Discoveries

News and Views from Discovery Southeast Fall 2002

Tracking toads
And other enigmatic amphibians

Richard Carstensen

Are toad populations really declining all over Southeast Alaska? A naturalist is likely to reply "of course." An ecologist, with equal authority, will say "where are your data?" To study a camouflaged, nearly silent species that spends half the year hibernating and the other half huddled under logs and duff, you need a team.

The team should include naturalists with memories extending back for decades within the region of concern, and well-connected to the local hiker/fisher/birder network; it sometimes takes 100 people to find a toad. The team also needs an ecologist, because naturalists are often excitable and prone to sweeping conclusions (like this one). An ecologist is trained to raise a polite eyebrow at statements like "toads used to be *everywhere,*" and to structure investigations in ways that reduce bias. Of course, the team could use a herpetologist too, but in Alaska these are rarer than snakes.

If you're lucky, the team will include experienced field biologists like Mary Willson and Bob Armstrong who have blended ecological research and natural history in equal parts throughout their careers. Discovery Southeast is very lucky indeed; we've been awarded a grant from the Alaska Department of Fish and Game to study amphibian habitats in the Juneau area for the coming year. Our team consists of Bob, Mary and me.

All local amphibians are pond breeders. Little is known about these stillwater habitats here near the northern range limit for toads and newts. The Discovery Southeast study will assess vegetation, physical features and water quality of a wide range of pond types. We're also gathering insights into amphibian distribution, life history, potential predators, and at least anecdotal evidence of population changes. Our findings will help researchers, naturalists, teachers and students throughout Southeast to mount a somewhat belated investigation into some of the rain forest's underappreciated inhabitants. Such research is a fairly new role for Discovery. (see page 3)

This is apparently the year of the amphibian in Southeast. A separate grant was just awarded to the Juneau School District and ADF&G to cooperatively promote amphibian education in the public schools of Juneau and neighboring towns. Discovery may become part of that effort as well. It's a sound investment. Kids are not only the world's best toad-finders; they are also tomorrow's toad guardians.

When Bob and Mary and I prepared our proposal for amphibian habitat studies last winter, I anticipated a year of often fruitless searching. Alaskans from Haines to Ketchikan say that western toads (*Bufo boreas,* formerly called boreal toad) have dramatically declined near their communities. But ever since this April, when Bob Armstrong first photographed breeding toads on Douglas Island, our trial searches and assessments have proven consistently fascinating. We were relieved to discover that within easy reach of the Juneau road system we can study not only western toads, but also rough-skinned newts (*Taricha granulosa*) and wood frogs (*Rana sylvatica*). Such diversity would not impress a herpetologist from the Smokies or the Klamath Mountains, but for Alaska it will do just fine. To further whet our appetites, Robert Hodge, author

continued on page 5

Mary Willson opens a bottle trap filled with western toad larvae. ***Banner****: tracks of adult western toad in mud. Straddle ~ 4 cm.*

In this issue

From the director

Larry West

Christy and I left Alaska very reluctantly two and a half years ago, so we were delighted when Discovery Southeast gave us an opportunity to return. Reconnecting with close friends and our favorite natural environment has been a true homecoming for us as a family, and at Discovery Southeast my deep love of nature makes work feel more like play. Perhaps most importantly, Alaska will become for our son Jayden (who turns one this month) his first real home.

It will be a few years before Jayden is ready for school, but things continue to change at a rapid pace and it's hard to predict what "education" will mean by the time Jayden reaches the equivalent of today's third grade. Opportunities for children to learn directly from nature—from their own experience, outside the classroom—are becoming more meaningful as schools face restrictive financial burdens, as teachers are challenged to squeeze new curriculum requirements into their already busy schedules, and as classroom performance is increasingly measured by standardized benchmarks.

Thanks to the vision and commitment of school officials and teachers, and to the funding we receive from insightful and generous parent groups, hundreds of children in Juneau and other Southeast Alaska communities step out into the wild with us each season. Out there among the furry, prickly, slimy, feathery, tasty, squawcky things, they learn to understand and appreciate all of the greatest and most intricate features of this extraordinary world we call Alaska.

Every child will benefit in some way from his or her experience with Discovery Southeast this school year. Many will never forget what they've learned, and in some a spark will be ignited that is ultimately fanned into a lifelong flame of attachment and service to this great land.

Outdoor Explorers 2002

Discoveries is published by *Discovery Southeast*, Southeast Alaska's leading source for natural history and conservation education. Founded in 1989 in Juneau and serving communities throughout Southeast Alaska, Discovery Southeast is a nonprofit organization that promotes direct, hands-on learning from nature through natural science and outdoor education programs for youth, adults, and teachers. By engaging youth and adults in the study of nature, Discovery Southeast naturalists deepen and enrich the connections between the people of Southeast Alaska and nature.
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Illustrations: Richard Carstensen and Kathy Hocker

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Discovery news

More in-school programs

Great news for our in-school programs – for the first time, this fall we will have a presence in all of the Juneau public schools through high school! As you may recall, an Alaska Department of Environmental Conservation grant funded our Vanderbilt Creek Stewards project at Dzantik'i Heeni last school year. We successfully pursued the same grant funding to enable us to continue this work and to conduct similar projects at Floyd Dryden middle school and the high school. The project, entitled Watershed Stewardship and Education, will provide the opportunity for students at DZ to continue the study and restoration efforts on Vanderbilt Creek. Students at Floyd Dryden will begin study and restoration efforts on Duck Creek. Students at the high school will conduct investigations of the Mendenhall watershed estuarine wetlands. We have long wanted to expand our work with middle and high school students, and this affords us the perfect opportunity. Thank you ADEC! Additional grant funding from the Division of Governmental Coordination is already in place to continue these programs into the following school year.

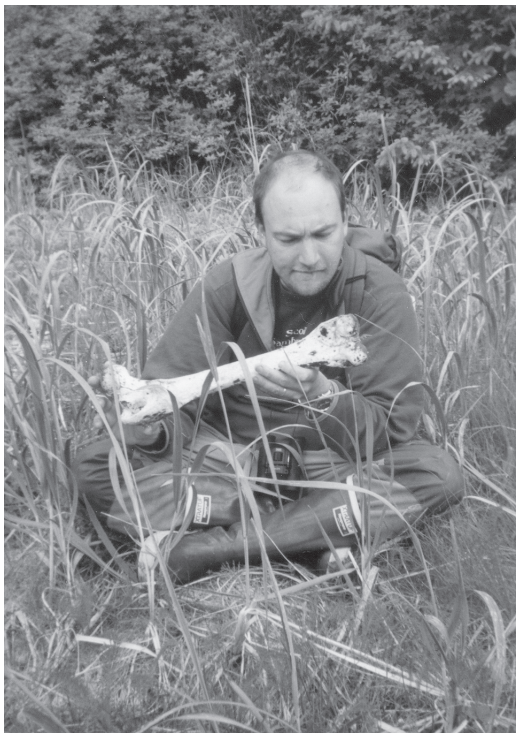
Also included in the ADEC grant is funding to produce another laminated Discovery Guide (our 4th!), this time with a focus on streamwalking. It will identify common riparian plants, aquatic insects, fish, and mammals, and discuss stream morphology. In addition to being a perfect field tool for these specific grant projects, it will add to our growing library of resources available to the public. Be on the lookout for it by spring!

Summer programs

The end of the school year marked the start of a summer adventure as a group of Angoon middle and high school students embarked on the Mitchell Bay Canoe Camp. Ten students joined two of our naturalists for fun in the sun (yes, there actually was some in early June!) as they explored the water wonderland of Mitchell Bay. We are grateful for the continued support of the Chatham School District and private donors that makes this camp possible. The Cross-Admiralty Camp scheduled later in June had to be cancelled due to low enrollment this year. The funding intended for that camp will be redirected toward other activities with Angoon students this fall.

With generous funding from an Alaska Conservation Foundation grant and the Forest Service, the second annual Bears of Admiralty Teachers' Expedition was a rousing success. Seven Juneau teachers spent an incredible week of focused bear studies near Pack Creek on Admiralty Island. They take more than facts back to their classrooms. Many thanks to the Alaska Department of Fish and Game for their tremendous support this year. We already have teachers requesting the class for next summer!

And a very weather-resistant group of Outdoor Explorers was out enjoying the nooks and crannies around town in July and August. Our switch this year to more sessions with fewer kids in each session worked well, and five different groups donned rain gear and hit the trails and beaches with all the enthusiasm of kids on summer vacation. The continued support of the City and Borough of Juneau allows us to offer this popular summer day camp each year.



Research programs

Discovery has engaged occasionally in habitat surveys, usually as subcontractor to other environmental consulting groups. But we have remained primarily an educational organization. For the coming year we'll be expanding our role as educators to include two field research projects. We're also bringing onto our staff two of Juneau's best known naturalist/ecologists: Robert Armstrong and Mary Willson. They'll be teaming with Richard Carstensen to study amphibian habitats (feature story) and bird "hotspots" of the Mendenhall Wetlands Game Refuge. The hotspots survey, on contract with the US Fish and Wildlife Service, is an effort to identify and understand major areas of bird concentrations within the refuge.

With additional funding from ADEC we plan to involve high school students in these studies, thus "blurring the line" between research and education. Public involvement is a strong component of both studies; Juneau birders have already contributed heavily to the hotspots project. Discovery is well positioned to turn both the amphibian and bird surveys into true community projects.

New ED joins Discovery

Kathy Hocker

New Executive Director Larry West, with wife Christy Long, son Jayden, and family companion Cedar

At last… Discovery Southeast staff and board are delighted to welcome our new Executive Director! Larry West, his wife Christy Long, and ten-month-old son Jayden arrived in Juneau in July, and are currently caught up in a tumble of moving, job search (Christy's career is social work administration), and settling into the community.

Larry comes to us from Hood River, Oregon, where he worked as executive director of two community arts organizations—but he and Christy have firm Southeast Alaskan roots. Larry first came to Alaska in 1990, leading groups of visitors on cruises and tours throughout the state. The land and the people captured his heart: "I think my jaw was on the deck the whole first cruise…From then on, I was looking for a way to move closer to Alaska," he says.

A couple of moves brought him first to Portland, then to Seattle, as he spent more and more time in the Panhandle and the Interior. Summer of 1994 found him living for six months in a sod-roofed cabin on the banks of the Nenana River—an experience that solidified the connections he'd begun making with the land. After a two-year stint as naturalist aboard Cruise West's small ships, he moved in 1997 to Haines, where he worked as the city's Tourism Director, guided for Alaska Nature Tours and Rainbow Glacier Adventures, and met and married Christy.

Larry is thrilled to be a part of Discovery Southeast. He feels very strongly about the importance of our work. Boyhood explorations in the Blue Mountains, the Wallowa Mountains, and the Cascade Range in Washington and Oregon helped him develop a deep, spiritual bond with nature. He looks forward to contributing—through his work with Discovery—to that same process for Southeast Alaskan students and families. His priorities for the organization include fundraising, maintaining and strengthening our award-winning programs, and reaching out to other communities.

Welcome, Larry West and Family!

Metcalf and Merli honored by ACF

Each year the Alaska Conservation Foundation honors people who have made outstanding contributions to conservation in Alaska. Of the 7 awards to be presented in Anchorage on September 23rd, 2 were earned by founding members of Discovery SE.

The *Celia Hunter Award for Outstanding Volunteer Contributions* goes to K.J. Metcalf. We at Discovery have long been on the receiving end of K.J's volunteer services, but we are only one of the many causes and organizations indebted to him.

The *Jerry Dixon Award for Excellence in Environmental Education* goes to Discovery naturalist Steve Merli, who has probably led more kids into the woods than any educator in Juneau.

Congratulations, Steve and K.J!

Admiralty Canoe Camp 2002. *This Angoon tradition was started by K.J. and Peggy Metcalf, and is continued by Discovery Southeast naturalists.*

Tracking toads *continued from page 1*

of *Amphibians and Reptiles of Alaska, the Yukon and Northwest Territories*, has asked us to be on the lookout for Columbia spotted frog (*Rana luteiventris*), northwestern salamander (*Ambystoma gracile*) and even the tailed frog (*Ascaphus truei*), all possible in the Juneau area.

We hope you'll lend your eyes and ears to the hunt for Alaskan amphibians. Please let us know what you find by calling or emailing us, or by sending in the data form on page 8. We're also interested in your memories of past amphibian sightings, especially if you can be fairly precise about date and location.

Western toad

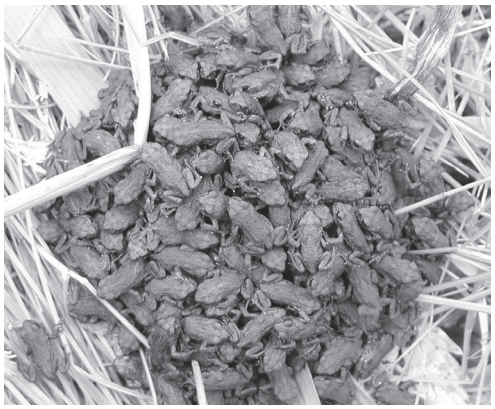
This is the amphibian once familiar to all longtime residents of Southeast Alaska. Those who moved here within the past decade might forgiveably doubt those stories of the "good old days" when hikers at dusk took care not to step on ubiquitous 3-inch adults. Swarms of tadpoles and tiny dispersing toadlets at Dredge Lake enchanted several decades worth of Valley Kids before mysteriously blinking off in the 1990s. At Amalga Harbor, where breeding adults once congregated by the hundreds in late April, residents have noted bumper crops of toadlets only twice in the last 10 years.

Unfortunately, few of us kept toad notes back when they were common as crows. Here are two entries from my Eagle Beach journals. Both refer to adults:

- *Aug 7, 1981*. Saw 20 to 30 toads today on the Eagle Glacier trail. [~4 miles long]
- *Sept 17, 1982*. Toads common along Scout trail on recent early mornings, ~ 10 to 20 per mile.

From 1990 to 1992, my last year living at Eagle Beach, I didn't see a toad of any size.

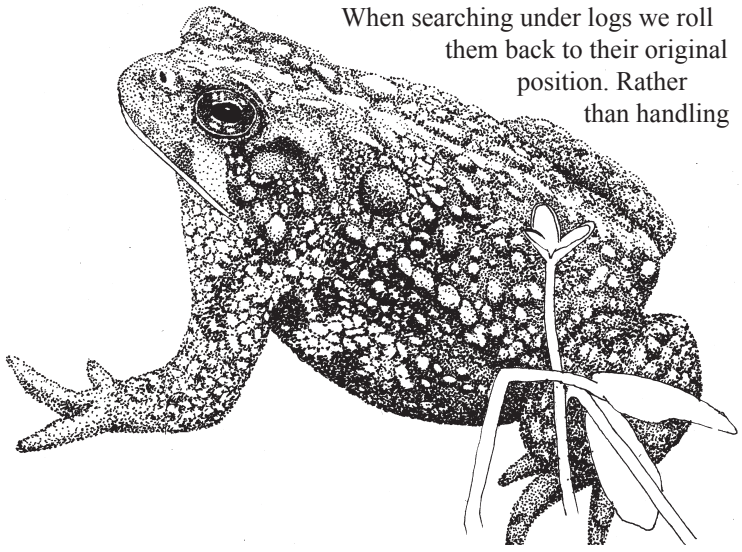
Alaska's suspected toad decline has parallels in better-studied states. Western toads are believed extinct in New Mexico's San Juan Mountains and much of Utah. Populations have plummeted at Yosemite, Yellowstone, the Grand Tetons, the Colorado Rockies, and the Oregon Cascades. Suggested culprits are acid rain, pesticide exposure, stocking with predatory fish, invasion of bullfrogs and other exotic species, drought, dams and water diversions, road construction, recreation near breeding sites, parasites and increased UV radiation. Infection of embryos by the fungus *Saprolegnia ferax* and of wintering adults by fungal chyritids are both exacerbated by global warming. Alaska hosts several of the culprits on this list. (Hermans & Armstrong, Sept 2000.) Immune suppression by some of these agents can make toads susceptible to otherwise non-threatening pathogens.

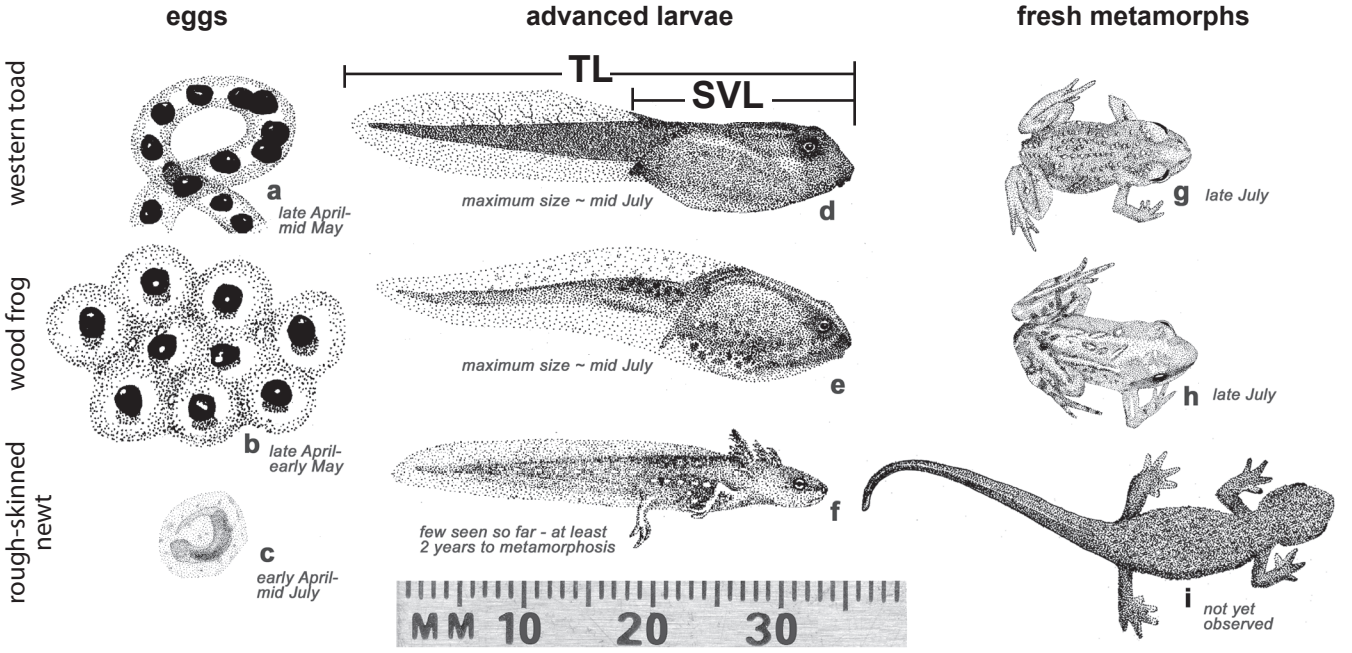


On July 29, 12-mm-long toadlets clump 10-deep next to their natal pond within days after resorbing tails and crawling onto land. Michigan studies suggest "clumping" helps avoid dessication.

Before biologists can address causes of declines in Alaskan toads, or even prove that such declines have occurred, we must locate surviving populations and learn about their habitats. But encountering an adult *Bufo boreas* these days is mostly a matter of luck. Except for a brief aquatic mating episode in late April and early May, adult toads spend their lives on "dry" land (that term is quite relative here of course). Avid hikers may stumble across adults once a year or so on forest or wetland trails, perhaps more often for those who habitually walk at dawn or dusk. In one Juneau location, where we've recently seen thousands of tadpoles and toadlets and perhaps a dozen 4 cm 2-year-olds, we've located not a single mature individual. Your best toad-finding option is to search the edges of shallow, warm-water ponds between late April and July for earlier stages of development. Visual searches for strings of eggs and the hard-to-miss black tadpoles are productive until emergent vegetation obscures the bottom mud. Both males and females give a chirping release call (meaning "hands off!") in mating time, but are reported to rarely call territorially.

Scanning and listening are the least intrusive ways to detect toads, an important consideration with any declining species. Many larval and adult amphibians hide under logs and large pieces of bark. When searching under logs we roll them back to their original position. Rather than handling





***TL** = total length; **SVL** = snout to vent length. All shown to same scale, from photos and measurements near Juneau (except i). Note shrinkage with metamorphosis. Dates are from our observations this year and other local reports; variations on this timing may well occur. a) toad eggs in strings of jelly; b) wood frog eggs in softball-sized mass of several hundred, 9 shown; c) newt egg deposited singly - with coiled embryo soon to hatch; d) "toadpole" is dark charcoal - dorsal fin starts farther back than on larval frogs; e) "frogpole" more olive brown - dorsal fin attaches well forward of the tail: f) newt larva has antler-like gills; g) toadlet has fat, warty body and small hind legs: h) froglet has smoother skin and legs are already more muscular than on toadlets; i) newts metamorphose at less than 25 mm*

the extremely delicate tadpoles, larvae can be scooped briefly into a clean ziplock for closeup photos or measurements. Even adult toads have highly absorbent skin and can be poisoned by handlers wearing bug repellent or sunscreen, or from nicotine on a smoker's fingers.

Other methods we use for detecting amphibians are dip net sweeps, shelter boards and minnow traps. Random sweeps through the bottom muck are disruptive to habitat, and we rarely need to do this. Shelter boards are simply pieces of plywood placed at margins of known or suspected amphibian ponds. Tadpoles of both toads and frogs as well as adult newts used our shelter boards this summer.

Minnow traps require research permits from ADF&G. These funnel-entry traps are deployed in much the same manner as for salmonid fry. We've tested known breeding ponds with various baits and trap designs. The traps work well for larval toads and adult newts, as well as revealing potential predators like small fish, leeches and diving beetles. The tests will improve our odds of locating amphibians when we trap new ponds next spring and summer. Traps, dip nets and rubber boots are rinsed and disinfected between pond visits to prevent disease transmission.

Habitat surveys by Dana Waters in the Stikine River basin in 1991 indicated that for toads and other amphibians, the best breeding ponds had minimal in- or outflow during summer. Toads selected warmest waters, ranging from 15 to 35°C (60 to 90°F), nearly twice the summer temperature of ponds more strongly influenced by cool streams or river backwatering. Warm ponds are

"Blinking lights" - metapopulation dynamics

Amphibian breeding pond populations can be ephemeral, resembling the blinking lights on a switchboard. For every light that blinks off, another needs to eventually blink on somewhere. Otherwise extinction is in the cards. It's hard enough finding amphibian ponds in Southeast these days, but assessing population trends will be still more challenging if breeding ponds are playing hopscotch. Western toads could be a metapopulation - a "population of populations" linked by immigration. In the maze of criss-crossing roads and agriculturalized bottomlands of more developed states like Oregon, populations that blink off may well stay *off. Isolating marine channels in Southeast Alaska could create similar barriers.*

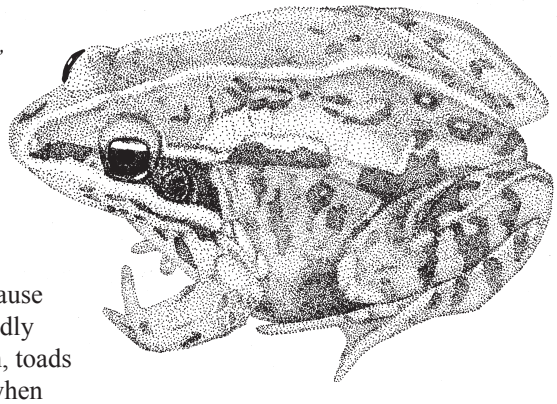
Metapopulation models focus on the patterns of "blinking lights" and the probability of persistance of the overall population, rather than on the size or location of subpopulations.

Captive amphibians

Raising amphibians at home from eggs or larvae is a wonderful experience, regarded by some as almost a childhood birthright. But with populations at risk, such collecting becomes questionable, not to mention illegal. ***ADF&G regulations wisely prohibit holding, transporting or releasing of any native amphibian without a state permit.*** *We encourage parents who want this experience for their kids to forego home rearing, and to assist instead in an authorized school-wide aquarium project with broader educational potential. Call us if you want to participate. But first consider that there's no "happy ending" for captive amphibians. Toadlets can no longer be returned, even to their natal ponds, for fear of introducing diseases that could eliminate an entire population. All amphibians collected for research or education must either become museum specimens, be destroyed, or live the rest of their lives in captivity.*

of course shallow and sunny, usually resulting in luxuriant growth of buckbean, swamp horsetail, sedges and pond lily. Lack of surface connection also reduces the likelihood of fish that eat amphibian larvae.

Our Juneau-area breeding ponds share most of these characters. Another common feature is "youthfulness." Tadpoles rear (or *once* did!) in recently exposed glacial kettle ponds, beaver backwaters, human excavations like Dredge Lake, and in barely-supratidal sloughs elevated by glacial rebound. Because young ponds are rapidly altered by succession, toads may abandon them when shade or acidity increase, or when food decreases. Ephemerality of toad populations could therefore result from inherently transitory habitat, as well as the animals' reproductive wanderlust.

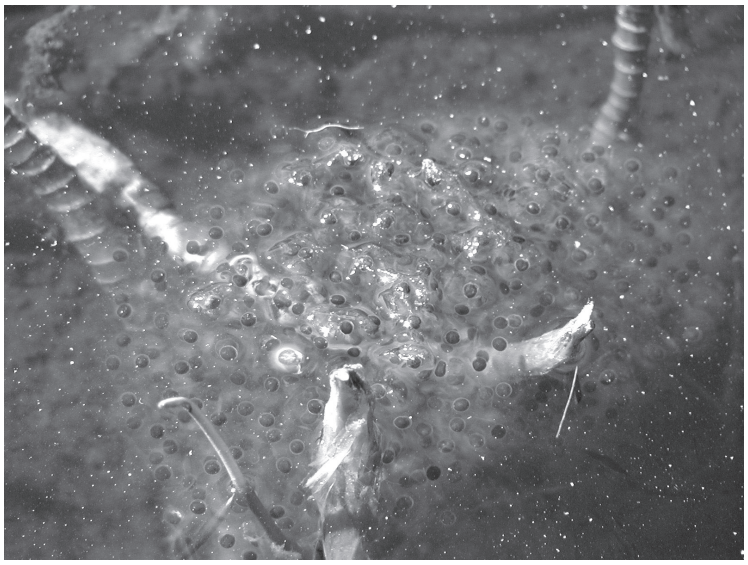


Adult wood frog Tagish, BC, 50 mm SVL.

Less favorable breeding sites include deepwater and high elevation lakes. Toads, newts and spotted frogs do reportedly breed in the "muskeg ponds," of Mitkof Island. But the term *muskeg* glosses over a wide range of peatland habitats, with rich sedge fen at one extreme and highly acidic sphagnum bog at the other. We suspect that breeding success of toads, newts and frogs may be better in fen waters than in bogs. We may learn more about that in 2003.

Wood frog

On May 4th this year, Cathy Pohl, Marinke Van Gelder and I visited a place where Marinke had seen toads breeding the previous spring. Emergent plants had yet to unfold their leaves and ice still formed on pond edges overnight. Instead of the long thin stringers of toad eggs that we expected, Cathy found a 5-inch diameter mass of frog eggs! Each egg was individually encased in jelly but adhered firmly to the others and to the buckbean stems. Bob Armstrong returned to the pond and collected an adult frog for Bruce Wing at National Marine Fisheries Service, who identified it as wood frog. The specimen is the first *Rana* of any species for Juneau, and was recently verified by Robert Hodge. Nearest known populations are on Taku River.



Wood frog eggs on buckbean stems, May 4, 2002.

While western toads and rough-skinned newts seem to be well distributed among the islands of Southeast, frogs are more restricted to the vicinity of mainland rivers. Our Juneau frog discovery could represent a natural colonization. But just as likely is the possibility of intentional release. Herpetologists thrilled to the 1991 "discovery" of Pacific tree frog (*Hyla regilla*) at Ward Lake in Ketchikan, only to be informed by a local resident that he had introduced them in the 1960s. While the Ketchikan frogs have not yet spread to neighboring ponds, other equally benign-seeming introductions have inflicted heavy environmental costs world-wide (see "Natives and Newcomers," *Discoveries*, Fall 2000). Caution against further releases, even of locally collected animals, will become a key aspect of education about amphibians in coming years.

Whether our tiny frog population is natural or exotic, we've learned a lot from monitoring its de-

velopment. Like western toads, adult wood frogs resume a terrestrial life after only a few days of aquatic mating; we've seen none at the pond since early May. On July 26th more than half of the tadpoles had fully metamorphosed, and were beginning to hop around in the adjacent fen.

Wood frogs are well adapted for extreme boreal climate, with the shortest interval from egg to metamorphosis of any northern amphibian at any temperature. While hibernating toads and newts must burrow below the frost line, wood frogs can freeze to -6°C (20°F) and live north of the Arctic Circle. They are perhaps over-qualified for the task of colonizing Southeast Alaska.

Rough-skinned newt

I first became aware that Juneau had newts several years ago when I saw student Clayton Fischer carrying a bowl of them through the halls of Dzantik'i Heeni Middle School. (With amphibians it will not be at all clear who is teaching whom - the best of all possible educational relationships!) Since then, Clayton's newt pond has become perhaps too well known. Fortunately there are others; our newt eggs are not all in one basket.

Bob Armstrong collected newts from Clayton's pond and mailed them to biologists studying newt toxicity. (Armstrong & Hermans, Nov 2001) Rough-skinned newts are the most poisonous salamanders in the world. Campers have died from accidently boiling newts in their coffee water. But newt toxicity increases from nil to virulent on a southward transect from Vancouver to San Francisco Bay. Supposedly this pattern results from a "predator-prey arms race" between newts and toxin-resistant garter snakes. Surprisingly, the Juneau newts, several ecoregions removed from the nearest snakes, proved highly toxic!

We've since learned that the newts of Clayton's pond were introduced from Shelter Island in the 1960s. But Shelter is as snakeless as Juneau, raising questions about the newt-snake arms-race hypothesis.

Three lessons emerge from our first season of amphibian hunting: 1) Learn to love surprises as much as scientific hypotheses. 2) Removing an amphibian from the wild is traumatic for the individual. Returning it to the wild, especially in foreign locations, can be an unretractable threat to entire populations. 3) Don't lick your fingers when petting orange-colored animals.

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Websites:

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• USGS site: http://www.npwrc.usgs.gov/narcam/idguide/bboreas.htm
• BC site: http://wlapwww.gov.bc.ca/wld/frogwatch/whoswho/factshts/westtoad.htm

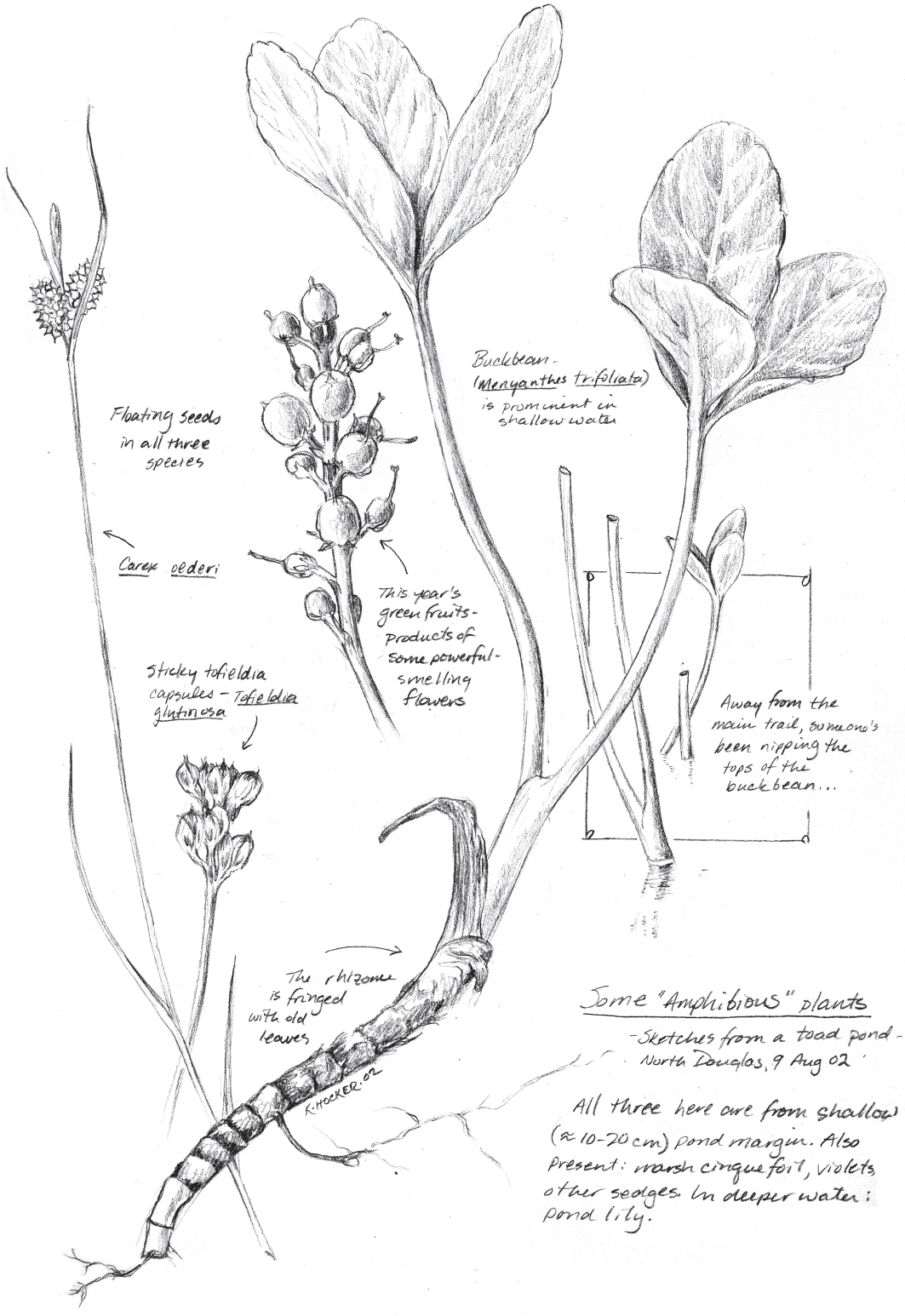
Amphibian report

Please mail, fax or email to: Richard Carstensen, Box 21168, Juneau, AK 99802 • fax: (907) 586-1272 • richard@discoverysoutheast.org

Observer_____Date_____Time_____
Phone_____ email or address_____
Weather: temp_____ sky cover_____precip_____
Location _____
_____*(attach photocopy of topo map segment if possible)*
Habitat (pond depth, temp, vegetation etc) _____
_____
_____
Amphibian species seen/heard_____number_____
Life stage (approx. length cm) adult____juvenile____larva____eggs____
Comments _____
_____
_____
_____

Sketches from a field notebook

Kathy Hocker



Many thanks to our great supporters!

Grant support

Discovery Southeast thanks the following foundations and organizations for their generous support in the past year.

Alaska Conservation Foundation
Membership, Bears of Admiralty Teachers' Expedition
Alaska Department of Environmental Conservation
Vanderbilt Creek Stewards Project
Alaska Department of Fish and Game
Habitat Use of Amphibians in Southeast Alaska
Alaska Fund for the Future
Nature Studies
B.G.A. Herrdum Foundation
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Chatham School District
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Wrangell Nature Studies
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A special thanks to parents ...

Nature Studies is supported at each Juneau Elementary School thanks to a 50% match from the parent groups. It would be impossible to engage every third through fifth grade student in Nature Studies without this terrific support.

Auke Bay PTA
Friends of Gastineau
Glacier Valley PTO
Harborview PTA
Juneau Community Charter School
Mendenhall River PTO

...and others

So many of you lend a hand when it's needed. Special thanks this quarter for everything from time to advice to housing: Alaska Department of Fish and Game, Alaska Discovery, Arcticorp, KJ and Peggy Metcalf, Susan Phillips, Steve Plasse, Joyce Sarles, Kate Savage and Chris Cunningham, Clay Wertheimer.

Members honor roll

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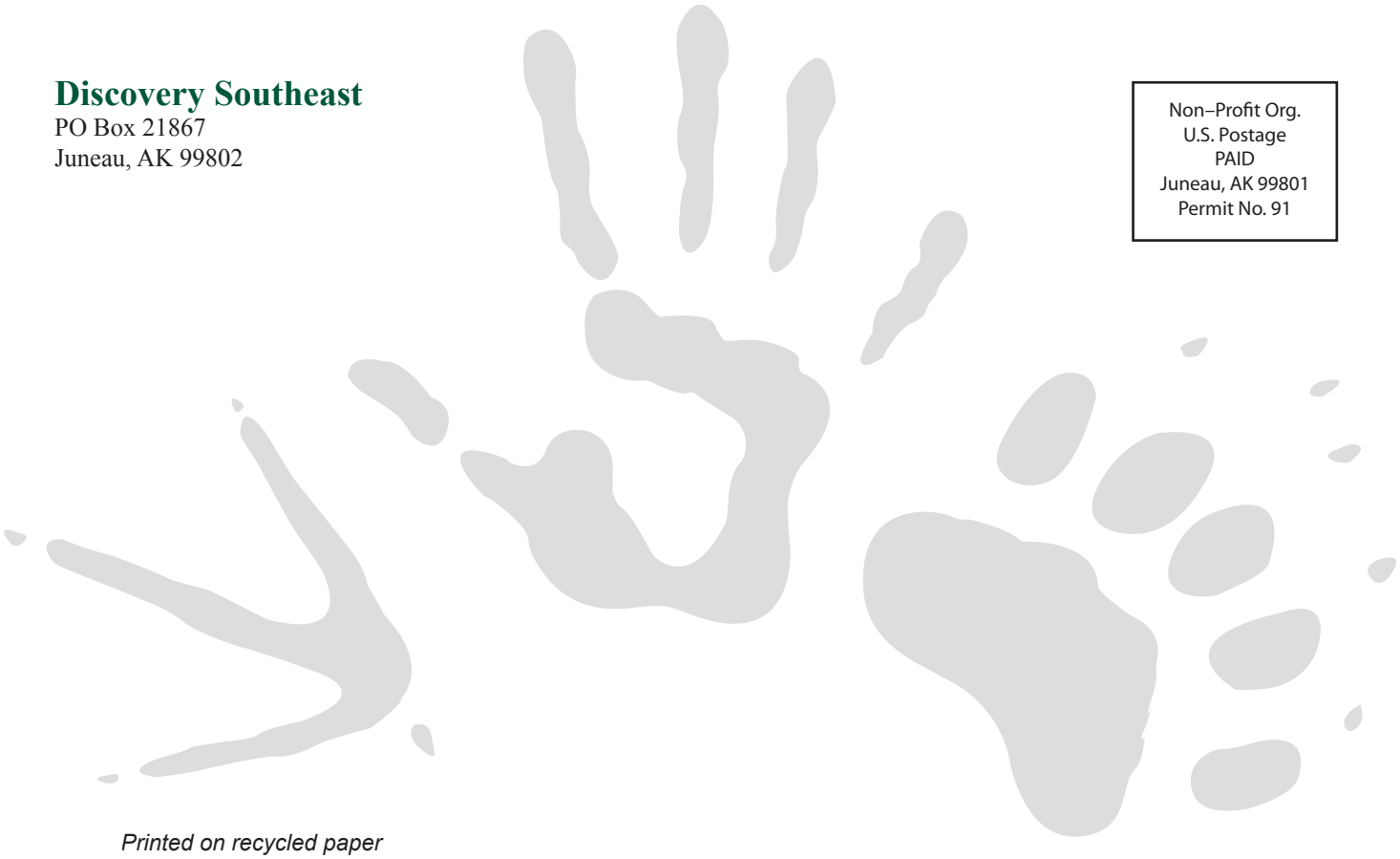

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