Letter from the Director
Education and Outdoor Experience
Coastal Change Research
Conservation and Wildlife
Public Visitation
News, Events and Noteworthy
Looking forward
Appendices
  A. National Science Foundation proposal summary
  B. References to Blue Carbon manual and research
  C. BMMCA Visitor data
While on a recent Grand Canyon river trip, my friend, KP, asked me about my work as the director of a coastal conservation area. We had been talking about private ownership of beaches in Maine, and managing the public use of natural resources that might generally be thought of as “the commons.” KP framed her question in an unusual way by asking “What is your position on that?” I noted that, because it is privately owned, there are no government entities defining the rules for public access to the beach, then said, “The bylaws, easements, BMMCA Corporation and director define the rules of engagement. It essentially means that I, as the director, can demand conservation-minded behavior from the public. If they don’t behave ethically, I’ll close the gate.”

My quick and matter-of-fact response surprised me, but in fact, I believe that the collective management of BMMCA can, and does, demand a heightened form of conservation behavior. The good news is that the BMMCA-going public has, for the most part, embraced high standards of environmental behavior. Still, a conversation about “carrying capacity” has been emerging over the last few years, and for good reason. The first day of the 2015 gate-keeping season began on March 29th—a cold day on which the Morse Mountain parking lot was, nevertheless, nearly full by mid-day. The next week-end, it was full at 10:30 AM. The following week, it was full on a Wednesday.

I am committed to protecting the conservation, research and educational values of Bates-Morse Mountain. This means limiting human impacts, including the presence of dogs. During the off-season, dogs appear at BMMCA too often, as if the absence of a gate keeper changes something about the essence of BMMCA. But dogs disturb wildlife in any season, changing ecosystem dynamics. This, in turn, changes research opportunities premised on natural conditions. And that limits the scope of environmental education.

Bates-Morse Mountain offers a host of opportunities based on this triad of values. But perhaps we underestimate the importance of outdoor experience for human well-being, and for serenity. Consider, for example, skiing in perfect, pure snow over the mountain to a stunning wind-blown beach on a brilliant winter day. Over much of the winter, visitors did exactly that, and explored a landscape that is largely inaccessible during most of the year. Ski trails appeared in the back dunes and across marsh flats. There was an ecstasy in seeing wildlife tracks crisscrossed with those of wanderers.

Such quiet ecstasy is not easy to articulate, but still, I am pleased that “research” is the area of reporting that requires most effort on my part. It has developed in complexity and value over these few years. Geology research on the Sprague Marsh, conducted by Professor Bev Johnson and students, now has an international audience, appearing in a recently published manual, "Coastal Blue
Carbon: methods for assessing carbon stocks and emissions factors in mangroves, tidal salt marshes, and seagrass meadows” (http://thebluecarboninitiative.org/manual/). Johnson’s research has been reported at regional, national and international conferences, and in additional publications.

In addition to standards for “conservation-minded behavior,” I am also committed to building BMMCA’s contributions to coastal research. To that end, I wrote a National Science Foundation grant proposal in December. The essence of the proposal is to more closely tie the field station capacity of the Shortridge Coastal Center to the research opportunities at BMMCA, and to strategically coordinate our work with the efforts of a dozen other small Gulf of Maine field stations. In mid-coast Maine, and with the rich opportunities afforded by BMMCA, we are well positioned to contribute to the development of a regional understanding of how climate change is effecting coastal systems.

I continue to feel fortunate for the varied experience afforded by my directorship and Bates College, and for the assistance of Don Bruce, Jim Joseph and Nathan Stephansky ’17.

With gratitude,
Laura
Education and Outdoor Experience

The Bates-Morse Mountain Conservation Area Corporation is dedicated to supporting outdoor and environmental education and research. Consistent with the corporation’s mission, school groups are welcomed, student and faculty research is facilitated, and conservation is practiced. With respect to experiential and environmental education, 530 primary, middle and high school students came to BMMCA during gate keeping hours during the 2014-2015 academic year. School groups did several service projects, including a coastal clean-up and brush-clearing. They learned field methods, did athletic practice and had school picnics. Mike McGraw, from Lewiston High School, now brings his biology students to Morse Mountain every year. They identify trees, lichens and mosses; they measure stream velocity and do field calculations; and they discuss ecosystem services and human impacts to salt marshes.

Elementary, Middle and High Schools
Phippsburg Elementary School, Coastal Clean-up (102)
Phippsburg Elementary School, Nature walks (111)
Coastal Studies for Girls (18)
Lewiston High School, (92, 2 trips)
Merriconeag Waldorf School (25)
Harpwell Coastal Academy, Charter School (9)
Learning Works School, Portland (12)
Thornton Academy, International Summer Program (24)
Kimberton Waldorf School, PA (21)
Brunswick High School, Coastal Clean-up (25)
Chewonki Semester School (45, 2 trips)
Wayne Fleet Academy (5)
Brunswick High School Outing Club (12)
Morse High School, (29, 2 trips)

Total Grade Schools: 14; Total Students: 530
Bates College Annual Reunion walk

**College Use**

- Bates First Year Student Orientation (28)
- Bowdoin Nordic Ski (42, 3 trips)
- Bowdoin Ecology field trip (26, 2 trips)
- Colby College Ecology field trip (34)
- Bowdoin Parents week-end (38)
- Bowdoin Outing Club (8)
- Bowdoin Ski Team (14)
- Bates Asian-American Students in Action (14)
- Bates Ecopsychology class (17)
- Maine College of Art (16)
- Smith College Geology students (12)

**Total Colleges: 7; Total students, staff and alums: 514**

**Camps and Clubs**

- Surf Camp, Yarmouth and Brunswick (52, 3 trips)
- White Pine Church Youth Group (33)
- Kingsley Pines summer Camp (23, 2 trips)
- Boothbay region YMCA (10)
- Hall’s Fitness Club (15)
- Merrymeeting Audubon (10)
- Maine Outdoor Adventure Club (5)

- U of Maine, Orono, Geology graduate students (3)

**Total Camps and Clubs: 15; Total visitors: 314**
Other Organizations
Highland Greens Retirement Homes Group Outing (15)
Maine Master Naturalist Program (5)
Community Works Independence Association (25, 2 trips)

Bates College Courses
The North Woods (BIO s37), Bret Huggett, 8 students
Independent Study (ENVR s46), Camille Parrish and Laura Sewall, 2 students
Marine Invertebrate Zoology (BIO211), Josh Lord, 14 students
Ecopsychology: The Human-Nature Relationship (FYS 427), Laura Sewall, 16 students

Total Courses: 4; Total Students: 40

“A young woman who came along on the walk had this to say, "I learned so much. I love connecting book learning with the real world!" The book's listing of the communities documented at Bates-Morse Mountain and the noticeable changes from one natural community to another offer a unique opportunity to do just that. On behalf of my fellow Maine Master Naturalists, I appreciate your taking the time to talk to me about current research before our visit.”

Pam Davis Greene.
Maine Master Naturalist
Coastal Change Research

Bates College has a 37 year record of student-faculty research projects at various study areas within and near the Bates-Morse Mountain Conservation Area (BMMCA). These projects typically take place in the form of senior theses or independent studies, and span a range of topics including coastal evolution, sea level rise, carbon cycling, bedrock mapping, hydrogeology and coastal erosion.

Over the past several years, research at BMMCA has evolved into an increasingly integrated and on-going program emphasizing carbon storage and changing coastal systems. Research initiated within the last year will provide data related to sea level rise in the Sprague River marsh, and potentially answer the question: are higher tides depositing more sediments, and will those sediments raise the marsh elevation enough to keep up with sea level rise? The question will inform predictions about the kind of coastline we may expect to have in the future, and will contribute to data sets describing changes in the larger Gulf of Maine region.

More specifically, in 2013, geology Professor Bev Johnson and student, Margaret Pickoff ’13, estimated that the Sprague Marsh alone stores enough carbon to offset the emissions of some 30,000 vehicles per year. This work is now part of a larger project of the Natural Science Working Group on the Coastal Blue Carbon Initiative, of which Professor Johnson is a member. The Blue Carbon initiative has several major goals, including (1) to detail the importance of coastal carbon (tidal marshes, mangroves, sea grass systems) in storage, sequestration and emissions of CO2; (2) to develop coastal marine management strategies to maximize carbon sequestration and to minimize carbon emissions; and (3) to create a work plan for carbon accounting in these coastal ecosystems. The following year, Johnson’ thesis student Cameron Russ ’14, fleshed out more of the details regarding carbon storage and sources in the Sprague River Marsh. Pickoff and Russ’s thesis results were included in a global study on carbon stocks and sequestration in salt marshes and was incorporated into a methods manual written by members of the Blue Carbon Initiative in 2014 (http://thebluecarboninitiative.org/manual/). In addition, Sprague Marsh blue carbon maps were presented and well received at the New England Geological Society’s annual meeting in April, 2015, and will be presented at the Society for Wetland Scientists annual meeting in Rhode Island, in early June. This work is being incorporated into a manuscript currently in preparation: Johnson, B.J., Duvall, M.D., Pickoff, M., Russ, C., Dostie, P. (in prep). Assessing carbon stocks in tidal salt marshes. Estuaries and Coasts.

In 2014, Professor Johnson installed four Sediment Elevation Tables (SETs) in the Sprague Marsh and initiated the use of a drone to document changes in plant communities and geomorphology. As noted earlier, the SETs will provide measures of marsh accretion and eventually inform our
understanding of coastal resilience in the context of sea level rise. To complement this work, a time lapse camera was installed in March, 2015, and Adam Auerbach ’16 and Nate Dana ’17 mapped a portion of the Sprague River marsh during short-term, 2015. Their work provides baseline data on inundation patterns by documenting the transition zones between high and low marsh vegetation, and between high marsh and upland zones.

Professor Mike Retelle’s students, Chrissy McCabe ’15 and Gwen Williams ‘16, surveyed Seawall Beach plus a number of other beaches (including Bailey Beach) in the BMMCA region, and helped to design a new technique for evaluating changes in sandy barrier beach systems. The new technique (informally called “dune health”) was designed to evaluate whether the berm (dry sand recreational beach) is building, being eroded, or cut back to the dune scarp. This technique allows for spatial analysis better than a detailed, surveyed beach profile in one location, and offers an easier way to communicate beach changes to the public. In addition, a major advance in this work was the consolidation of data from previous years into one data base. McCabe and Williams also used GIS to compare some of the measurements made in previous studies and finished their report with a State of the Beaches section. Beach profiles were also completed for the Popham beaches by geology Professor Bob Newton and students from Smith College.

Maureen Correll, a PhD candidate from the University of Maine, Orono, recently completed a 4 year study on salt marsh nesting birds in the context of “abrupt climate change.” Correll’s work in Maine is part of a larger project, The Saltmarsh Habitat and Avian Research Program (SHARP), in which researchers visited over 1500 survey sites along the coast, from Maine to Virginia, 2-3 times each, between May and August. The overall purpose of the project has been to conduct a before and after analysis of the impacts of Hurricane Sandy on coastal wetland animals and plants. The BMMCA and adjacent marshes are a significant part of the northern control area for this analysis. Research technicians working under Correll’s supervision have utilized the Shortridge Coastal Center for summer housing throughout the project.

These studies, all of which emphasize coastal changes, provide opportunities to engage with the public, and to explore potential policy changes appropriate to sea level rise and other coastal environmental changes. In 2014, these opportunities led to the initiation of a Summer Fellowship in Coastal Policy and significant partnership activities with the Town of Phippsburg’s Conservation
Commission. The fellowship was directed by Laura Sewall and funded by the Dean of Faculty’s office. Over a six week period, Nicholas Stewart ‘17 and Mark McCauley ‘15, studied flood maps and land use policy, engaged with state and local officials to discuss federal emergency programs for increased coastal flooding, and produced a report of findings. Outcomes included three successful public presentations, offered by Stewart and McCauley, informing the community about coastal conditions and risk, and new federal standards for assistance.

**Conservation and Wildlife**

*Piping Plovers:* The 2014 nesting season was the most successful in a decade. Statewide, 50 pairs of piping plovers produced 97 fledglings, compared to 85 fledglings in 2013. On Seawall Beach, 2 nesting pairs produced 4 fledglings; on Popham Beach, 5 pairs, produced 14 fledglings. For the Summer 2015 season, nesting areas were staked as part of the annual BMMCA cleanup day on April 25th. One pair of plovers was sighted on April 28th near the Sprague Spit.

*Native Seed Collection:* The New England Wild Flower Society is a regional, non-profit plant conservation organization based in Massachusetts. Its activities include collecting seeds from common, native plant species throughout New England. The plants grown from these seeds are available for use in property restoration projects at local, state and federal levels, and for retail sales that support and fund plant conservation efforts. The society has collected seeds at BMMCA on two occasions in the last two years. In 2014, four plant species were targeted for collection at BMMCA:

- Ammophila breviligulata (American beachgrass)
- Ionactis linariifolia (Flax-leaved stiff aster)
- Lathyrus japonicas (Beach vetchling)
- Solidago sempervirens (Seaside goldenrod)
Invasive plant eradication: Since 2009, a series of herbicide treatments supported by a grant from the US Fish and Wildlife Services enabled the eradication of Purple loosestrife in the southern region of the Sprague River salt marsh. In 2014, numerous additional sites were identified in Phippsburg for invasive plant treatment by the same licensed eradicator and also supported by USF&WS, but this work was difficult to schedule and ultimately unsatisfactory.

Hemlock Wooly Adelgid (HWA) infestation: The HWA was discovered by biology professor Brett Hugget and students during a short-term course, *The North Woods*. The infestation is found along the Mountain Road, just past the Sprague Marsh. Typically, infestations cause tree mortality within 4-10 years. Chemical controls are not advised, particularly in forest conditions as trees must be saturated with a foliar spray. The best options for control are biological, however, these methods require the introduction of non-native pests that predate on the HWA. Currently, no treatment plan has been identified.

Public Visitation

Visitors to Bates-Morse Mountain Conservation Area come from all over the northeast and beyond, representing 44 states in 2014. During the 2014 gate-keeping season (between late March and late November), 19,147 people walked over Morse Mountain to Seawall Beach. This represents an average of 112 visitors per day and nearly a doubling in the number of people who visited in 2000. In 2013, the daily average was 104 visitors per day. The lot was full on 44 days.

Due to the increase in “lot full” days, the director is recommending the construction of a loop road that would allow cars to drive through a corner of the parking area, thus minimizing congestion and avoiding a potentially dangerous situation in which cars line up before being able to turn around to
leave. This idea is being further discussed, however, the entry gate will be moved closer to the parking lot to ease the management of cars.

News, Events and Noteworthy

*National Science Foundation proposal:* In December, the Director submitted a proposal for a planning grant that would establish BMMCA and Shortridge as linked assets for doing coastal field research in conjunction with other Gulf of Maine field stations. It is likely that this will be funded. (See Appendix for the summary of proposal.)

*Annual beach Clean-up:* On April 25th, two trucks, a tractor and over 30 volunteers (mostly Bates College alums) removed garbage and 70-80 lobster traps from Seawall beach. It was a successful day, and included two roommates, Amy Schrag ’91 and Betsy Tomlinson ’91, meeting by surprise, and for the first time since 1991. Noted was an increase in plastic debris over previous years.

*Seawall Beach Geology presentation:* As part of a community lecture series, Professor Mike Retelle spoke at the Small Point Club in August, describing changes to area beaches. Mike has spoken to the community previously and the event was very well-attended and received.

*2014 Reunion walk:* Forty or more Bates alums joined in an especially successful Reunion walk in early June, 2014. Alums learned about current research, coastal changes and migrating birds. Lunch was shared on the beach. The 2015 Reunion walk is scheduled for June 6th.

*Policy fellowship and presentations:* The BMMCA office, with funding from the Dean of Faculty, sponsored a 6 week summer fellowship in coastal policy, with a focus on sea level rise. Mark McCauley ’15 and Nicholas Stewart ’17, researched land use law for the purpose of recommending potential adaptation strategies for vulnerable coastal zones. Their work was presented to town officials and community members (noted earlier), and used to inform and strengthen a National Science Foundation Coastal SEES proposal in December.

*BMMCA Corporation Trustee Elections:* The election of BMMCA Trustees representing the public now occurs prior to the annual meeting. The process was changed in order to avoid the awkward occurrence of trustees being voted on at the same meeting at which they are asked to serve.

*Film Showing:* In collaboration with the Phippsburg Conservation Commission, the BMMCA Office sponsored a film showing of *Shored Up*, a documentary depicting the aftermath of Super Storm Sandy and attitudes toward climate change in states where coastal development is at odds with significant coastal change. *Shored up* illustrates the division between policy and environmental conditions, and was a Sundance Festival winner in 2013. The film was shown at the Shortridge Coastal Center, on August 8th, with good attendance from students and community members.

*Payment in Lieu of Taxes:* Bates College made an annual payment in lieu of taxes, in the amount of $12,729.59 for the 2014-2015 tax year. This is consistent with the Letter of Agreement, dated March, 2006, between the Town of Phippsburg and Bates College. The agreement assures a 3.5% payment increase each year.
Proposed Management Plan changes: The St John family has proposed amendments to the 2012 BMMCA Management Plan. (See Appendix C.) To date, most constituents are agreeable. These changes may be considered by the BMMCA Corporation for oversight, or, without such comment, will be adapted and approved by the director, and integrated into the 2012 BMMCA Management Plan.

Criminal Trespass citation: A young man claiming to be hunting on March 29th, 2015, was cited for Criminal Trespass after insisting on taking his pit bull across Bates-Morse Mountain property.

Director's professional activities: Conferences attended: Organization of Biological Field Stations, Woods Hole, MA; Presentations: “Visual Science, Ecology and Mindfulness”, Maine Science Festival, March, 2015; Professional Service: Lead on external review panel; Naropa University’s Master’s in Ecopsychology Program.

The Shortridge Coastal Center: Although reporting for BMMCA is independent of Shortridge, students, faculty and staff utilizing Shortridge often visit BMMCA for research, educational or recreational purposes. These groups are seldom recorded by gatekeepers because they generally visit during the off-season for gate-keeping. Because of this, it is worth noting that there were 24 groups, representing approximately 377 students, staff or faculty utilizing Shortridge during the 2014-2015 academic year.

The 2014 Shortridge Summer Residency hosted 6 students and research assistants; the 2015 residency will serve 12 students and research assistants working at BMMCA and in the nearby vicinity.

Looking forward

I was recently reminded of Bob Chute, the visionary first director of BMMCA, telling me that he measured success by changing nothing at Morse Mountain. From his point of view, the work of managing this wondrous site should simply be to protect what is. I sincerely hope that Chutes’
philosophy is consistent with my efforts to manage a growing number of visitors, and to support more research activity.

Looking forward, if the NSF proposal is funded I will soon be focused on linking BMMCA and Shortridge to a nascent network of a dozen field stations documenting near-shore coastal change around the Gulf of Maine. Among other significant changes, the Gulf is threatened by increased temperatures; a 2014 report from Bigelow Labs, among others, states that the Gulf of Maine is warming faster than 99 percent of all marine water bodies. It was noted as a “living laboratory for change.” This should uplift our efforts to research and document place-based environmental change, and to contribute to a larger understanding of the flux within which we are embedded.

Looking forward, I am ever-more interested in making a difference through research and innovative thought. I continue to write and speak, to present what it is that I am learning as the director of a unique natural site, and especially, by working with exceptional students and exploring the confluence between a changing coastal environment and human behavior.
Appendices

A. National Science Foundation Grant Proposal; Project Summary

Overview:

The Gulf of Maine is well known for its cold waters, strong currents, nutrient-rich upwelling and once-abundant groundfish. Historically, the Gulf of Maine (GOM) was one of the most productive marine ecosystems on earth, yielding a cod fishery claimed to be responsible for the making of America (Kurlansky 1997). However, in August 2014, the National Oceanic and Atmospheric Administration announced that the cod population had plummeted to a mere 3% of what is considered to be a sustainable population size (NOAA Fisheries Service 2014). Representing a 13-18% decline from the previous assessment in 2011, the statistic signals the commercial extinction of cod in the GOM. In addition, the Gulf of Maine Research Institute recently claimed that the GOM is warming faster than 99% of the world’s oceans (Record 2014), suggesting that the Gulf may serve as a “living laboratory” for observing the effect of climate change on marine ecosystems (Cohn 2014).

At least 20 field stations collect environmental data in the Gulf of Maine. Of these, 10-15 operate on a small scale, with limited faculty, staff and equipment. Most emphasize undergraduate education and some place a high priority on engagement with the community. Although each station covers a limited geographic range and a relatively narrow scope of ecological systems, together they cover the distance from Nantucket to Nova Scotia. Furthermore, their combined data sets document fine-scale conditions across a great range of natural systems, and across decades of place-based observation and research.

The central purpose of this proposal is to ensure the further development of a nascent network of the small GOM field stations. To date, 11 station directors have agreed to coordinate efforts in the interest of developing a regional understanding of climate related changes in the GOM. If funded, this proposal would allow the network to do the strategic planning necessary to attain several goals. Based on an initial 2 day meeting in March, 2014, our shared goals are three-fold: 1) to contribute to the growing analysis and understanding of environmental change occurring in the GOM; 2) to enhance and coordinate undergraduate research and training in this area and 3) to foster science communication and climate adaptation in coastal communities.

Intellectual Merit:

A recent report published by the National Research Council argues for the importance of field station contributions to science and society (NRC 2014). Field stations offer opportunities to develop long-term data sets that are distinctly place-based and cross-disciplinary, to train young scientists in close proximity to experts, and to contribute to environmental solutions within community settings.

In addition to the above, this planning grant is important for its ability to strategically leverage the fine scale of monitoring offered by small stations in a rapidly changing coastal context. Its successful implementation has the potential to yield research findings that bridge the gap between specific localities and large scale regional understanding. At a time when climate change impacts are believed to be increasing, new understanding for coastal managers and policy-makers may be more important than ever.

Broader Impacts:

This planning grant is important for its ability to strategically leverage the research and training capacity of small field stations. Its successful implementation has the potential to yield significant and important impacts beyond the direct participants and beneficiaries. Conversely, by coordinating efforts, the participating GOM stations will gain facilitated access to current data and interpretations produced by larger stations and networks, fostering synergisms and innovation for coastal research. Furthermore, by
creating a strategic plan for realizing the network potential of coordinated field stations, Bates and Bowdoin Colleges, and The Hurricane Island Center for Science and Leadership, can confidently invest in the resources necessary to ensure that individual field stations are equipped to fulfill their promise.

B. References documenting Blue Carbon research on the Sprague River Marsh at BMMCA.


C. BMMCA Visitor Data (see attached)