level. This means that we have evidence of more than 48 feet of water level change in this lake. Jigsaw Lake is thus proving to be extremely climate sensitive!

It is well known that the climate in the Northern Hemisphere was distinctly warmer 6000 to 10,000 years ago, when Jigsaw Lake was at its low point. This is called the Hypsithermal Period. The extra warmth was due to a favorable alignment of the Earth's orbital parameters, which produced more solar radiation in

the summer and less in the winter. The axis of rotation was near maximum tilt (24.2 degrees), which increased seasonality. Likewise, the Earth was closest to the Sun in July, rather than in January as at present. Finally, the ellipticity of the Earth's orbit was at a local maximum of flatness, which also increased seasonality. The combined effects added about 6 degrees-F to summer temperatures, and this no doubt greatly increased evapotranspiration and lake drying.

If climate was only determined by the orbital parameters, we ought to be headed for another ice age, which should reach its coldest point in about 15,000 years. It will be 40,000 years before there is another warm-summer alignment of the orbital parameters. The dramatic climate warming that we are now seeing in the northern latitudes is in direct opposition to the downward trend of the orbital parameters, which should be taking us toward another ice age. Most climatologists attribute the present warming trend to the "greenhouse effect" of added carbon dioxide from fossil fuels. If we are headed for another Hypsithermal Period any time soon, it will probably be one of our own creation.

There will be more to the Jigsaw Lake story as the geologists examine the other cores from last summer. They took one core at the deepest point (46 feet) and it should have the full record back to the end of the last major glacial period 14,000 years ago, when the lake was formed. I'll keep readers posted as the story unfolds.

Ed Berg is has been the ecologist at the Kenai National Wildlife Refuge since 1993. He will be discussing this research in more detail in his one-credit "Cycles of Nature" class at the Kenai Peninsula College, Tuesday evenings, March 26 – April 23. Call the College for information (262-0300). For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Losing one of your own

by Robin West



We remember refuge manager Richard Guadagno who was lost on United 43.

The U.S. Fish and Wildlife Service is a small agency, as Federal agencies go. I've heard this said in a variety of ways, such as "the entire Service budget costs less than one MX missile," and other such comparisons. Well, I don't know about all of that, but I do know that in my 23 years with the Service I have met many of those that I consider to be part of a relatively small family. One of those people was Richard Guadagno. Rich was one of the several thousand innocent people who died during the terrorist attacks on September 11.

All 45 people aboard United Airlines Flight 43 were killed when their plane, after leaving Newark in route to San Francisco, turned around near Cleveland, and then crashed approximately 80 miles southeast of Pittsburgh. Rich was on that flight, returning home to California after a two-week vacation visiting his sister in Vermont and parents in New Jersey where he helped celebrate his grandmother's 100th birthday. We now know that this was the hijacked aircraft that was not allowed to reach its intended target due to valiant efforts by passengers to thwart the terrorists. While we will never know exactly what happened, we recognize that our Nation owes a debt to a handful of pas-

sengers on Flight 43 that prevented what would have almost certainly been a much greater loss of life, property, and social order. Either the White House or Capitol was almost certainly the intended target of the hijacked plane. Those who knew Rich well are confident that he was instrumental in the brief but effective fight that ensued on Flight 43.

Rich Guadagno was the Refuge Manager for Humboldt Bay National Wildlife Refuge in northern California. He had a 17-year career with the Federal Government, serving both as a biologist and as a refuge manager. For much of his career he was also a commissioned law enforcement officer. Because of his training in apprehension, self-defense, and arrest, and Rich's strong sense of right and wrong and non-nonsense attitude, it is believed he likely played a key role in the ultimate events of Flight 43.

Rich had a sense of wonder and appreciation for the outdoors that led him to a career with the National Wildlife Refuge System. He started his career as a temporary biologist at Great Swamp National Wildlife Refuge in New Jersey. After graduating from Rutgers University in 1984, and serving a short time as a wildlife inspector, he returned to Great Swamp as a refuge manager trainee. From there he moved to Prime Hook National Wildlife Refuge in Delaware, to Supawana National Wildlife Refuge in New Jersey, to Baskett Slough National Wildlife Refuge, to Ankeny National Wildlife Refuge in Oregon, and finally to Humboldt Bay.

Humboldt Bay National Wildlife Refuge consists of 2,600 acres of California coastal dunes, wetlands, and bay habitats. It is a major staging area for black brant—a small dark goose—during its migrations between nesting areas in Alaska and wintering areas in Mexico. The Refuge also provides important habitat for over 100,000 other waterfowl and shorebirds each year. Rich was excited about his job at Humboldt Bay. He served the Refuge, the Refuge System, and our shared wildlife resource well. Rich also served his Country well. His name has been added to the Fallen Comrades Memorial Wall at the National Conservation Training Center in Shepherdstown, West Virginia. His is the 61st name of a U.S. Fish and Wildlife Service

employee that lost their lives in the line of duty. Two other such names include James Petersen and Gerald Watson who died on Skilak Lake in 1955. All of these 61 people are unsung heroes who gave their lives while conducting public service. Rich's contribution to the conservation of the Nation's fish and wildlife was worthy; and his sacrifice on September 11, at only 38 years of age, enormous. We within the Fish and Wildlife Ser-

vice say good-bye to one of our own, with a great sense of gratitude.

Robin West is the Refuge Manager of Kenai National Wildlife Refuge, one of over 500 refuges found within the National Wildlife Refuge System. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Cycles of nature evident in short walk through wildlife refuge

by Ed Berg

After a recent snowfall, I took a midday walk in the woods to look at some of the fine points of winter life.

Normally I am zipping along on my skis, often by headlight, and I miss the details. Today, I am checking out some of the smaller denizens of the woods around the Kenai National Wildlife Refuge headquarters.

Snowshoe hare tracks are abundant, even though we are three years down from the peak of the hare cycle. We have monitored hares by live traps and pellet counts since 1983 and have documented a full cycle from the 1984 high, through the rock-bottom lows of 1988-93, and then the 1996-98 high.

I soon pick up a shrew track crossing the trail. This is just about the most delicate track you can find in fresh snow. It looks like a necklace, with pairs of tiny footprints spaced about two inches apart, probably made by hopping. The entire track is no more than an inch wide, and there is a hint of a tail trace connecting the pairs of footprints. The tracks emerge from under a stump and run 20 feet before disappearing into a tunnel in a clump of willow. Down on my hands and knees, I can see a few inches into the fragile snow tunnel.

In the spring, these tunnels are often revealed for a few days just as the snow is finally melting off. At that time, long runways can easily be followed, where the small mammals, especially voles, have eaten through the grass and litter.

I puzzle about why a shrew or vole would ever bother to surface during the winter. They have more tunnels than the Taliban, and basically live in a well-insulated, well-connected world away from the watchful eyes of airborne predators. The tracks that I see on top of the snow are quite businesslike, from point A to point B, with no pauses for nibbling or meandering. This is a war zone, and dawdlers may soon be somebody's dinner.

Not that life in the tunnels is all snugness and warmth. Voles, I suspect, do most of the heavy construction work. They are basically vegetarians and are able to auger through the sod and reduce a well-

manicured lawn to a labyrinth of crisscrossed grooved channels.

Shrews, however, are voracious predators (with a heart rate of 1,200 beats per minute), and like to eat more than their body weight per day in high-protein food, such as insects, voles and other shrews. A vole's worst nightmare is probably a shrew loose in its tunnels.

Continuing on my walk, I find many more shrew tracks, but nothing that I can identify as vole tracks. We have caught four masked shrews in the office in the last week, so I think that next summer may be a big year for shrews—and probably voles as well, because they cycle together.

The strong boom-and-bust cycles of small mammals have long puzzled North Country naturalists. The 9- to 11-year snowshoe hare (and lynx) cycle is well documented from the Hudson Bay Fur Company records since the 1840s. Recent studies have used tree rings in the Yukon to track the hare cycle back to the 1750s and have convincingly correlated it with sunspot cycles.

Just how sunspots might be affecting the hares is completely unknown, but weather variables (such as temperature, air pressure and drought) are strongly correlated with sunspot cycles in some parts of the world. On the Kenai, we see a strong 9- to 13-year cycle in tree rings in the Tustumena Lake area, which suggests a sunspot connection.

I recently had an opportunity to discuss population cycles with a visiting researcher from the Arctic Institute field station near Kluane Lake in the Yukon. Elizabeth Hofer has lived and worked as a wildlife biologist in the Yukon for more than 30 years, frequently collaborating with Canadian researchers Rudy Boonstra (University of Toronto) and Charles Krebs (University of British Columbia).

Liz explained that there are basically two kinds of theories about population cycles: extrinsic factors (increased predation, overbrowsed plants, diseases, parasites, weather, etc.) and intrinsic factors (something is "wrong" with the animals). It is well known that

predators (e.g., lynx, wolves, hawks and owls) move in and reproduce well during a hare maximum, and no doubt hammer the heck out of the bunnies.

A similar influx of predators (especially weasels) can hammer the voles and shrews during their highs.

The Achilles heel of all cycle theories, according to Boonstra, is the low phase of the cycle. What keeps the hares down at rock bottom numbers for two to six years, and the small mammals for one to three years, after the predators have declined and the vegetation has regrown?

Many investigators, including Boonstra and Krebs, have conducted various predator removal or exclosure experiments during the lows of hare and small mammal cycles and have found that this protection didn't have any significant effect on critter numbers. At Kluane Lake Boonstra and Krebs artificially fed rabbit chow to two populations of hares during the 1983-87 low phase and found that this didn't help either. It's like the animals were determined to do poorly, regardless of how the experimenters tried to help them.

Boonstra's pet hypothesis is that there is something wrong with mothers during a population low phase. (I hate to see mothers knocked again, but the evidence is persuasive!) Boonstra measured various blood factors during an intense decline phase and found the animals to be highly stressed by the threat of imminent predation.

Combat veterans will find this obvious, but the remarkable fact is that the stress effect carries over into the offspring and grandoffspring. This is "post-traumatic stress syndrome" for the grandchildren and beyond. Boonstra demonstrated the existence of a

"maternal effect" in the laboratory by raising vole mothers under ideal conditions for several generations. Mothers that were captured during a population low phase (and subsequently their offspring) continued to have reduced reproductive output for the next three generations. They had, in fact, about half as many offspring as did mothers—and their progeny—captured during a population increase phase. This is an extremely strong maternal effect, whatever its cause may be. With human beings, we recognize that "poverty breeds poverty." But poverty doesn't generally translate into fewer children, grandchildren and great-grandchildren.

There is much to be learned about these remarkable hare and small mammal cycles. Rudy Boonstra posed a very insightful question when he asked, what keeps the populations low for so many years, when the predation and food pressure is off? Framing the question this way naturally suggested focusing on the animals' physiological and reproductive condition. Tracking this condition from one generation to the next then led to the "maternal effects" concept. This is a nice example of how reframing a question can open up an entirely new line of inquiry.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. He will be discussing this research in more detail in his one-credit "Cycles of Nature" class at the Kenai Peninsula College, Tuesday evenings, March 26-April 23. Call the College for information (262-0300). For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

DNA from poached moose extends long arm of law in refuge

by Chris Johnson

I recently taught a class at the National Conservation Training Center in West Virginia for new U.S. Fish and Wildlife Service Law Enforcement Officers. To liven up the class, I related a moose-poaching case from the Kenai National Wildlife Refuge, where I had made some instructive mistakes but still came out alright.

Several students told me that they thought the case was fascinating and that others might like to hear about it.

On a late August afternoon several years ago, I was patrolling Swan Lake Road, and I contacted a hunter. During the course of our conversation he told me that the night before, just after dark, he had witnessed two guys in a red and white Blazer shoot a moose just west of the Silver Lake pullout on Swanson River Road on the edge of the large swamp. He said he did not see the moose antlers, just the body of the moose.

Earlier that morning, I had observed a red and white Blazer, parked near the Silver Lake pullout, and I had recorded the license and location in my notebook. When I came back that afternoon, the Blazer was gone. I attempted to locate the kill site, but did not find it.

Two weeks later, I ran into the hunter who had told me about the men in the Blazer shooting the moose after dark. He asked me if I had ever found that moose kill that he had told me about earlier. I told him I hadn't, and he said that after he talked to me, he had gone back to the kill site and found that the men had left a front quarter and a set of ribs. He then salvaged the meat and took it home.

He said, "The only thing left at the kill site was a gut pile and one front leg from the distal joint to the hoof."

He then gave me better directions on where to find the kill site. He had not reported his find to anybody because he had picked up the abandoned moose meat. With the better directions, I found the site. There was an old gut pile and one moose leg from the distal joint down. I collected tissue samples.

I did a vehicle registration check on the red and white Blazer license that I had recorded in my note-

book. I went to the registered owners' residence and discovered that they had sold the vehicle that summer. However, they were able to help me identify the new owner of the vehicle.

I went to the residence listed for my new suspect. When I got there, I found out that he had moved out a short time before. While I was at the former residence of the suspect, a red and white Blazer pulled into the driveway next door. I questioned both subjects together.

This was my first mistake, as I pointed out to the new student officers. It gave both men a chance to work out their stories together. They said that they had shot a moose on Swanson River Road earlier in the season. The location and other details they gave were consistent with the information I had at the time.

They claimed that they shot a small bull moose and had left the antlers in the field. They also claimed to have taken all the meat out and said some things that led me to believe they were not being entirely truthful with me. I asked them if I could get a meat sample from the moose, and they told me that all the meat was in Homer. They said they would get me a sample.

This was my second mistake. I should have gotten a search warrant for the meat at this time.

Two weeks went by, and the hunters still had not delivered the meat sample. I called them again, and they said they did not know when they would get to Homer for the meat.

An hour after talking to them, one of the men called and said that he had picked up the meat and wanted to drop off a sample. I found it a little strange that they all of a sudden had the meat with them. Anyway, I took their meat sample, and the samples from the hunter who had picked up the front quarter, and my sample from the kill site, and sent them all to the National Fish and Wildlife Forensics Laboratory in Ashland, Oregon.

The forensics lab is the only full-service wildlife forensics laboratory in the world. The lab can make species identification, gender identification and even can identify individual animals by DNA "fingerprint-

ing” of body tissues submitted for evidence by federal, state and international wildlife law enforcement agencies. The lab works just like a police crime lab, matching the suspect, the victim and the crime scene through examination of physical evidence of all types. The forensics lab concluded through DNA analysis and serology examination that all three samples were from moose. My sample collected from the kill site and the sample taken from the front quarter picked up by the reporting hunter came from the same animal—a cow moose. The sample given by the suspects came from a bull moose.

At the time I thought this was the end of my case, but the story continues.

Five months later, while on routine patrol on the Kenai River near the inlet to Skilak Lake, I observed the suspects from the moose case camping and fishing. I observed one of the suspects take a package of meat wrapped in freezer paper out of his backpack and start cooking the meat. The camper proceeded to make chili.

After their meal, the campers broke camp and dumped the remaining, uneaten chili on the ground. I then collected the meat from the chili. I sent samples of the meat to the forensics lab to be compared with the previous samples. The lab concluded through DNA analysis that the chili meat was a cow moose. They further concluded that the chili meat was from the same cow moose as the samples collected from the kill site on Swanson River Road and the meat from the front quarter picked up by the hunter.

There were several mistakes made in this investigation that almost closed the case, but with a little luck and some good DNA, I was able to muddle through it. I issued citations, the fines were paid, and lessons were learned by all involved, not the least being myself.

Chris Johnson is a law enforcement officer at the Kenai National Wildlife Refuge. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.

Unusual mammal may be roaming woods of peninsula

by Ted Bailey



Least weasel photographed by Kevin Law, posted on Flickr <http://www.enature.com/fieldguides/detail.asp?recNum=MA0453>.

Several years ago, I am 99 percent certain that I saw a mammal not previously recorded—to the best of my knowledge—on the Kenai Peninsula. It was in the early fall with a light dusting of snow on the ground.

I was in a vehicle with a witness when this unexpected mammal ran into the middle of the road and stopped briefly to stare at the truck. I got a good look at it. I had seen one like it more than 30 years ago, thousands of miles away. Although this mammal is apparently widespread throughout mainland Alaska, I could find no museum record of it from the Kenai Peninsula. But its distribution maps are shaded on the Kenai Peninsula, indicating its expected presence.

You may be asking, what was this strange mammal? A mountain lion? A flying squirrel?

No, this was a very small mammal—the smallest of its family. My first impression when I saw it dart out of the brush was that it was an extremely large red-backed vole. But when it stopped in the middle of the road and raised its almost snake-like head, I knew that it was no red-backed vole.

This small mammal had a very long neck, short feet and short tail, and it loped across the road like a little weasel. As a matter of fact, I am almost certain it was

a weasel. It was a “least weasel,” known to science as *Mustela nivalis*, the smallest living weasel. I had seen several least weasels years ago while working in the Midwest. They were captured incidentally in small live traps set out by a graduate student that I knew, who was capturing mice and voles for a research project. One least weasel that he caught died in the trap. I obtained the tiny carcass to make a study skin and to save the skull.

The least weasel is not the same as the short-tailed weasel, or ermine—*Mustela erminea*—that we occasionally see and that trappers catch on the Kenai Peninsula. It is much smaller than the attractive ermine. An adult male ermine is about 13 inches long with a long tail, 30 to 45 percent as long as its body. An ermine’s fur turns white in the winter, but the tip of the tail remains black. White ermine fur is a fur of nobility in England, and British justices and peers traditionally wear white ermine pelts.

By contrast, an adult male least weasel is only about 10 inches long and has a much shorter tail, only 25 percent as long as its body. Like ermine, least weasels in the north also turn white in the winter, but their short tails are completely white without a black tip.

Least weasels are the champion vole and lemming catchers among mammals because their tiny snake-like bodies enable them to follow the small prey inside their underground and undersnow tunnels. Least weasels are usually found near grassy areas where meadow and tundra voles are common, but they would be adept at catching red-backed voles—the most common vole—in our area.

Over the years I have had several people report seeing “baby” weasels on the Kenai Peninsula. But without physical evidence, I was uncertain whether they were indeed baby ermine or the least weasel. Fur trappers are unlikely to capture least weasels, because these weasels are so small that their light weight is unlikely to trigger a trap. Unlike ermine, least weasels are not sought for their fur value.

I thought about reporting my observation to the University of Alaska Museum in Fairbanks, but museums like to deal in physical evidence, i.e., specimens,

not observations. So let me address an appeal to our readers for some hard evidence. If your cat or dog brings a dead small weasel with a short tail to your doorstep, or if you catch such a tiny weasel in a trap, please save it and bring it to the refuge office.

A small weasel will easily fit into a Ziploc bag, which can be stored in a freezer. Record the date and location on the bag. Refuge biologists will confirm its identity. If it is a least weasel, they will send it to the University of Alaska Museum in Fairbanks, and your

name will be recorded for posterity in the museum's records.

Ted Bailey is a recently retired wildlife biologist who has worked on the Kenai Peninsula for more than 25 years, primarily at the Kenai National Wildlife Refuge. He maintains a keen interest in the Kenai Peninsula's wildlife and natural history. For more information about the Refuge, visit the headquarters on Ski Hill Road in Soldotna, call 262-7021 or see the website at <http://www.fws.gov/refuge/kenai/>.