MOSAIC update

Mid-summer news from Manomet~Maine, 'round about July 10, 2001

Dear Manomet friends: I came upon a strange lull in what has been a marathon month of field work. In our 10 years in the Maine woods, never have we had so much going on in the field at once. I'm seizing the opportunity to write this little newsletter in hope of giving you a small window into our adventures, tribulations, and alas, trials. -JMH

The field season hits

There are enough of us working on *The Shifting Mosaic Project* this summer that we could form our own local government and thus *Organize* the otherwise *Unorganized* townships of northwestern Maine. We've broken our previous record of 17, with 20 people in the field this summer. About half are from the Student Conservation Association's Intern Program, which matches college student's interests with different summer projects around the country. For some reason, our projects always have been wildly popular. Could be Maine. Could be our cutting-edge research. Couldn't be the black flies. All these hard working people are divided between 2 projects: The *Headwater Streams Project*, and the *Patch Retention Project*. The common thread of both projects is that we are working on ways to protect ecological features in the forest that may be especially vulnerable to forest practices. Read on.

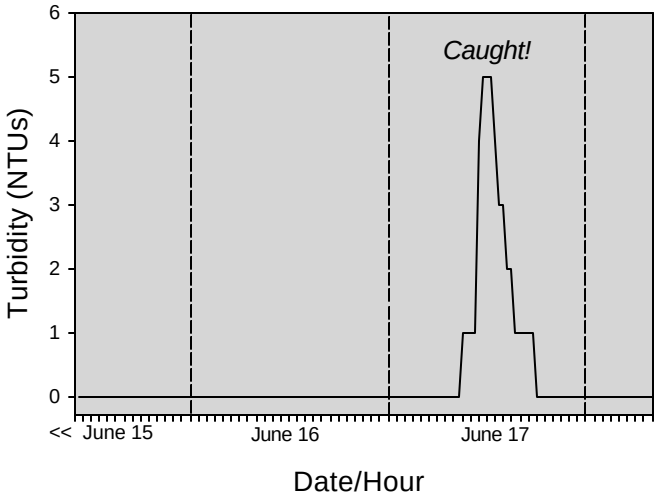
Happy stream people. From left to right: Darlene Siegel, Headwater Streams Project Manager, Chris Collins (from Denver and in "green shock," and Sacha Pealer, a budding botanical genius with a marathoner's strength and stamina. Successfully having found 15 suitable streams, they can hold back their emotion no longer.

A HyrdoLab Datasonde Model 4a, which can continuously record an array of water quality parameters when it feels like it. We tried the "carrot" approach with these widgets, but in the end we had to resort to "The Hammer" (shown right).

Elusive headwaters

The Boundary Mountains of western Maine may contain one of the highest densities of headwater streams on earth. So, what's our problem? We spent a solid year (excluding last winter; Mainers know what I mean) covering some 700 square miles of western Maine looking for streams that suited us. Maybe we've been a little too finicky. But hear me out. We needed 15 headwater streams, all 1-2 m wide (3-6'), at least 500 m (1650') long, with mature forest on both sides, which could be harvested to our exact specifications this coming fall or winter, and for which no harvesting would be allowed upstream for 3 years. Needless to say, we tested our heretofore cordial relationships with many forest landowners. In the end Mead, International Paper, Seven Islands Land Co., and Plum Creek Timber Company came through with what we needed.

The goal of the *Headwater Streams Project* is to find out how wide of a forest buffer is needed to protect an array of ecological values that these little streams provide. It's a "before-and-after" study, whereby we take an array of measurements this year, before the harvesting takes place, and then follow up with 2 years of post-harvest measurements, obviously looking for whether there's an impact of the harvesting. Why study little streams? Why not the bigger ones? It's a fractal dimension concept that there are many *many* more miles of little streams than big streams. Thus, things like great big feller bunchers come upon little streams in the woods a lot more frequently than big streams. These machines (and the



A HyrdoLab Datasonde Model 4a having a good day. On Sunday, June 17th, HydroLab Unit 3 unilaterally decided that it would record a turbidity event. The turbidity event was associated with a downpour, which was detected by our much more well-behaved automatic rain gauge. Turbidity reached a wopping 5 NTUs for a brief flash of HyrdorLab brilliance. The drinking water standard is 40 NTUs.

fellers in them) then wonder what to do. "How close should I go to this little stream?" The law says that all they need to do is leave shade over the stream ("shade" is not a scientific term with a lot of precision). The idea of leaving shade is to keep the water cool, which is important especially to fish. Some like it hot, but fish like it cold.

Of the seemingly thousands of things we're measuring on these streams, most of our time in June was spent measuring a variety of water quality parameters, such a dissolved oxygen, conductivity, and pH. We wanted to do this early in the season in case some streams started to dry up later in the summer. Of particular interest is "turbidity" (the clearness of the water). Fish not only like it cold, they like it clean. When sand starts filling in the spaces between rocks in the streambed, fish have a hard time finding a place to spawn. So, measuring turbidity is one way to measure sedimentation.

What did we find out about turbidity (remember, this is the pre-harvest year)? The water was so clean that our instruments barely could register any turbidity at all. Rarely did turbidity get over 1 NTU (nephelometric turbidity units). (The EPA drinking water standard is 40 NTUs, FYI).

A couple of problems here. First, we could only get to each stream about once a week to take water quality measurements. The likelihood of encountering a turbidity "event" at precisely the time of our visit was, well, very low. At least we have a good idea of what baseline turbidity is on these small streams (functionally zero).

Enter the HydroLabs (see p.1 and 2). We have 5 very fancy devices that will continuously record turbidity (only had $ for 5). Having fussed with getting them to work properly for weeks, we hold out hope that we can learn something interesting about the turbidity "behavior" of small headwater streams. On a trial run, one unit, sure enough, detected a turbidity event on Sunday afternoon, June 17th (see graph). Not surprisingly, this event was related to a rainstorm (we have automatic rain gauges too).

The rest of the stream story

For whole organism biologists, we are much more fascinated by plants and animals than turbidity, per se. Even with modesty, we can say this is the most comprehensive study of headwater streams in the northeastern U.S. In the *Shifting Mosaic* tradition, we try to work with as many other scientists as we can. Mac Hunter and his graduate student Dusty Perkins at U. Maine are studying amphibian populations in and along the same 15 streams. Our water quality and stream habitat data provide information they need, and they help expand the study to the surrounding terrestrial community.

We're also working with the Maine Department of Environmental Protection to sample periphyton (slimy algae) and stream macroinvertebrates (bugs). Our stream crew had to haul 100 lbs. of rock-filled bags to *each* of the 15 streams (we paid $27 for a ton of official rocks). In addition to building character, the bags of rocks will be colonized by stream bugs over the summer. We'll scrape the bugs off the rocks later in the summer (and yes, we're going to leave the rocks streamside till next year). Thank you crew!

If our streams don't run dry, we'll be sampling fish in September. The Maine Department of Inland Fisheries and Wildlife will be helping us with that.

Sometimes methods in field biology are embarrassingly simple. How do you catch an amphibian in the woods? You put up an amphibian fence (called a "drift" fence, for those high plains drifting amphibians). When a salamander hits the fence, it moves left or right, until if falls into the bucket. Dusty Perkins, a Ph.D. student at U. Maine is running the amphibian part of the *Headwater Streams Project*. Dusty became a father in May, *the week* field work began. We wonder how he did that.

Patch Retention Project

When Andy Whitman (Project Leader) walks though a forest, he recognizes certain ecological features that are more vulnerable than others to loss as a result of timber harvesting. Vulnerable features can include: large dead trees, large living trees, unusual trees species, rare or uncommon herbs, vernal pools, raptor nests, key moss and lichen species. All of these ecological features are easy to lose from a working forest if (1) you don't recognize them as being ecologically important, and (2) you don't have a plan for maintaining them. Over time, these features could quietly and unknowingly vanish from large expanses of forest (this has happened in Scandinavia). Jerry Franklin calls these "ecological legacies," features that are retained and carried through the stand through time. If retained, they become legacies of the former stand. Retaining these legacies might be just as important in selection cutting as clearcutting; if you aren't trained to recognize these features when you see them, they could be unwittingly lost using any harvest method.

Andy Whitman, who directs the *Patch Retention Project*, stands guard 24/7 over an old sugar maple, which is to be the "nucleus" of a retention patch. Last winter, a feller buncher operator missed noticing one of Andy's patches. Andy's taking no chances this year.

The idea of patch retention is to retain a small patch of forest surrounding the ecological feature of interest. In this way, the feature is maintained, and buffered by the patch. Our experimental patches are about ¾ acre (30 m, or 100' radius circles). In practice, patches might be ½ - 2 acres in area. We have monitored air temperature 3' above the ground in our experimental patches. The center of the patch is within 3 ^{o}F of deep interior forest during the warmest part of the day.

The *PRP* is another logistically complicated project, requiring a lot of hard working, dedicated field staff, including SCA interns. The *PRP* has a "before-and-after component" whereby Andy and his crew took measurements on all kind of ecological features in "to be" patches last year, and will follow up this year and in 2002 to find out what features persist (post harvest).

Happy lichen people. This old maple is host to *Lobaria pulmonaria* and *L. quercizans*, two species of epiphytes (plants growing on the surface of trees) than appear linked to older forest.

Also this summer, Andy's team is looking at what features have persisted over time in cleacut buffer strips that were created 8-10 years ago. Although we don't know what was there 10 years ago, we can document the kinds of species and features that have persisted so far. This should give us some clues about the longer-term effectiveness of patch retention.

We think patch retention could greatly increase conservation of these key ecological features throughout the northern Maine landscape. If implemented as a standard practice by forest managers, we could see the retention of thousands and thousands of these features across northern Maine. The alternative is, well… we wonder. Patch retention could be one simple and cost-effective component of a strategy to maintain "healthy, well-distributed" populations of native species throughout the managed forest of northern New

I heard him ask. On the June 21 press tour, Joe Rankin of the *Morning Sentinel* asked Eve Schluter (Tufts University) to show him a moss, and name the species. Eve did. She could have shown him another 99 species she has identified in Kibby and Skinner townships in western Maine (the Plum Creek Timber Co. *Shifting Mosaic* study area), but alas, Joe was spared.

Sarah Holt, of the Brunswick *Times Record*, locates a future beneficiary of a retention patch (red-backed salamander).

England. The *Patch Retention Project* (*PRP*) is all about assessing the scientific merit of this tool in the region's forests (as quickly as we can).

We are pleased (and grateful) to have back with us Eve Schluter and David Werier on the *PRP*. Eve is a graduate student working under the direction of Michael Reed at Tufts University. Eve's work on mosses is incredible; and the first of it's kind in Maine. She has found a moss that appears to be tightly linked to old (or large) sugar maple trees. David is a one of the top botanists in the entire Northeast. Last year David discovered a plant in the Plum Creek *Shifting Mosaic Project* area that had not been seen in Maine for over 15 years (boreal bedstraw). Turns out that it is fairly common in the study area. Nice work David!

Press tour in June

Thanks to the Maine Forest Products Council (Jeff Rowe) and the Maine Tree Foundation (Sherry Huber), we had the opportunity to participate in a forestry press tour on June 21. This a great deal for us. Jeff and Sherry do all the hard work of contacting the press and making arrangements. All we have to do is put on a show. This is a classic win-win (I hope, we'll see if we're invited next year). We give added credibility to the press tour because (1) we don't work for the companies and (2) we don't mind pointing out some of the things that we're concerned about in terms of forestry and biodiversity. The beauty of it is, we can also show them potential solutions to the problems (e.g., patch retention).

Franklin lecture Sept. 11

Manomet has invited Dr. Jerry Franklin, arguably the world's leading forest ecologist, to Portland, Maine on September 11. Jerry created the notion of "ecological legacies," which is the focus of much of Manomet's research and conservation in the Northern Forest. This is a talk you will not want to miss. The lecture will be at DeLorme in Yarmouth, at 7:30 PM. An announcement will be mailed soon.

Next *Forest Exchange*

The next meeting of the *Forest Ecosystem Information Exchange* will be on Thursday, October 25, 2001, on the University of Maine Campus in Orono. The title of this *Exchange* is "Forest Structure: A Multi-layered Conversation." The purpose of the *Exchange* is to create a dialogue between scientists and stakeholders. What do stakeholders want to know about the region's forests, and forestry? What information would be helpful for better understanding whether forest values are being threatened? How forestry might alter the structure of the forest (e.g., tree size, snags and logs, habitat fragmentation), and species that depend on structure, was a topic of high interest identified by the participants at the last *Exchange*.

Our people

We're very demanding, but somehow we manage to get our crew to smile on occasion. Anyone with an interest in forest conservation is indebted to the following people: *Stream Project*: Liane Beggs, Chris Collins, Morgan Hall, Stephanie Hart, Corey Myers, Sacha Pealer, Matthew Peters, Darlene Siegel; U. Maine amphibian project: Kristen Dillworth, Dusty Perkins, and Melissa Sousa; *Patch Retention Project*: Lauren Aldrich, Jessica Barbay (Maine Forest Service), Sarah Bendit, Julia Briedis, Chris Laverla, Justin Meyer, Aljoscha Requardt, Eve Schluter (Tufts), Rachael Strattard (Maine Forest Service), Jesse Twitchell, David Werier, and Andy Whitman.

Our partners

International Paper, J.D. Irving, Ltd., Mead Corporation, Maine Department of Environmental Protection, Maine Forest Service, Maine Department of Inland Fisheries and Wildlife, Plum Creek Timber Co., Seven Islands Land Co., Tufts University, University of Maine.

Our funders

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And thank you!

If you've read this far, or even if you just flipped to the back page to see if this newsletter got any better, thank you for being interested in forest ecology and conservation.

John Hagan
Manomet
14 Maine St.
Brunswick, ME 04011
207-721-9040; e-mail: *jmhagan@ime.net*