Discoveries

News & views from Discovery Southeast Fall 2000

Natives and newcomers

Invasive species in Southeast Alaska

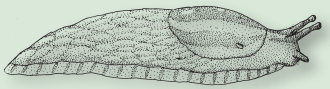
Richard Carstensen

"If ... all events are part of a great plan, then maybe exotic plant pests were sent here to teach us the value of what we have not yet properly valued, and to help us begin to glimpse the connections between all parts of the natural world."

Judith Larner Lowry, *In my town*
Orion, winter 1998, *"What is Native?"*

Above: Marsh slug (*Deroceras laeve?*), grey with clear slime and breathing hole (pneumostome) in rear half of mantle. Collected in Juneau, probably native at least to the Pacific Northwest. ***Right***: Unidentified orange exotic (*genus Arion?*), abundant in Gustavus for about 3 years. Forward-positioned pneumostome and prominent 'skirt.' Bright orange goo rubs off the mantle.

Both slugs are about 1.5 inches long. Greg Streveler says the orange invasive has been far more damaging than marsh or milk slugs (*Deroceras reticulata*) to Gustavus garden plants and to many meadow herbs. They even consume wild iris, considered poisonous to native herbivorous mammals and insects. The orange slugs were seen in large numbers this summer in Juneau's Brotherhood Park. Cooperative Extension is sending out a specimen for identication.



How deep are your roots in Southeast Alaska? Were you born here? Does it matter? Few of us—humans, bears or berry bushes—can claim more than 15,000 years of rootedness in this country so recently overwhelmed by ice. What, then, are the credentials of a 'native' of the northern temperate rain forest bioregion?

The most thoroughly native species are 'endemics,' found nowhere else on earth but the province of their origin. On isolated islands of the Alexander Archipelago, endemic bird and mammal *sub*species have proliferated, but this is so young a landscape that we can scarcely claim a single *species* of any flowering plant or vertebrate.

To be somewhat more inclusive, natives are simply organisms or populations that, from long occupancy, reflect and even help to define their bioregion. Tlingit culture is an evolutionary expression of millennia of subsistence in a rain forest island cluster. That's native. Only deep time can embed a species or a culture in a place. Nativeness is an ancestor's gift. It can't be earned in a lifetime.

Most of us are newcomers, and unfortunately we travel with an alien entourage. Exotic flora and fauna roam the world on our boots and in our cargo. At the same time, extinction rates of native species are soaring, and the two phenomena are often directly connected. In the U.S, 400 of our 958 threatened or endangered species are at risk primarily because of competition, predation, and/or hybridization with nonindigenous species. Annually, the environmental and economic costs of invasive plants, vertebrates, arthropods,

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Banner: Webbed-toe print of river otter

Bears as our teachers

John Neary

Have you ever wondered what you'd do if a grizzly walked through your camp? Anyone who camps on Admiralty Island surely has. The island supports one of the world's densest populations of brown/grizzlies, some 1,600 or more. This fact was not lost on the 8 student members of the Admiralty Youth Stewardship Expedition, nor on their 2 instructors. Bears were the focus for 7 days in July and a lot of the camp was about learning to live in harmony with them.

The expedition began in Juneau with orientation and sea kayak training—our primary mode of transport. Thanks go to Alaska Discovery and Alaska Paddle Sports for the kayaks and the dry suits used to learn paddle strokes, wet exits and self rescue techniques at Amalga Harbor. Heavy rain didn't dampen the spirits of expedition participants. In fact it was an effort to get some of them out of the water once they were in.

Upon arrival in Windfall Harbor, campers set to work reconstructing the roof of the historic shelter built on the edge of the estuary by the CCC in 1934. This 2-day effort required attention to detail as cedar shakes were fitted closely together using hand-tools to cut and fasten them in place. At the same time others learned skills in map reading, backcountry baking, low impact camping, and more. Low clouds caused cancellation of the planned alpine ascent, but each morning there was a walk down the shore to the creek at the head of Windfall Harbor to see bears fishing for salmon, and discuss the needs of bears.

Windfall Harbor is in Seymour Canal near Pack Creek, known for its bear viewing. It is also part of an area closed to bear hunting for 16 years and which has received increasing attention by bear watchers. Each day the camp participants noticed independent and guided visitors arriving by plane or boat. Some students noticed an average of 12 planes per day overhead and they put together some thoughts on effects of floatplanes upon wildlife and people. Since the Forest Service is currently engaged in planning for this area and proposals for limits on the numbers of bear watchers are being considered, the students had a chance to participate.

Bears were our most compelling teachers. For example, the campsite in Swan Cove received close scrutiny, and decisions on placements of tents, food cache and cooking area were reached only after thorough scouting. Bear trails, fresh sign, and an eagle carcass were found nearby. The group decided to hang the food high in a tree, to cook where tide would carry off the crumbs, and to tent well away from the bear trail. Not long after the last tent stake was driven, an adult female bear ambled down the beach and along that same trail through the woods right next to camp. The timing was perfect and the effect was immediate. Although excited with having a bear that close, all knew they had made some good decisions that would prevent the bear from getting into any trouble.

The bays of Admiralty Island hold rich lessons for youth stewards. The high school students especially were able to focus on the subtle beauty of the rainforest wilderness as well as the excitement of the bear walks they shared. In the words of one student "*I would tell my friends that the expedition is one of the neatest things that I have ever done*." The Forest Service is interested in continuing the long established partnership with Discovery Southeast for this camp.

Conservation education award

Discovery naturalist Steve Robertson—below with students on Stikine River—was recognized by the US Forest Service's Conservation Education Outstanding Achievement Award for the Alaska Region this September. Robertson leads our Nature Studies program in Wrangell. Congratulations, Steve!

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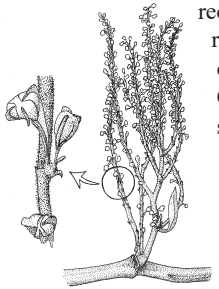
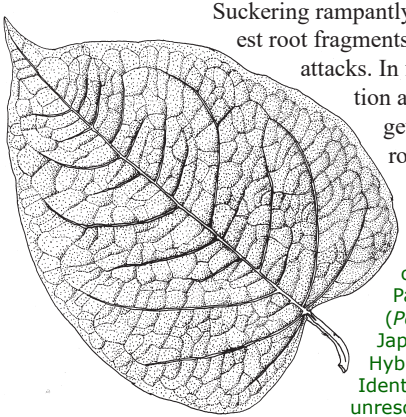
mollusks, microbes, and diseases are placed at $136 billion. By one estimate, 99% of the biomass, or weight of living matter, in the San Francisco Bay area is non-native.

But Alaska's different, right? Compared to California's inviting mediterranean climate, the northern rain forest is more demanding and exclusive. As recently as 10 years ago I paid scant heed to Juneau's roadside and lawn exotics like starlings, bluegrass and creeping buttercups. They seemed to know their place. Our forests and wild shorelines apparently enjoyed some kind of immunity from invasion.



Knotweed convinced me otherwise. The bamboo-like canes of this asiatic ornamental tower over salmonberry, goatsbeard and other native shrubs. At current rates of dispersion, knotweed could soon bracket the roadside from Juneau to Berner's Bay. Suckering rampantly and re-establishing from tiniest root fragments, knotweed laughs off shovel attacks. In fact it may *benefit* from eradication attempts if cuttings and uprootings get dumped unthinkingly along the roadside. Highway brush trimmers further dice and distribute the invader. Biological control is unlikely. In late summer, when leaves of Juneau's native plants bear the tatters and scallops of a season's worth of dining by insects, knotweed leaves remain clean and unchewed.



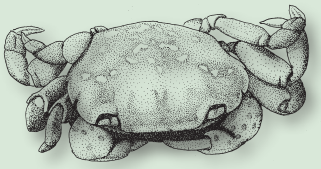
Leaf and fruits of knotweed, collected in Juneau. Two species of invasive knotweed occur in the Pacific Northwest: giant knotweed (*Polygonum sachalinense*) and Japanese knotweed (*P. cuspidatum*). Hybrids can be especially aggressive. Identification of Southeast plants is unresolved.

Knotweed's affinity for disturbed soils isn't limited to garden fringes and roadsides; naturally disturbed habitats like streamsides, avalanche chutes and beach fringes are susceptible as well. The plant has probably been present in most Southeast towns for several decades, but only when a certain threshold density is achieved does it begin to spread at the alarming rate we're now witnessing in Juneau. Meticulous plant-by plant application of Roundup or Rodeo to cut stems may be the best solution, but such control awaits public and agency recognition that our problem merits medicine we normally shun.

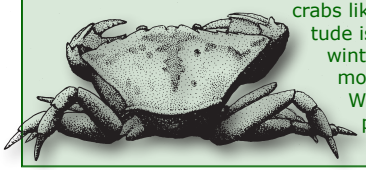
My complacency about Southeast invasives withered as I began to travel more frequently out of state. The New York lake where my brother's children learned to swim barefoot can now only be entered by wearing sandals to protect against invading razor-edged zebra mussels. These small mollusks (*Dreissena polymorpha*), have almost completely colonized the freshwater systems of the eastern U.S. They filter plankton with frightening efficiency, removing the base of the food chain that supports native fish and invertebrates. They routinely carpet the bottom at densities of thousands per square yard, and are predicted to reach the rest of the nation's waterways within 20 years. They tolerate cold water. According to Tom Shirley, a marine ecologist with the Juneau Center School of Fisheries, zebra mussels could probably survive in our local lakes.

Southeast Alaska's 'immunity' to invasion is illusory; we are simply a decade or two behind the global trends. Lack of road access helps delay terrestrial exotics, but only temporarily. And the marine highway has its own liabilities when it comes to saltwater aliens. Tom Shirley says large crabbers and fishing vessels transporting live catch in chilled tanks are potential

Dueling decapods The purple shore crab, *Hemigrapsis nudus*, right, is an abundant native intertidal species of our southern archipelago. On Kuiu and Prince of Wales Islands, nearly every bear I saw from my kayak was rolling over rocks, licking up these inch-long morsels. Middens of mink and otter were built largely of shore crab shell fragments. Haida Gwaii black bears, largest in the world, owe much of their bulk to *Hemigrapsus*.



The European green crab, *Carcinus maenas*, left, is the most widespread native crab of Britain. Inhabiting the rocky intertidal, in summer it moves into brackish estuaries. About 2.5 inches long, this aggressive crab is spreading north up the Pacific coast from Washington, where it has decimated native mollusk populations. The green crab displaces other shore crabs like *Hemigrapsus*. Its temperature amplitude is 4 to 28°F, so it could easily tolerate our winter conditions. A research group has been monitoring tanker ballast water in Prince William Sound, in hopes of detecting and preventing establishment of this species.



vectors for many marine organisms. The tanks are emptied when catch is delivered to the processor. This could bring outer coast species to inside waters, for example. Similarly, large cruise ships and tankers add and jettison ballast water as they burn and take on fuel.

The influx of globe-trotting cruise ships into Southeast waters could have environmental consequences even more serious than pollution. So far, the states most devastated by invasive species are Florida and Hawaii. While much of the damage there can be attributed to welcoming climate, these states share another vulnerability to which Alaskans might pay heed–their reliance on tourism and international trade. Maybe a desert reptile or tropical moth would never survive on the Tongass, but what about a climbing vine from a southern hemisphere temperate rain forest? Where did those big ships tie up last?

With a few exceptions, invasions in Southeast follow the national pattern, with vascular plants and vertebrates introduced intentionally, while invertebrates and microbes arrive accidentally. One of our worst invasive plants is reed canary grass (*Phalaris arundinacaea*). Until recently, the seed of this grass was intentionally used in mixes for roadside stabilization throughout the Tongass, so it's nearly universal on every island with logging roads. Taller than native grasses such as rye and bluejoint, invasive reed canary grass now chokes some reaches of Juneau's Duck Creek and is invading beaver meadows 'out the road.'

Invasives may gain first foothold because of their beauty as well as their perceived utility. European purple loosestrife (*Lythrium salicaria*) is invading US wetlands such as cattail marshes at the rate of 450 square miles per year. Like knotweed, this exotic was invited to our continent as an ornamental and nectar-rich bee pasture plant. The late Professor Donald Lawrence, who pioneered succession studies in Juneau and Glacier Bay, wrote me 10 years ago that he had noticed purple loosestrife in a garden in Juneau (hinting perhaps at a night-raid).

But Don probably worried even more about accidental introductions into his beloved Glacier Bay. Old-style researchers and recreationists went ashore in skiffs, and usually had to wade the last few yards, thus washing off seeds from Minnesota or Germany. Modern dayboats now off-load dozens of tourists from ladders on the bow, potentially tampering with succession in one of the world's most revered outdoor laboratories. Plant invasions threaten more than a remodelling of Southeast Alaska's domestic scenery; non-natives could fundamentally unravel natural communities. In Florida's mangrove swamps, invasion of Brazilian pepper tree causes abandonment by white-crowned

pigeons. Because these birds are keystone seed-dispersers for many native plants, the mangrove community collapses.

I wonder where the Tongass will first feel such effects? Habitats most at risk from knotweed, canary grass and their ilk are productive, early successional marshes and thickets along rivers, raised beaches, slide zones and forest gaps. Here, fast-leafing native deciduous plants become insect incubators in spring and summer. These insects in turn feed a large share of our breeding hosts of thrushes, warblers, kinglets and sparrows.

In the Pacific Northwest and Australia, such brushland habitat bird populations have been severely altered by invasive Scotch broom (*Cytisus scoparius*), another ornamental gone bad. Only common yellowthroat, a widespread warbler, seems to thrive in these degenerate communities. In 1994 I found Scotch broom happily flowering in waste gravel by a fuel tank at Naukati on Prince of Wales Island. While this Naukati plant was probably accidental, Scotch broom also grows in lovingly tended gardens at Sitka's Pioneer Home!

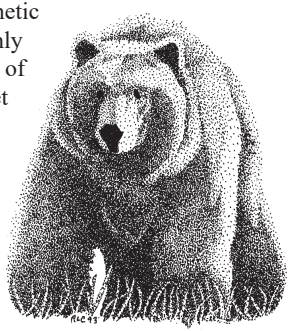
Are Southeast's conifer forests 'safe?' Paul Hennon of Juneau's Forestry Sciences Labs points out that our low diversity of tree species could actually magnify the impacts of an invasion. The Sitka spruce weevil *Pissodes strobi*, for example, aggressively infests leaders of young spruces in BC. almost north to the Alaskan border. Global warming could foist further range expansion. It was devastating enough for eastern deciduous forests to lose American chestnut to an oriental fungus; chestnuts were one of dozens of widespread hardwood species in the Appalachians. It would be quite another thing for the Tongass to suffer major impacts to spruce or hemlock.

If an invasive such as Scotch broom or spruce weevil were to proliferate beyond control, radically altering natural communities of one island in Southeast, could we contain it there? Intervening waters of the archipelago might serve as a blessed barrier to further dispersal, at least until we mustered the will and means to defend remaining pest-free islands. But the down side of islands is their proclivity to extinctions, once invasives do arrive. In *Song of the Dodo,* David Quammen wrote:

> *"Dispersal ability* [loss]*, size change, endemism ... disharmony . . . are all characteristic of insular evolution ... but nothing on the list is more characteristic than extinction. Islands are where species go to die."*

Quammen's book is named for a species symbolic of helplessness who had the misfortune to evolve on an island.

The islands of Southeast are only 12,000 to 15,000 years old, and never had dodos. However they do support possibly the largest number of endemic mammal subspecies on any National Forest. Genetic relationships to nearest mainland relatives are only just beginning to be sorted out. The brown bears of Admiralty, Baranof and Chichagof islands, as yet unnamed, are now considered the most unique *Ursus arctos* group in the world, genetically isolated from all other living brownies for far longer than the known postglacial lifetime of their island cluster: (Figure that one out!) In light of such backwater bear genetics, oddball Prince of Wales Island spruce grouse, and the doubtlessly even quirkier populations and distributions on still-unstudied islands, it seems pretty bold to transplant, say, a black bear from Mitkof to Kuiu, or a red squirrel from the mainland to Admiralty. Managers and ecologists can no longer plead ignorance of the horrific record of island invasions and extinctions.



In 1987, the Alaska State Legislature directed our Fish and Game Department (ADFG) to transplant 33 Roosevelt elk (*Cervus elephas roosevelti*) and 17 Rocky Mountain elk (*C. e. nelsoni*) onto Etolin Island near Wrangell. By 1999, Southeast's elk population had reached 250 to 300. Elk are superb

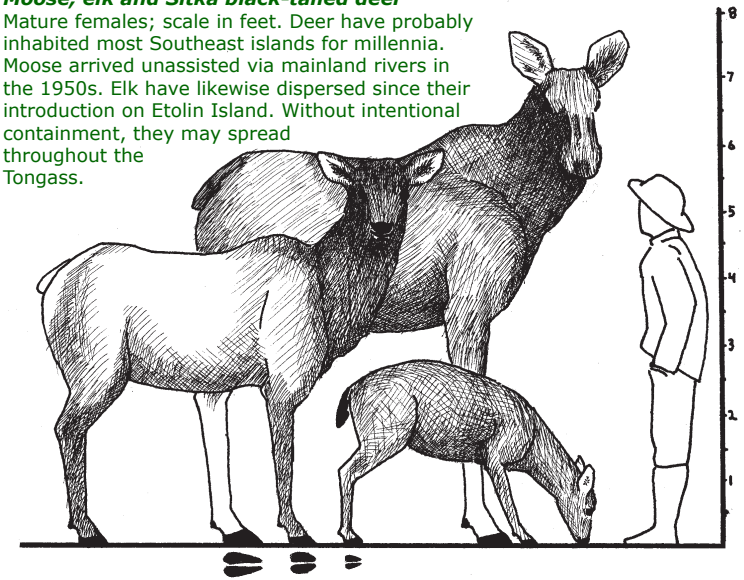
swimmers, who could easily reach every island in the archipelago from their current strongholds. Research by Matt Kirchhoff and Doug Larsen on the diets of Etolin elk and native deer shows an even higher degree of overlap (64%) than found by studies in western Washington (46%) or Colorado (37%). Relatively low plant diversity in Southeast restricts dietary divergence between deer, who tend to browse, and elk, who tend to graze. On southern Etolin I found huckleberries, the favored deer browse, clipped down to pencil diameter by elk. The heavier elk have a larger rumen-to-body-mass ratio and subsist on coarser forage, leaving deer to pick around the fringes of elk winter range.

Between 1991 and 1998, elk pellet group densities doubled while deer declined by 56%. Studies elsewhere suggest that in severe winters our deer will be unable to compete with introduced elk. Diseases and parasites, some undetectable during quarantine, can also be transmitted from elk to deer. And beyond their effect on deer, elk have enormous impact on vegetation. In the Olympics, trampling by overpopulated elk is especially severe in wet places. This fall, ADFG will propose to the Board of Game that a general elk season be opened, running concurrently with the deer season on islands adjacent to Etolin and Zarembo. This could help to minimize elk dispersal. [1]

Nobody has proposed that we contain the spread of moose, who entered Southeast under their own power. Is there a qualitative difference between natural range expansion and human-induced invasions? Mark Sagof of the University of Maryland says that there is no good economic or ecological reason for waging war on exotic species as such. Many pests are native. Many exotics are benign. Zebra mussels improve water clarity. And after all, a vote against invasives is a vote against ourselves. Sagof feels that control of invasives is essentially a value judgement rooted in aesthetics, not in science.

He's right. Science may predict global ecosystem collapse, but it can't tell us whether that is good or bad. There may always be those who value exotic elk above native deer, farmed fish above wild salmon, clean grassy roadside borders above undisciplined tangles of Sitka alder. Whether such values are informed or misguided, they hold brief profit and convenience above a lasting partnership with the planet where we were born.

Moose, elk and Sitka black-tailed deer
Mature females; scale in feet. Deer have probably inhabited most Southeast islands for millennia. Moose arrived unassisted via mainland rivers in the 1950s. Elk have likewise dispersed since their introduction on Etolin Island. Without intentional containment, they may spread throughout the Tongass.



Thanks to Terry Brock, Jim Douglas, Paul Hennon, Kathy Hocker, Matt Kirchhoff, Donald Lawrence (deceased), Catherine Pohl, Michael Shepard, Tom Shirley, Mary Stensvold and Greg Streveler for discussion and information on invasives.

1 **PS 2020**. Nope; liberal regs notwithstanding, elk are colonizing Tàan (POW)

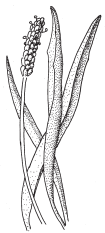
Who is native?

Richard Carstensen

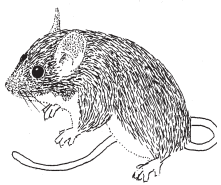
These related pairs of plants and animals are both found in Southeast Alaska. One is native. It occurs here naturally. The other was brought here by people, accidentally or on purpose.

For each pair, underline the name of the species that is native to Southeast Alaska. Then check your answers below.

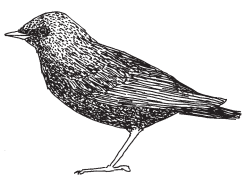
1) common plantain • goosetongue

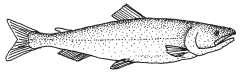


2) house mouse • deer mouse

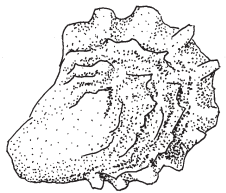


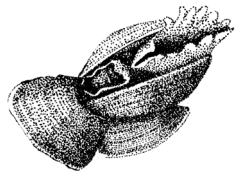
3) bohemian waxwing • starling



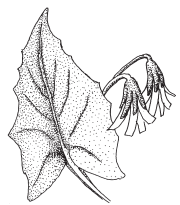


4) Atlantic salmon • sockeye salmon





5) oyster • mussel



6) rattlesnake root • dandelion

1) Goosetongue is a delicious native edible thatgrows on our beaches. Common plantain is a sidewalk weed. • **2)** Deer mice are native to SE Alaska. House mice are introduced. Both occur in houses. • **3)** Native bohemian waxwings can be found in Juneau in winter, feeding on berries of introduced mountain ash trees. Starlings were introduced to New York from Europe in 1890, and eventually spread to Alaska. • **4)** Native sockeye salmon rear in many Southeast lakes. Introduced Atlantic salmon have recently been caught by Alaskan trollers. • **5)** Native Mussels are abundant on our rocky beaches. Oysters are introduced by oyster farms into Southeast bays. • **6)** We don't have rattlesnakes but we do have native rattlesnake root, a plant of sunny forest edges. Common dandelion is introduced.

Sketches from a field notebook