Prepared for the Governor's Office of Energy Independence and Security

MAINE WIND ASSESSMENT 2012, A REPORT

Pursuant to Resolve 2011, Chapter 93
"To Clarify the Expectation for the 2012 Assessment of Progress
On Meeting Wind Energy Development Goals"

Photo Credit: Brad Blake

Stephen Cole, Coastal Enterprises, Inc. (CEI), Wiscasset, Maine
Stephen Ward, Perkins Point Energy Consulting, Newcastle, Maine
Robert Fagan, Synapse Energy Economics, Inc., Cambridge, Massachusetts

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Maine Wind Assessment 2012: A Report

Prepared for the Governor's Office of Energy Independence and Security
Pursuant to Resolve 2011, Chapter 93:
"To Clarify the Expectation for the 2012 Assessment of Progress On Meeting Wind Energy Development Goals"

I. Executive Summary

This report was prepared for the Governor's Office of Energy Independence and Security, pursuant to Resolve 2011, Chapter 93 ("To clarify the Expectation for the 2012 Assessment of Progress on Meeting Wind Energy Development Goals"). After interviewing some forty spokespersons on all sides of debates over wind power development; the Report's authors offer a series of observations about utility-scale wind permitting and development in Maine. A summary of these observations follows.

1. Meeting Maine's Statutory Goals for Wind Development: In order to meet the 2015 goal, at least 552 new turbines will have to be permitted and become operational by 2012, and – depending on the size of the turbines – potentially as many as 1,103 turbines will be needed. Compared with the pace of siting that was actually achieved over the past three years – about 75 megawatts (MW) per year – meeting the 2015 goal will require a much faster pace, 552 MW per year on average. The pace of permitting over the next three years will nearly have to increase seven-fold. Maine will likely fall short of the 2015 goal by 513 MW even if all onshore projects proposed and in development actually come on line – an unlikely prospect. Maine is making progress, though, in meeting the off-shore wind goals for 2020 and 2030.

2. Efforts to Expedite the Review Process: Even with a streamlining of the process that took effect in 2008, the permitting process at the Land Use Regulation Commission (LURC) still requires 270 days (185 days at Department of Environmental Protection (DEP) with no evidentiary

hearing) and is preceded by up to four years of data gathering in compliance with permitting requirements. The permitting process remains arduous and costly.

3. Developer Criticisms of Maine's Permitting Process for Wind: Delays in the permitting process are "commonplace". Because Maine has a "one-size-fits-all" permitting process, there is no possibility of avoiding major costs in the case of permits for smaller projects in less sensitive settings. After initial high hopes in 2008 for wind development, developers now say they are "bearish" about the regulatory climate. Generally, developers prefer DEP's non-hearing process to LURC's adjudicatory process. In both settings, outside State agencies that provide consultative comment during permitting are seen often as over-reaching in making extreme demands. There still is not enough certainty and predictability in Maine's permitting process.

4. Criticisms of Wind Opponents: Both DEP and LURC lack in-house capacity to evaluate the financial capability of individual project developers. Both agencies accept developer claims about the projected output of wind turbines without sufficient scrutiny. Opponents have a consistent preference for LURC's formal process over DEP's informal, consultative process. Unlike LURC, DEP operates without any specific "process guidance" for how wind project applications are to be handled; the process is at the discretion of the DEP Commissioner.

5. Specific Aspects of Siting: The 2007 decisions creating the areas eligible for Expedited Permitting have left three species exposed to significant potential harm, in the eyes of some opponents – Bicknell's thrush, the Northern bog lemming and the Fir-Heartleaved birch forest. There also is interest in diminishing nighttime visual impacts from wind turbines by installing radar-activated lighting systems.

6. Visual Impacts: Sporting camps and scenic highways were left off the list for scenic features of state or national significance and deserve reconsideration, some believe. Lists of other scenic resources – Great Ponds and rivers – could be updated and expanded to include remote ponds. There is concern about the cumulative visual impact of wind development among some observers and regulators and some research underway.

Some observers suggest post-construction user surveys as an important means to assess visual impact. There is some interest in considering visual impacts that are beyond the current mandated and optional zones around a wind project.

7. Other Siting Concerns:
Municipalities that are confronted with very large wind proposals would benefit from assistance in evaluating TIF requests and community benefit proposals. Such assistance could be derived from sharing some portion of the developer's application fee at LURC or DEP. Regarding projects eventually being decommissioned with developer funds reserved for that purpose, both DEP and LURC permit major portions of the projected requirement to be "paid for" with proceeds from the expected sale or salvage of the turbines and related equipment. Both LURC and DEP recently have required full funding of the decommissioning reserve at an earlier point – year 12 for DEP and year 7 for LURC.

8. Technical Aspects of Wind Generation: The fact that wind turbines only generate output when the wind blows (intermittency) is not likely to impose costs on the ISO-New England grid and its ratepayers until wind's share eventually comes to more than 20% of total electric output in the region. A recent CMP study indicates that a major strengthening of the transmission system to accommodate more wind projects in Western Maine could raise rates by as little as 0.3% (with ISO-New England subsidies) or as much as 8% (without ISO-New England subsidies). Any reduction in Greenhouse Gases resulting from increased wind output in New England can best be estimated based on reductions in natural-gas output and its associated Greenhouse Gases.

9. Reconsidering the Statutory Goals:
There are considerable viewshed impacts in Western Maine if the 2030 goal is to be achieved. Maine could designate the habitat of the Bicknell thrush as ineligible for wind sites. Maine could eliminate the 2015 goal as excessive in light of harm to sensitive mountainous settings, while retaining the 2020 and 2030 onshore and off-shore goals. Maine could convene a new panel – in an open process that is available to the press and public – for reconsidering the designations that created the Expedited Permitting Area for wind development in 2007.

II. Introduction

This report fulfills the directive of the 125th Maine Legislature in its enactment in the First Regular Session of Resolve Chapter 93. That Resolve directed the Governor's Office of Energy Independence and Security to examine a number of specific issues associated with the siting and permitting of wind energy projects in Maine. These issues ranged from the treatment of visual impacts at locations eight miles or more distant from a wind energy project, the evaluation of cumulative visual impacts from projects, the accuracy of estimates for greenhouse gas reductions resulting from wind energy development, the quality of plans for the decommissioning of wind turbines at the end of their lives, as well as a number of other concerns. The Office was also asked to consider "the number of turbines necessary to meet the goals...and other factors that may indicate it is necessary to amend the wind energy development goals". Finally, the Office was encouraged to consider commenting on the effects on tourism, the cost burden resulting from transmission upgrades and the implications of the fact that wind energy is an intermittent resource unlike other forms of electric capacity in New England's wholesale power markets.

In researching the questions posed by the Resolve, the authors of this report consulted with more than 40 individuals and conducted more than 30 interviews between November 15 and December 30, 2011. Of the people interviewed, half can be characterized as wind industry representatives or supporters, ten as regulators or observers of the permitting process and eight as opponents or critics of wind energy development in Maine. A listing of the interviewees and the organizations with which they are affiliated is appended to this report as Attachment 1. Also appended are a number of submissions that the authors found useful in capturing the intensity of debate today over wind energy development in Maine. These include: a 49-page technical report from the Appalachian Mountain Club (Attachment 2); an 11-page critique prepared by Robert Weingarten of Friends of the Boundary Mountains entitled "Flaws in the Expedited Permitting Process" (Attachment 3); a 12-page letter dated January 15, 2012 from Maine Audubon (Attachment 4); a 5-page letter from the Natural Resources Council of Maine dated January 13, 2012 (Attachment 5); a 9-page LURC Memorandum regarding changes in the wind permitting process dated December 20, 2011 (Attachment 6); a December 30, 2011 letter from David Publicover of the Appalachian Mountain Club (Attachment 7); and a letter from Alan Mishka to Dr. Pinette at the Maine Centers for Disease Control regarding health effects (Attachment 8).

The authors have not presented formal recommendations for changes in law or policy in this report, intending instead to provide a survey or inventory of key issues in contention during recent debates in Maine over wind power siting and permitting. The authors, however, do include several observations about potential opportunities or challenges that confront wind development in the context of the statutory goals for wind power established by the 2008 Wind Energy Act.

The authors selected by the Governor's Office of Energy Independence and Security for this project include: Stephen Cole of Coastal Enterprises, Inc. of Wiscasset, Maine; Stephen Ward of Perkins Point Energy Consulting of Newcastle, Maine; and Robert Fagan of Synapse Energy Economics, Inc. of Cambridge, Massachusetts. Brief summaries of the authors' professional experience with issues relevant to this report are also appended as Attachment 9.

The authors would like to express their gratitude for the assistance they received from participants in the interview process and, in particular, for the candid manner with which interviewees shared their opinions. Although few interviewees requested confidentiality for non-disclosure of the substance of an interview, we generally have attempted to capture representative comments in our report without identifying the commenter.

We hope that this report can contribute to productive discussion in future Legislative Sessions, without an untoward focus on personalities. As of January 2011, wind projects in Maine comprised no less than 40% of all new renewable electric capacity proposed for development in the six states participating in ISO-New England's energy market. Because Maine's role in the development of wind power in New England has been so prominent, it is our hope that reports and analyses such as this can assist in a thoughtful evaluation of Maine's wind resource as development matures.

III. Quality of the Wind Permitting Process

The overall quality of the permitting process for utility scale wind came in for fewer comments than more specific regulatory topics that are individually examined in this Assessment. To be sure, wind opponents did have a number of specific criticisms. These included the absence of in-house expertise at the Land Use Regulation Commission (LURC) and the Department of Environmental Protection (DEP) capable of evaluating the "financial capability" of a wind developer. As one critic argues, simply looking at an un-audited balance sheet is not sufficient to assess the financial robustness of a project for years into the future. Similarly, critics are dismayed that LURC and DEP seemingly adopt

without independent analysis the developer's claims about the expected output and capacity rating of the project's turbines; the amount and value of this output is of course a key parameter for the profitability of any wind project. Finally, evidence about the presence of vernal pools at a project site has been gathered in late summer and accepted at LURC despite the fact that the phenomenon occurs in late spring and early summer. This circumstance may have been driven by the 270-day "clock" for contested applications with hearings but cannot be justified in the view of one of the interviewees.

Some wind developers voiced different criticisms. A wind developer stated outright that wind regulation in Maine has gotten worse over time, not better, and that current developers pay a price in constant scrutiny and mistrust due to several, early, poorly designed or sited projects. He concluded that the wind development atmosphere has changed from "bullish to bearish." A specific concern cited was the role of "commenting agencies." The developer felt that problems were often not created by the primary regulator – LURC or DEP – but by the other state agencies with whom DEP and LURC regularly consult – Inland Fish and Wildlife, Agriculture, Maine Historic Preservation Commission, and the Bureau of Parks and Lands – and whose demands in commenting on projects sometimes border on "the irrational". He challenged the DEP and LURC staffs to push back with the commenting agencies – manage their comments and requests – so that requirements developers confront are reasonable and legitimate. An example cited was bird and bat studies. Some wind developers believe that just 1% of East Coast wind projects have had bird and bat impacts, yet all are required to perform extensive bird and bat studies/assessments that can cost $200,000. A second wind proponent offered a similar observation on managing the regulatory process, noting that while the Office of the Attorney General advises both DEP and LURC on wind permitting, the agency has not been proactive in offering legal advice, which is a disservice to the Board of Environmental Protection (BEP) and LURC citizen boards.

Maine's wind permitting was characterized more positively by yet a different development firm. Stating that while it was a "non-trivial" process, the commenter appreciated the "thoughtful, careful, fair and clear permits issued in Maine." It was noted, though, that by the time an applicant gets toward the end of the permitting process, something in the standards almost certainly will have changed. The same party took issue with wind project appeals, observing that the quality of appeals can be very low and no objection seemingly thrown out, buying opponents a year of delay, yet raising the cost of every aspect of the development.

Both a consulting firm and several wind developers expressed a preference for project review by DEP with the consultant advising clients to pursue projects in DEP's jurisdiction. They regarded DEP as having greater experience reviewing large development projects with technical specialists and engineers on staff to conduct analysis: "professionally run, fair, quicker, reliable science-based decisions," is how one party described DEP review. A different commenter observed that the BEP relied on DEP's staff and technical experts in making decisions and did not "freelance" decisions themselves. In contrast, LURC's joint planning and regulating role was characterized as making the permitting process less "predictable" and introducing a host of qualitative issues that affect both staff and Commission decisions. The "transparency" of LURC's documentary record on wind project permitting was praised, however, by wind opponents and supporters alike with most documents available online.

Developers also did present specific criticisms about both the LURC and DEP processes for unpredictability and a lack of certainty for planning purposes. For example, at DEP there is no date after which late-filed evidence cannot be considered by DEP staff – with the result that developers at the last minute are required to respond to eleventh-hour claims or new arguments. LURC's adjudicatory procedure means that "ex parte" rules prohibit all substantive conversations between a party and the LURC staff or Commissioners even when this could save time, regulatory expense or avoid pointless litigation. Both of these peculiarities of the permitting process received frequent mention from wind developers. Additionally, as one developer pointed out, it is a "one-size-fits-all-process" in Maine without any ability for regulators to distinguish among varying levels of project impact – with diminished or expanded oversight as the circumstance warrants. In the opinion of some, this creates a "needlessly stringent" standard of review for projects proposed for unexceptional sites.

There remains one set of issues about the permitting process that emerged in the course of the interviews from a number of environmental groups. They noted with concern the fact that there is no place in the permitting process at either DEP or LURC for consideration of the non-site specific benefits of a wind project – specifically the incremental reduction in Greenhouse Gases that the addition to the grid of wind-generated electricity can be expected to provide. The amount of any such benefit, its probability and its durability, simply is not a matter of regulatory consideration. This circumstance creates a peculiar mismatch, in the eyes of some observers, between the policy goals underlying the 2008 Wind Act and the permitting process that implements it. In a close case where other considerations are evenly divided on both sides of the question, wind regulators in Maine may

legally give no weight to evidence that the project will advance the goals underlying Maine's participation in the Regional Greenhouse Gas Initiative (RGGI) or the State's Climate Action Plan. For these observers, the biggest benefit of wind development in New England is one that can't be acknowledged as the basis for approving a permit application.

One final comment from interviewees about the permitting process comes from DEP Commissioner Aho. She is troubled by a growing practice of wind opponents to flood DEP with identically-worded email protests. Maine's current administrative law requires that each communication be retained in the record of the proceeding and receive an individual written response. In a recent case, 650 identical "robo-emails" came to DEP and required a considerable investment of staff time in order to comply with the law. In the Commissioner's opinion, treating all 650 communications as a single comment makes more sense and would free up a great deal of staff time. The fact that many of the emails came from outside the state and in fact originated outside the United States only adds to her concern, she stated.

IV. Expedited Permitting

The impression created when the Wind Law was first enacted – that wind project permitting would be speedy and trigger a virtual "Gold Rush" for sites in Maine – has turned out not to be the case, in the eyes of many observers. Developers bluntly call Expedited Permitting a "misnomer," pointing to the 3 to 4 year period in pre-permit survey work and project development that still is necessary under the new system and the judicial or BEP appeals that often follow the issuance of a LURC or DEP permit. Opponents, however, point to the fact that the new process does eliminate intermediate appeals to Superior Court, with LURC or DEP permits appealable only to the Maine Supreme Court (and the fact that BEP lacks original jurisdiction over wind permits), as indications of a process that today does move more quickly than had been the case before the 2008 Wind Law was enacted.

But most opponents concede that the current permitting process at LURC provides plenty of opportunity for airing disagreements over the developer's expert testimony and for contesting key claims. The statute provides a 270-day period for processing a permit application whenever there is an evidentiary hearing and more time is available if the developer voluntarily withdraws the application to provide the opportunity to consider new evidence presented by project opponents. In fact, organizations like the Citizens Task Force on Wind Power give LURC credit for the transparency of its process and the degree of attention the lay LURC Commissioners pay to citizen testimony. Above all, opponents applaud the fact

that LURC always has held evidentiary hearings on permit applications from wind projects – unlike DEP which relies exclusively on less formal public meetings.

It is the pronounced differences between the DEP permitting process and the LURC process that occasioned the most comment from observers on both sides of the issue. These comments may have responded to the recent suggestions of the legislatively-established LURC Reform Commission that LURC's wind power jurisdiction should be transferred altogether to DEP and terminate at LURC.[1] In general terms most of the developers that were interviewed supported the idea that DEP should assume LURC's jurisdiction over wind projects – while all wind opponents rejected that idea. Developers seemingly regard DEP's non-evidentiary, staff-led process as more congenial and involving a higher level of expertise than LURC's adjudicatory process. Citizen intervenors in LURC proceedings on the other hand point to the fact that LURC's fundamental role is one of comprehensive planning in the Unorganized Territories and transferring all wind permitting to DEP "would be a disaster" given the lack of any land use planning expertise at DEP. Presumably, some type of re-zoning would still be necessary for any wind project that is sited outside of the Expedited Permitting Area (EPA) which the 2007 Wind Task Force identified. So even if projects in the Unorganized Territories that are located within the EPA are to be transferred to DEP, projects in LURC's jurisdiction outside that area could continue to require a re-zoning decision at LURC. Several wind opponents expressed grave concern that the planning and land use perspective that is vital to the protection of sensitive mountainous environments will be lost forever if this transfer of responsibilities goes forward.

We should note that, since September 5, 2011, DEP has been implementing a change to the process for reviewing permit applications from wind projects. A second public meeting is added to the 185-day schedule that is chaired by the DEP Commissioner or a Deputy. On December 20 LURC announced that it was considering adopting an identical process with two public meetings and set January 20 as the deadline for receipt of comments from the public on this proposal (See Attachment 6). LURC is contemplating this change "in cases where an evidentiary hearing with pre-filed testimony, cross-examination and the like are not necessary to make the required findings and rulings".

It remains unclear currently whether this description would apply to every case going forward or whether LURC might continue with formal evidentiary hearings

[1] See: http://www.maine.gov/doc/lurcreformcommission/pdf/LURC_Reform_Commission_final_document.pdf

on zoning issues affecting wind development from time to time – if its jurisdiction were not transferred altogether to DEP. If nothing else, the December 20 LURC announcement indicates a desire to move toward a consistent regulatory scheme for wind projects and eliminate the major discontinuities between LURC and DEP's implementation of their wind permitting responsibilities.

The configuration of the EPA comes in for considerable criticism from an entity that itself participated in the Governor's Task Force on Wind Power Development in Maine. Conceding that the designation of the Expedited Permitting Area "is generally appropriate for ecological values at the broad landscape scale," it faults the designation in two areas. The EPA does not exclude areas of high ecological value at a smaller than township scale or exclude high-value locations using natural – instead of political – boundaries. Cited are subalpine forest environments and Habitat Focus Areas.[2] It is proposed that an amendment to the wind law modify the EPA to exclude these and other resources and regions of high ecological value by definition. In addition, the commenter asserts that the EPA identifies without sufficient detail "those regions and viewsheds that are most critical to the state's recreational and tourism economy, and would be unacceptably degraded by any significant level of wind power development." According to this entity, impacts to these places are evaluated on a project-by-project basis, but are of such high scenic significance that wind power development in their viewsheds should be disallowed. They suggest an amendment to the wind law that would identify these iconic locations and viewsheds "and remove any area within fifteen miles of them from the Expedited Permitting Area" unless the wind project is not visible from them.[3]

One other organization commented that it is not ready to say that specific locations and viewsheds should be removed from the EPA based on the criteria described above. It expressed uncertainty about the scope of the problem and preferring to modify the existing permitting process to better identify and protect iconic scenic resources. It did point out, however, that while the wind law allows for additions to

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[2] Designated under Maine's Comprehensive Wildlife Action Plan and Beginning With Habitat program.

[3] These locations and viewsheds are identified as: Rangeley Plantation, Sandy River Plantation and Adamstown Township in the Rangeley Lakes region; Dallas Plantation, Lang Township, Coplin Plantation and the western half of Highland Plantation in the High Peaks region; Rockwood Strip, Taunton and Raynham Academy Grant, Sapling Township, Big Moose Township and Moosehead Junction Township along the western shore of Moosehead Lake; and Carroll Plantation (south of Rt. 6) in the Downeast lakes area. The extension of the EPA in the northeast corner of Chain of Ponds Township (containing the summits of Sisk and Pisgah mountains) also is proposed for elimination. In relation to these locations/viewsheds, it is interesting to note this excerpt from LURC's Comprehensive Land Use Plan: "The jurisdiction includes much of the Maine section of the Appalachian Trail—a resource of national as well as world-wide significance, valued for the scenic qualities that surround it." LURC CLUP, pg. 273.

the EPA, it contains no mechanism for areas to be removed from the EPA – a circumstance that they believe should be reconsidered.

V. Statewide Wind Permitting Controversies

Taken together, the perspective among wind proponents on Maine's permitting standards is that they are "clear standards and high standards" – in fact, high enough so that some wind developers have reviewed them and decided to prospect in other states where permitting requirements are simpler. In the words of one developer, "Maine really does understand the right questions to ask about environmental impact, but it is incapable of accepting a consistent set of answers, as it has no solid, immovable standards." In the opinion of this party, DEP and LURC pay excessive attention to permitting issues that are "settled", where the impacts are understood and the standards set. This commenter believes that the regulatory agencies pay more attention to the concerns of affected parties – even when the concerns are beyond the scope of the regulations – than they do to the facts presented in the permit applications. A leading environmental voice sees Maine's permitting differently, arguing that it looks at wind projects and their impact in isolation and fails to consider cumulative impact and landscape scale issues.

Opponents take the view that the applicable legal standard – the preponderance of the evidence – in practice is a low standard and is in no way equivalent to determining that the public interest will be served by granting a permit. Opponents also fault DEP for having in place no process guidance specific to wind permitting that is comparable to LURC's. This gap in procedural guidance at DEP leaves to the Commissioner's discretion key decisions about processing a wind permit and creates confusion and uncertainty. For example during the pendency of the noise controversies at Vinalhaven, four successive DEP Commissioners held that position, generating uncertainty that might have been avoided had clear procedural rules been in place. Below, we will consider critiques of permitting standards on both sides of specific issues.

1. Noise

A consultant summed up a common perspective on this topic by stating that the existing turbine noise standard is fair when a developer chooses to be conservative about project location, but when the site is tight and abutters are very near, problems and conflicts arise.[4] A wind developer opined that Maine's noise standards have been predictable, but the BEP's September 2011 decision to reduce

[4] OEIS's April 2011 Report: Tracking Progress Toward Meeting Maine's Wind Energy Goals devotes considerable attention to an examination of current wind energy noise guidelines.

overnight noise limits for turbines from 45 to 42 decibels was "interesting" – an arbitrary adjustment based mostly on citizen complaints and a citizens' petition. The development community hopes that the noise standards will again "settle down" but worry that a continuing downward trend in decibel levels ("the BEP moving the goalposts in sound standards") would be difficult to meet and signal an unsettling lack of long-term predictability in the regulatory framework. A different commenter noted that Massachusetts, with a high number of community scale wind projects, has a protocol for separating ambient noise from turbine generated noise that is helpful in project siting. To date, the Maine DEP has not accepted a methodology that disaggregates turbine from background noise. LURC staff shared that noise has not generally been an issue in its jurisdiction, but pointed to a recent request for post-construction noise monitoring of an approved wind project. Currently, LURC has no funding mechanism allowing for such monitoring, but feels it needs one. Finally, a wind opponent argues that, given the inexactness of the present noise standards, what Maine really needs is a statutory standard that regulators can monitor and enforce. The Legislature needs to establish such a standard in the Wind Act in this interviewee's view.

Because the focus of this Assessment has been on the broad effects of utility-scale wind on Maine's environment, economy, local governments and unorganized territories, our conversation with numerous interviewees has not dealt at all with local and immediate impacts of wind turbines on abutters and nearby residents. This is an important aspect of the ongoing debate over wind power in Maine, however, and to indicate its scope we include a January 17, 2012 letter on this subject to Dr. Sheila Pinette of Maine Center for Disease Control; this letter is attached as Attachment 8.

2. Avian and Bat Studies, Species and Habitat Issues

Maine's requirements for bird and bat studies are perceived as stricter than those of many other states. A continuing refrain of wind development proponents is that the cost of avian studies, which can consume $150,000-$250,000, is not justified by the minimal impact that East Coast wind farms have on birds. Observers contend that wind projects of 1MW to 5MW have shown no bird impacts and that overall, only 1% of East Coast wind projects have resulted in significant bird mortality. These figures have not been verified. Wind developers' belief is that these studies have become pro forma, but their scope and cost can no longer be justified. One wind advocate did point out that there appears to be impact to bat populations from wind development, which requires sensitivity in permitting, but that unfortunately, avian and bat studies get lumped together by regulators.

Conservation interests – Maine Audubon and the Appalachian Mountain Club (AMC) in particular – see a continuing threat to specific species and habitats from wind development and believe there are multiple areas where permitting standards could be clarified. Both organizations call for the law to prohibit development from taking place in documented occurrences of Fir-Heartleaved Birch Subalpine Forest or occupied Bicknell's thrush habitat.[5] The high elevation sub-alpine forests, or mountaintop forests, are a rare resource in Maine and provide habitat for Bicknell's thrush, the northeast's rarest migratory songbird. Maine Audubon notes: "Despite the lack of state or federal listing as an endangered or threatened species, there is widespread agreement among major bird conservation organizations and state and federal agencies across the northeast and the nation that Bicknell's thrush is a high conservation priority at multiple scales."[6] Regarding the high elevation sub-alpine forests, the Appalachian Mountain Club states: "Current rules put LURC and DEP in the untenable position of determining on a case-by-case basis how much impact to this rare critical habitat is acceptable." AMC posits that a "more comprehensive approach would be to prohibit all wind power development above 2,700 feet in elevation."[7]

Maine Audubon also draws attention to the endangered Northern Bog Lemming, evidence of which indicates it has shown up at several wind power development projects. Maine Audubon calls for no development of any kind within 250 feet of a documented occurrence (or evidence of a likely occurrence) of the species unless IF&W grants an exception based on micro-site factors.

In contrast to claims that many wind permitting matters are "settled," Maine Audubon offers this perspective: "Our analysis shows there are still many important natural resources that occur within both the Un-expedited and Expedited Areas that overlap with wind resources, and either should be avoided up front or will require careful review during the permitting process. Of particular concern are impacts (both direct and indirect, and over time and space) to rare, endangered, and threatened species; rare and exemplary natural communities; significant wildlife habitats; and large unfragmented and undeveloped landscapes."[8]

3. Threats to Community Wind

In discussing statewide permitting, one interviewee offered the assessment that "community wind is dead" in Maine. The cause of death is perceived to be a

[5] In addition, Maine Audubon calls for a 250 ft. buffer around occupied Bicknell's thrust habitat to limit indirect impacts.
[6] See Attachment 4, Maine Audubon comments dated January 15, 2012.
[7] See Attachment 7, Appalachian Mountain Club comments dated December 30, 2011.
[8] See Attachment 4, Maine Audubon comments dated January 15, 2012.

regulatory system that cannot differentiate between the permitting requirements/costs appropriate to a community or small number of ratepayers, as opposed to a utility scale wind developer and backers. To encourage community wind, Maine needs to lighten its small project regulatory requirements, make certain that mitigation requirements are no greater than the value of the resource and stabilize its data requirements so that applicants know definitively what regulators require, according to this interviewee. A case study of this argument can be found in "The Green Hardhat" (The Working Waterfront, December 21, 2010), an article documenting the regulatory trials of permitting the Fox Islands Wind project, Vinalhaven.[9]

4. Best Available Technology

Several commentators pointed to a need for LURC and DEP to have authority to order the use of so-called "Best Available Control Technology" to limit impacts from wind development. An example is to modify turbines for higher cut-in speeds in certain circumstances in order to reduce bird and, particularly, bat mortality. Such modifications are said to not impose any major reduction in wind power output. A second example that was more broadly cited is to require radar-controlled night lighting systems (such as the Obstacle Collision and Avoidance System and the HARRIER Visual Warning System) that can detect oncoming aircraft at night and activate warning lights and audio signals. The result is a major decrease in visual impacts in the night time landscape from turbine arrays and their warning lights. At present, it is not clear that the regulatory agencies possess statutory authority to order "Best Technology" mitigation in the absence of the applicant's consent. One interviewee noted that approval from the Federal Aviation Administration may be required before radar-activated night-lighting systems could be required; this is a concern that justifies further research.

VI. Visual and Cumulative Visual Impacts

In the words of a consultant, "Visual impact is where wind projects live or die due to the uncertainty of the outcome. Visual impact stops people in their tracks: they either find turbines acceptable on the landscape or not – it is in the eye of the beholder." In commenting on the methods used to evaluate the effect of wind projects on scenic character, interviewees focused either on the scenic elements themselves or on the visual assessment process and standards.

1. Scenic Elements

Several environmental interests argued that the existing list of scenic resources is incomplete. They identify the absence of sporting camps from the list – the remote,

[9] http://www.workingwaterfront.com/columns/The Green-Hardhat/14150

historic, privately owned lodging complexes serving sportsmen/women and associated with guides. Sporting camps are not specifically listed as a "scenic resource of state or national significance" in the law, so LURC and DEP cannot consider wind project impacts on them. Both LURC, in its Comprehensive Land Use Plan, and the Maine Historic Preservation Commission (MHPC), a commenting agency, recognize the significance of sporting camps as an iconic and historic cultural resource.[10] One interviewee referred to sporting camps as "having a quasi-public identity that is already recognized distinctly in LURC rules and plans." If a wind project requires an Army Corps of Engineers permit for facilities associated with a wind project, MHPC can review sporting camps under Section 106 of the National Historic Preservation Act; that Act requires federal agencies to take into account impacts to properties listed or eligible for listing on the National Register of Historic Places. While Maine sporting camps are considered eligible for listing as a cultural resource class, none are currently listed on the National Register. We should note, however, that not all conservation interests interviewed agree that sporting camps deserve inclusion on the scenic resource listing.

Some interviewees identified a second resource deemed worthy of listing: "scenic highways" as designated by the Maine Department of Transportation. These currently include the Old Canada Road Scenic Byway, which runs through the Kennebec River region, and the Rangeley Lakes Scenic Byway. Presently under the law, only the scenic turnout portion of these roadways is listed as a scenic resource – but not the roads themselves. Several interviewees believe this is a peculiar oversight that should be remedied.

Some commentators also called for updating the surveys of resources designated as "having state or national significance". These include the Great Ponds in the State's organized area, the Great Ponds in the State's unorganized territory and scenic rivers and streams. All of these resources were identified in studies performed by Maine state agencies during the 1980s. In addition to these resources, some interviewees call for a survey of remote ponds to be conducted and analyzed for potential scenic status.

2. Process and Standards

A nearly constant refrain of wind proponents and consultants is that Maine needs a standard methodology (or a more formal guidance document) for visual impact assessment. Many believe having this in place would save time, money and frustration in what is accepted as the most qualitative of the permitting standards.

[10] See "Maine Sporting Camps" manuscript and sporting camp survey data by Stephen Cole on file at the Maine Historic Preservation Commission.

Other suggestions include increasing the number of firms that serve as agency reviewers of visual impact assessment. Currently, both DEP and LURC rely upon a single contractor for this service. Additionally, an interviewee suggested that early involvement by an agency reviewer in the assessment process should be made mandatory, so that contractors can receive up-front, timely guidance on the methodology for intercept surveys for contractors – typically landscape architects.

While some interviewees object to the narrowness of the defined scenic resources, others applaud the state and national scenic resource listing as a clear and important standard. One source called it, "the best scenic resource protector in the country because it is clear about what the scenic resources are and removes the vagueness that causes conflicts." Since most states do not have such lists, all too often there is no easy way to do analysis to distinguish what is scenically significant from what is not. But within Maine's existing list of scenic resources, some feel that a number of clarifications are necessary. One is greater specificity on what constitutes "legal right of access" to a historic site listed on the National Register of Historic Places. A second is "what constitutes use of a scenic resource?" The general interpretation has been that to use a scenic resource of state or national significance a person must be within its boundaries. But, a number of exceptions exist like this one offered by an observer: "People gain enjoyment looking at Mt. Katahdin, a scenic resource of state or national significance, from many locations that are not scenic resources of state or national significance. Turbines in their view may negatively affect their enjoyment of the Katahdin view. Is that view a "use" of the Katahdin scenic resource?"

Intercept surveys represent a technique currently used to help gauge scenic impact. These surveys rely on questioning resource users prior to construction on how they are "likely" to react to turbine development. A number of parties believe this survey work is speculative and needs to be verified by mandatory, post-construction surveys. Only then will the true impact of the project to users be known and regulators be able to discern whether the right permitting decisions were made. This research would help regulators understand when scenic impact is too great and provide data on the tourism impact of wind development. LURC staff would very much like to have funds for post-construction visual impact surveys, but are not certain that it is a cost applicants should bear. Another interviewee offered this analogy: "We have post-construction monitoring of bird and bat kill, shouldn't we also monitor scenic resource use patterns and attitudes?"

The scenic evaluation zones incorporated into the wind siting law require visual impact analysis to a distance of three miles, with analysis to a distance of eight

miles being left optional. The eight mile distance appears to have become the de facto scenic evaluation zone for permitting. But a regional conservation organization asserts that Maine's current three and eight mile standards represent a selective reading of an influential National Academy of Sciences study,[11] and that the wind law should require scenic impact evaluations to eight miles, with a fifteen mile standard optional and provisions made for review to greater distances, if warranted. Further, all visual impact should be based on worst case conditions. In this way, they believe, the clear visibility of utility scale wind turbines beyond eight miles would be acknowledged and the potential for impact to highly sensitive viewpoints could be assessed. Another environmental organization noted that to evaluate scenic impacts beyond the eight miles would be a substantial deviation from the balance struck in the wind law, but could imagine several specific cases where an expanded evaluation zone might be appropriate. Another commentator suggested that the eight mile standard restricts the analysis to a distance where the greatest impact is likely, stating "I think that it is unlikely that an individual project of the scale that has been proposed (to date) will produce an unreasonable scenic impact beyond eight miles." An interviewee observed that the wind law gives regulating agencies no authority to require mitigation for visual impact and wondered aloud what "mitigation" would mean in this context. He concluded that the purchase of other scenic lands could be an approach to mitigation.

Finally, a number of interviewees signaled concern about the scenic assessment of a wind project's "associated facilities" – buildings, access roads, substations, etc. They believe that existing visual impact standards don't address associated facilities well and need further refinement. There is also uncertainty about what triggers a review of these facilities with the sense that they are almost entirely ignored in the permitting process. But another commentator observed that opponents have not been asking that associated facilities be considered under the visual impact procedures and noted that if similar facilities were being proposed by a municipal public works department, for instance, their scenic impact would not be controversial.

3. Cumulative Visual Impact

The potential cumulative visual impacts from multiple wind farms is an issue which has become a focus of attention and research within the past year. LURC and DEP understand cumulative visual impact as resulting from either of two circumstances: a concentration of turbines that dominate a particular landscape; or the dispersal of turbines throughout a landscape over a considerable distance.

[11] "Environmental Impacts of Wind Energy Projects", National Academy of Sciences, Committee on Environmental Impacts of Wind Energy Projects, 2007, National Research Council, www.nap.edu

Cumulative visual impact is of particular concern to LURC staff as planners and regulators; they already struggle to mesh qualities of the jurisdiction such as "remoteness" with wind permitting. LURC is anxious about the prospect of wind development occurring throughout the jurisdiction in a manner akin to developmental "sprawl" in the remainder of the state. When LURC sought public comment on cumulative visual impact, it learned that "concentrating in a few locations is more desirable than spreading broadly across the landscape," in siting wind development.[12] This finding mirrors tourists' perceptions in the Gaspe region of Quebec, where visitors preferred to see a concentration of turbines (more than 12 turbines) in a few places, rather than fewer turbines (less than 12) in multiple locations.[13] Some wind opponents that we interviewed noted, however, that concentrating many turbines in a small area is no better than wide dispersal over a broad swath of topography. In both cases the result can be a "death from a thousand cuts" from unacceptable impacts, compared with a smaller-scale and appropriately-sited project.

Consultants and wind developers bring other perspectives to this issue. Calling cumulative visual impact "a huge and fascinating question," one consultant could not imagine clustering to a degree that a two hundred turbine wind project would ever be built in Maine – "the public outcry would be too great." A developer added that too much concentration of wind energy is not ideal from a grid transmission perspective and that decentralized wind production – close to users and for electric cars and home heating storage is an important vision.

A regional conservation organization asserted that cumulative visual impact is an issue "best addressed through landscape level planning" and is nearly impossible to address in the context of a specific permitting decision. Maine has some of the largest expanse of natural landscapes in the Northeast, but these landscape-scale resources are not considered at all in the permitting process. It lauded LURC staff for framing the right questions, but noted that the detailed analysis required might exceed their current capacity and, in any event, must take place at a statewide level as impacts will occur in organized towns as well as in LURC's jurisdiction. Another entity seconded this assessment, and supported clearer statutory authority for permitting agencies to consider cumulative visual impacts.

In November 2011, LURC convened a small working group of agency and DEP staff, landscape architects/consultants and other state interests to consider

[12] OEIS Assessment of Cumulative Visual Impacts from Wind Energy Development, November 15, 2011.
[13] A report presented to Technocentre Eolien Gaspesie-les-Iles. Quebec, Richard Guay Consultants (2004).

approaches to cumulative visual impact analysis. The group has continued to communicate, meet and work and will submit their ideas to OEIS in tandem with this report.

VII. Wind Development and Tourism

Varying perspectives on wind development's impact on tourism have one element in common: they are largely unsubstantiated. Nationally and internationally, wind energy trade associations and environmental/scenic resource advocates alike rely on anecdotes, personal testimony and selective excerpts from research papers to advance claims that wind development either boosts or diminishes tourism economies. In fact, much of the academic research on tourism impacts is prospective or hypothetical, having been conducted in advance of a wind project's construction and attempting to gauge likely visitor response and behavior.[14] By its nature, this type of evidence is speculative.

For example, we are aware of no formal research conducted in Maine of tourism impacts from wind development. Anecdotally, staff at the Maine Office of Tourism report that it is a topic they hardly hear about from operators and trade groups. There are, however, several studies from Scotland that look to provide meaningful analysis of the relationship between these two economic sectors.[15] Both reports reach a similar conclusion, that is, on a *national level* "there is little evidence of significant negative impact or substantial loss of value from the introduction of wind farms into the landscape, but some evidence of small changes."[16] In the research, loss of value was assumed to come from two areas: fewer visitors and reduced lodging rates. On a *local level*, though, the "small changes" were found to have a significant negative economic impact. We interpret this to mean that in rural regions of Scotland with a high dependence on tourism and where other job opportunities are limited, the tourism employment and revenue loss resulting from wind development can be meaningful.[17] Certain Scottish regulatory bodies require

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[14] Lilley, M.B.; Firestone, J; Kempton, W. The Effect of Wind Power Installations on Coastal Tourism. Energies 3, no. 1 and Davidson, Michael. Impact of Wind Farms on Tourism in Skamia County, Washington. June, 2010.

[15] Caledonian University, Glasgow. The Economic Impact of Wind Farms on Scottish Tourism. A Report for the Scottish Government. March 2008 and Riddington, G.; McArthur, D.; Gibson, H. Assessing the Economic Impact of Wind Farms on Tourism in Scotland: GIS, Surveys and Policy Outcomes. Int. J. Tourism Res. 12, 237-252 (2010).

[16] Assessing the Economic Impact, Ibid.

[17] There is an interesting parallel to the Scottish tourism findings in research conducted on property values and wind development by the Lawrence Berkley National Laboratory, "The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-Site Hedonic Analysis.", December 2009. The study reviewed 7,500 sales of single family homes within 10 miles of 24 wind farms in nine states. "The analysis finds that if property value impacts do exist, they are too small and/or too infrequent to result in any widespread, statistically observable impact, though the possibility that individual homes or small numbers of homes that have been or could be negatively impacted cannot be dismissed." As with the tourist studies, these findings suggest that local property value impacts can exist where no national scale impacts are apparent.

wind developers to prepare a Tourism Impact Statement parallel to the environmental impact analysis routinely required. Some researchers have suggested that the Tourism Impact Statement be obligatory in parts of Scotland where tourism is important in the economy.

Scotland and Maine share a number of characteristics: they are rural places with low population density, high economic dependence on tourism and natural resource industries and a rapidly growing wind development sector in which electricity is produced largely for export. Because of these similarities, it will be important to follow up on the Scottish studies and conduct quantitative research on the impact of wind farms on tourism in Maine. Looking at the behavior of sporting camp clientele and their likelihood of return trips has been suggested as an important element of any research. Only then will permitting agencies have a context for considering tourism impacts in the regulatory process and understanding the threats of specific wind projects raised by guides and lodging owners. The wind permitting process in Maine does require an analysis of project effects on scenic resources, but that analysis does not directly address potential economic losses in tourism resulting from negative scenic impacts.

VIII. Impacts on Municipalities

When a wind project located outside of LURC's territory is first announced, it is town officials who undertake the first regulatory response – often in the form of a Comprehensive Plan amendment or re-zoning. If local opponents secure enough signatures, there may well be a proposed new municipal ordinance that is designed to stall or prohibit the project – again a matter entirely within the purview of the town. If the developer requests Tax Increment Financing (TIF) or an abatement, it is the town officials who must consider the request and decide whether to engage in negotiations over its terms and duration. The town officials also have to assess the adequacy of any Community Benefit Package that the developer wishes to propose in satisfaction of state policy under Public Law 2009, C. 642. Finally, during the operating life of a wind project that is successfully permitted, it is the town officials who must monitor the conduct of the owner in paying property taxes, maintaining the site and funding eventual decommissioning.

All of these duties are undertaken in rural Maine by a small group of Selectmen, sometimes with the assistance of a Town Manager, but without the benefit of in-house expertise that regularly deals with projects as big and complex as a wind farm. The question of capacity for effectively dealing with the developers of utility-scale wind projects is one that surfaced at several points with interviewees. For example, a lawyer/opponent who frequently has challenged wind permits on

appeal, and Maine's DEP Commissioner both identified a concern about the ability of a three-person Board of Selectmen in a small town to handle negotiations with a well-financed developer over a TIF or a Community Benefits package.

In contrast, one developer opined that Maine should follow Vermont's example and altogether pre-empt the "home rule" jurisdiction of municipalities over local ordinances and local permit requirements.[18] His argument is that despite strong political support at the outset, Maine's permitting process for wind has turned out to be neither predictable nor free of contention. There should be no separate avenue for judicial appeals of municipal permitting, he argues, but town jurisdiction over wind simply should be eliminated. It is noteworthy that the 2010 "Ocean Energy Task Force" legislation (PL 2009, C. 615) already grants this type of exemption to offshore wind development, stating: "A municipality may not enact or enforce a land use ordinance that prohibits siting of renewable ocean energy projects, including but not limited to their associated facilities, within the municipality."

In the course of two interviews with municipal officials, a Town Manager in Woodstock and a Selectman in Roxbury, none of these aforementioned concerns surfaced at all. Both interviewees stated that the interaction with their respective developer had gone smoothly and they found the communication to be straightforward and credible. In neither case did the town pursue a TIF negotiation, which had been an area of perceived imbalance in the town/developer relationship in the eyes of other interviewees. In both cases the town officials had confidence that decommissioning requirements would be fulfilled and in both cases they were pleased with the Community Benefits arrangements that the developer had agreed to.

But to other observers, the mismatch between a project developer who will spend $25 million getting a utility-scale project permitted and a Board of Selectmen in rural Maine is too pronounced to pass without comment. Apart from one wind developer, however, there was no support whatever for the suggestion that the State should take all wind-related responsibilities away from towns in a repeal of home rule. Interviewees pointed to arrangements for intervenor funding in other regulatory proceedings in Maine, such as MPUC cases, as a model that deserved

[18] According to a representative of Vermont's Department of Public Service, this assertion may somewhat overstate the practical effect of a wind project receiving a single, comprehensive Certificate of Public Good from the state. Although Section 248 of the Certificate law does provide a single and conclusive permit for commercial operation that supercedes municipal ordinances, towns are invited to participate in permitting proceedings and their opposition, if any, is given due weight.

consideration in the case of expedited wind permitting. Wind opponents generally believed themselves to be at a major disadvantage in addressing a wind permit application – and believe that town officials confront an identical disadvantage.

IX. Offshore Wind Project Potential

In legislation signed into law in April 2010 ("An Act to Implement the Recommendations of the Governor's Ocean Energy Task Force", PL 2009, C. 615), Maine increased the potential role of offshore wind energy in meeting the State's renewable energy goals. This was done though policy directives to the Maine Public Utilities Commission (MPUC), the Bureau of Parks and Lands within the Department of Conservation, DEP, LURC, the Maine Port Authority and to the Governor's Office of Energy Independence and Security. The law streamlines the permitting process by creating a general permit administered by DEP and designates offshore test sits near Boon Island, Monhegan and Damariscove.

Additionally, the MPUC was directed to solicit up to 30 MW of capacity or renewable energy credits from wind projects in federal waters at least ten miles offshore, including up to 5MW from tidal demonstration projects. In its solicitation, the legislation clarified that the resulting rate impact of such contract or contracts must not exceed $10.85 million annually as an aggregate annual cap on funds available to cover above-market costs for any such long-term contract. The MPUC expects to finalize its bid review and, possibly, announce its bid award for one or more contracts totaling 30 MW in February or March 2012.

Independent of this legislation, the University of Maine's Advanced Structures and Composite Center is now developing a test site in state-jurisdictional waters near Monhegan Island. Additionally, a Norwegian firm is pursuing its own demonstration project in federal waters near Boothbay. Statoil of Norway has submitted a lease application for its off-shore floating platform design to the Bureau of Ocean Energy Management (BOEM), a federal agency within the U.S. Department of Interior. Statoil proposes to construct a 12 MW project with three turbines and hopes to begin construction in 2016. If the project is successful, Statoil is considering a larger wind power project in the same general vicinity.

These developments strengthen the prospects for Maine achieving the ambitious goals of the 2008 Wind Act for bringing on-line 300 MW of off-shore wind and tidal generation by 2020 and 5,000 MW from offshore sources by 2030. To the extent that offshore resources prove to be technically and financially feasible, they could relieve pressure in the development of on-shore wind projects on inland

ridgelines and sensitive high-altitude portions of Maine. This possibility was not lost on interviewees who have opposed siting of wind generation at inland locations. A representative of Friends of Highland Mountains called development of the offshore wind resource "the best long-term solution" since noise and visual impacts are negligible and habitat disruption may be less significant. In his words, there is today no crisis that compels us to rush headlong in pursuit of the on-shore wind resource: "We can afford to wait for the development of offshore technology" in order to achieve State goals for wind resource development.

Interviewees at Environment Northeast were somewhat less sanguine about the prospects for affordable development of the offshore wind resource. Pointing to the estimated costs of the Cape Wind project off Cape Cod, at an estimated 22 cents/kilowatt-hour, and to low price levels currently for natural gas-fired power output, they see little likelihood that the offshore wind resource can be developed quickly and at a more competitive price than Cape Wind.

At Maine's Geological Survey, there is a different reason for caution in expecting offshore wind to replace on-shore wind in fulfilling the State's statutory goals. Bob Marvinney chaired the working group that designated sites for offshore wind demonstration projects. He points to the fact that all sites beyond the three-mile limit are under the jurisdiction of the federal Department of the Interior and anticipates that any Maine project seeking an offshore lease would inevitably have to compete against projects proposed in other areas of the Atlantic coast – such as a major offshore project under consideration in New Jersey. Politics could well be a factor in the BOEM decision-making process for awarding seabed leases among competing offshore applications.

X. Implications for Intermittency

1. Analysis

A concern that frequently surfaces at debates over the value of wind-generated electricity is the issue of the intermittency of its output. Since wind turbines generate energy only when the wind blows, and thus are generally less dispatchable[19] than gas turbines or hydroelectric generation, the question arises: are wind generation resources less valuable than other resources? Additionally, does the presence of a certain level of wind generation place any incremental demands on the electric system for back-up or storage capacity? And finally, is there an

[19] "Dispatchable" means a supply or demand-side resource is available and able to effectively increase output or decrease output upon a request by the central control authority in a balancing area, such as ISO-NE in most of New England, or New Brunswick Power for the Maine Public Service territory.

upper limit on how much wind capacity can be added to the New England grid before additional non-wind capacity must be added to ensure grid reliability? It turns out that New England's grid operator, ISO-New England has recently considered precisely these questions in a study completed in 2010 – the New England Wind Integration Study (NEWIS)[20]. Additionally, we reviewed the most recent ISO-NE Regional System Plan[21] to assess the implications of variable energy output from wind resources on the regional grid, including (at a high level) the effect on the forward capacity market and electricity price volatility.

Because power generators in most of New England are centrally dispatched[22] by ISO-New England, the variable output of wind resources is taken into account in the central dispatch function itself. Maine, or any other New England state, does not "balance" its own wind resources in isolation from the rest of the ISO-New England dispatch mechanism. The practical impact of increased levels of wind resources on the dispatch function is a possible need to carry additional amounts of operating reserve. The grid maintains operating reserves in order to respond to the "ramping" requirements of the ISO system, and the need to continually balance load and supply on the grid. ISO-New England's system operators continually adjust the output of dispatchable resources to "follow the load" as it increases and decreases throughout the day. Power systems are designed and built to address varying loads and the varying output of multiple resources on the system; the fundamental requirements for operating electric power systems under these conditions are well understood, and system operators put this knowledge into practice daily.

The New England Wind Integration Study (NEWIS)[23] came to the conclusion that a potential of 24% of all power generation in the region could come from wind resources without any system disruption:

> "The study results show that New England could potentially integrate wind resources to meet up to 24% of the region's total annual electric energy needs in 2020 if the system includes transmission upgrades comparable to the configurations identified in the Governors' Study."

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[20] GE Energy Applications and System Engineering, EnerNex Corporation, AWS Truepower, "Final Report: New England Wind Integration Study", December 5, 2010, prepared for ISO-NE.
[21] ISO-NE, 2011 Regional System Plan, October 2011.
[22] Northern Maine's Maine Public Service territory is separate from the ISO-NE region, is interconnected with New Brunswick and is part of the New Brunswick balancing area. The Mars Hill wind farm is connected to this region, and it is New Brunswick, not ISO-NE, that is responsible for balancing requirements associated with injections from the wind plant.
[23] ISO-NE Wind Integration Study, Executive Summary, page 14.

In reaching this conclusion, the study assumed: (1) no significant retirements of any capacity cleared through the second Forward Capacity Auction; (2) the retention of the additional resources cleared in that Forward Capacity Auction, and (3) increased regulation and operating reserves as recommended in the NEWIS study.

The 2010 study addressed several different levels of wind penetration in New England, and concluded that at penetration levels up to 20% by energy[24], the New England system has adequate "flexibility" or adequate operating reserves to handle ramping requirements. As wind penetration increases beyond these levels, the report indicates that ISO-NE needs to assess flexibility needs and investigate methods to ensure sufficient system flexibility. The report's authors explain[25]:

> "**Flexible Generation**: The ISO-New England system presently has a high percentage of gas-fired generation, which can have good flexibility characteristics (e.g., ramping, turn-down). Using the assumed system, the results showed adequate flexible resources at wind energy penetration levels up to 20%. Also using the assumed system, there are periods of time in the 24% wind energy scenario when much of the natural-gas-fired generation is displaced by the wind generation, leaving less flexible coal and nuclear operating together with the wind generation. In this study, physical limits were used to determine how much units could be turned down when system conditions required such action. ISO-New England will need to be diligent in monitoring excessive self-scheduling, which could limit the apparent flexibility of the generation fleet. ISO-New England may need to investigate operating methods and/or market structures to encourage the generation fleet to make its physical flexibility available for system operations (See Section 5.2.1.2)."

The NEWIS authors concluded that there was no need for installation of new Energy Storag**e** systems:

> "**Energy Storage:** Study results showed no need for additional energy storage capacity on the ISO-New England system given the flexibility provided by the assumed system. However, the need for energy storage may increase if there is attrition of existing flexible resources needed to

[24] I.e., New England total electricity consumption is roughly 130,000 GWh per year, thus 20% by energy implies wind energy output of roughly 26,000 GWh per year, or ~9,000 MW of wind at 33% capacity factor.
[25] ISO-NE Wind Integration Study, Executive Summary, page 30.

balance net load and dispatchable resources. It is commonly believed that additional storage is necessary for large-scale wind integration. In New England, wind generation displaces natural-gas-fired generation during both on peak and off-peak periods. Natural-gas-fired generation remains on the margin, and the periodic price differences are usually too small to incent increased utilization of pumped storage hydro-type (PSH) energy storage, which is why the study results showed PSH utilization increasing only slightly and only at higher levels of wind penetration."

2. Observations and Opportunities

Wind does contribute towards capacity requirements in New England today, and the NEWIS found that aggregate capacity credit ratings[26] were projected to range from 20% (of the installed Megawatt rating) to as much as 36%, for different scenarios of future wind generation.[27] The higher values represented scenarios where greater amounts of offshore wind were assumed. Offshore wind resources exhibit patterns of output that include increased summer peak period output, compared to onshore wind. The level of capacity accreditation for New England wind is related to its availability during summer periods when New England's grid experiences peak demand for power.

Increased levels of wind generation can be expected to decrease prices in both New England's capacity and energy markets – as increases in supply lower the clearing price in the respective markets. However, wind is primarily an energy resource, and as such its effect would be felt most strongly in the energy market. But the NEWIS study supports the conclusion that the addition of wind resources up to 20% of total energy will tend both to reduce energy prices and impose no new system requirements for storage or back-up power resources.

XI. Transmission Costs for Delivery of Maine Wind

1. Analysis

Just how costly is it for a wind farm in Maine to connect to the electric grid? And who pays those costs? The answer depends on what portion of that transmission

[26] Capacity credits, or capacity accreditation, for wind resources are different from capacity factors. Capacity factors represent the average energy output over a defined period of time (usually a year) as a fraction of the total energy output that would be seen if the wind resources operated at their installed or maximum capacity ratings continuously over the specified time period. Capacity credits represent the fraction of the installed or maximum capacity that can be "claimed" for reliability purposes, such as is required when conducting resource adequacy studies.

[27] NEWIS, Executive Summary, Table 0-1, "Summary of Wind Generation Capacity Values by Scenario and Energy Penetration" page 25.

connection we are talking about and whether there is a reliability or efficiency benefit from the project for everyone else on the grid. The costs associated with transmission upgrades that are required to transmit wind energy in Maine can roughly be categorized into three elements:

a. Costs to interconnect the wind farm to the nearest point on the transmission grid;
b. Costs to reinforce the grid locally – if or as necessary, depending on the form of interconnection service sought by the wind farm developer[28] – in the region where the wind farm is sited in order to allow the wind to be "delivered" into the Maine sub-region of New England, and possibly beyond the Maine local region; and
c. Costs to reinforce the regional grid (New England) to allow for Maine wind to be "delivered" anywhere in New England.

The first of these components is usually considered part of the developer's cost of bringing the wind project to commercial operation, and is passed on to consumers based on the contractual arrangements for the sale of the wind energy itself.[29] If the project is located close to the transmission grid (such as most of the locations considered in Western Maine for new wind development[30]) and is a utility-scale wind farm (tens to hundreds of Megawatts of installed capacity), these costs could be on the order of 10% of the total wind farm costs.[31]

The second category of cost elements is often referred to as "network upgrades", with costs assigned either to the generation unit "triggering" the upgrade, or assigned more broadly to New England ratepayers. Broad assignment to all electric

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[28] In the ISO-NE region, new generators can connect to a "minimum interconnection standard", which may preclude them from participating in the capacity market in New England, allowing only energy market participation; or they may connect at the "Capacity Network Resource Interconnection Standard", which allows participation in the capacity markets. See ISO-NE's Standard Large Generation Interconnection Procedures documentation, Schedule 22 of the ISO-NE Open Access Transmission Tariff (OATT), available at http://www.iso-ne.com/regulatory/tariff/sect_2/sch22/index.html.

[29] This is an important area of wind economics for Maine consumers, but the scope of work for this assessment does not include such analysis.

[30] See, for example, CMP's submission to New England States Committee on Electricity ("NESCOE") concerning the Western Maine Renewable Integration Study (WMRIS) that describes potential new wind resources and required transmission, available at http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/mtrls/2011/apr142011/cmp_submission_to_nescoe.pdf.

[31] For an illustrative example, consider a standard 115 kV line with a cost of roughly $1 million per mile, for a 100 MW wind farm located 20 miles from an interconnection point to the grid. It would incur roughly $20 million in direct interconnection costs. Assuming a $2,000 per kW capital cost for the wind farm, or $200 million total, the radial transmission interconnection cost is thus roughly 10% of the total costs. For a more thorough review of the intricacies of transmission costing for renewable energy, see for example Andrew Mills, Ryan Wiser, and Kevin Porter, Lawrence Berkeley National Laboratory, "The Cost of Transmission for Wind Energy: A Review of Transmission Planning Studies", February 2009. Available at http://eetd.lbl.gov/EA/EMP.

ratepayers will occur only if the overall market efficiency benefits of the upgrade are greater than its costs, or if the line is needed for reliability purposes even without the wind farm.[32]

The costs of the third category (grid reinforcement for regional delivery) generally are assigned to all New England load, such as is being done with the $1.55 billion Maine Power Reliability Program (MPRP) upgrades now being undertaken by Central Maine Power (CMP). Major reliability upgrades such as MPRP are not normally predicated on the need to integrate renewable energy onto the grid, but they certainly provide increased grid capacity that can be utilized by wind resources seeking to connect in Maine.

To illustrate the costs to ratepayers of transmission that might be required primarily to integrate Maine wind resources onto the grid, we examined information available from CMP concerning the costs of upgrading the Western Maine transmission system in order to allow for increased wind resource interconnection in that area; we must note, however, that we have not assessed in detail the parameters behind CMP's conclusions regarding the need for Western Maine transmission reinforcement. We also reviewed the current costs of power for Maine ratepayers, as represented by the current Standard Offer prices and delivery costs for small customers in the CMP and Bangor Hydro service territories.

The Western Maine Renewable Integration Study (WMRIS) analyzed transmission requirements for integrating a minimum of 743 MW of incremental wind (along with 362 MW of existing generation in the region for a total of 1,105 MW) within the "Upper Kennebec Hydro Export constraint area".[33] The report described two categories of upgrades, one consisting of reinforcement to the 115 kV grid in the region, and another increment that added 345 kV equipment to the region, extending from the 345 kV elements that will be in place when the MPRP project is complete. The report found that a total of roughly $340 million would be required to reinforce the existing 115 kV system, and an incremental $213 million ($553 million total) would be required to add 345 kV elements to the grid.[34]

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[32] For example, the ISO-NE tariff allows transmission costs to be allocated to all New England load if the upgrade is needed for reliability and thus the facilities are considered "pool transmission facilities", or PTF. It also would allow facilities to be allocated across all load if the upgrade is found to be a Market Efficiency Transmission Upgrade per Attachment K of the ISO-NE transmission tariff. Otherwise, facility costs are allocated either to local load or to the interconnecting generator.

[33] CMP submission to NESCO on WMRIS (see previous footnote 13), at Table 1, page 3.

[34] We did not analyze in detail the assumptions associated with the reinforcement need cited in the report.

Each of these incremental steps – reinforcing the 115 kV system, and adding additional capability to extend the 345 kV system into the region – expands the ability to deliver more wind from the Western Maine region onto the grid. The amount of additional wind that could be added and delivered to the grid, given these types of upgrades, depends on a number of factors. It depends on the type of interconnection service used by wind resources in the region, and it depends on the grid conditions at any point in time, including the level of load and the output of non-wind resources (hydro, biomass) in the region at that time.

These upgrades allow for increased "firm" transfer capacity out of the region, but they also could allow additional energy to flow from wind resources than the level of "firm" increase might otherwise indicate.[35] As noted in the CMP submission to the New England States Committee on Electricity (NESCOE):

> "A series of 115 kV upgrades, including CMP's proposed Section 241, has been identified that would increase the summer transfer capability out of the Upper Kennebec area to about 550 MW. A three step series of 345 kV upgrades could increase the summer transfer capability to nearly 760 MW for step one and to 916 MW and to 1382 MW for steps two and three. A conceptual level cost estimate, consistent with ISO-New England Planning Procedure No. 4 Attachment D, Estimate Class A, for this full build out is $553 Million." (page 5)

If ISO-New England finds that the Western Maine upgrades benefit the entire grid (through lower production costs, for example) then the project could be eligible for regional cost sharing. If not, then the costs would need to be paid by some combination of local load (CMP load) and interconnecting generators. To estimate the full range of possible costs, we "bookended" their effect by calculating the annual revenue requirement stream necessary to support these investments, and allocating the resulting costs either to all New England load, or to a subset of Maine load. Tables 1 and 2 below illustrate both sets of findings for CMP.

[35] Additional capacity on the transmission lines exists beyond that indicated by the "firm" transfer level. Firm transfer levels are computed using definitive assumptions about load and generation in the region. There will be times when additional transfer of wind energy can be reliably accommodated on the grid.

Table 1 –Revenue Requirements for Western Maine Transmission Expansion

Western Maine Renewable Integration Study	**Costs ($ millions)**	**Annual Revenue Requirements ($ millions)**	**Est. New England Load, TWh**	**Est. CMP Load, TWH**
High costs – 345 kV +115kV	553	99.5	130	9
Low costs – 115kV only	340	61.2	130	9
Note: Annual revenue requirements assume 18% fixed charge rate.				

Table 2 –Rate Impacts of Transmission Allowing More Western Maine Wind

	Rate Impact, $/MWh		Rate Impact, % of Total Bill	
Transmission Expansion Scenario	All New England, $/MWh	CMP Only	Costs Allocated to All of New England	Costs Allocated to CMP Only
High costs – 345 kV +115kV	0.77	11.06	0.6%	8.0%
Low costs – 115kV only	0.47	6.80	0.3%	4.9%
Note: Rate impacts exclude any production cost benefits from wind.				

As Table 2 shows, the rate impact on CMP customers is very small if the costs are allocated to all of New England load, less than a 1% impact or less than $1.00 per month for a residential customer with average usage. If the costs were to be allocated solely to CMP load, the rate impact would be considerably higher, as much as 8% higher if the full 345 kV build-out was done.

2. Observations and Opportunities

The estimates shown in Tables 1 and 2 are approximate, and in particular the high end "bookend" could overstate the impact that would be seen on CMP ratepayers' bills. First, and most importantly, these effects exclude the beneficial market effects of adding on the order of 1,000 MW additional wind to the western Maine grid – generally, energy market clearing prices decline when additional renewable resources are available, as they are "infra-marginal" and lead to lower clearing prices in the regional market. Hence the likelihood of lower energy costs for all customers in New England is not captured in these tables. Second, if it became clear that the costs would have to be borne solely by CMP load, wind developers

would be expected to make an increased cost contribution to cover such reinforcements. These additional developer payments also are not captured in either table. Third, as noted, the level of reinforcement contemplated by the WMRIS study is significant. Some reduced level of reinforcement could still allow for significantly increased levels of wind at lower cost.

Finally, we note that both the NEWIS and the New England 2030 Power System Study[36] reviewed wind resource increases in Maine that are in excess of Maine's 2015 onshore goals, and even in excess of the 2020 onshore goal of 3,000 MW. Numerous transmission build-out scenarios are contemplated in those studies, including dramatically increased 345 kV – or even 500 kV – elements throughout parts of Northern Maine.

We do not address the merits of those studies here, but note that the existing transmission system in Maine not only has the capability to serve 2,000 MW of peak load, but also will be able to export upwards of 2,000 MW more to New Hampshire when MPRP is in service. A more surgical approach to estimating Maine's actual transmission needs to meet its immediate onshore goals would likely find that reinforcement on the order of what is in the WMRIS, along with similar magnitude increases for wind-rich regions in the BHE service territory, could suffice to integrate the level of onshore wind contemplated by Maine's 2020 goals.

XII. Greenhouse Gas Reductions Arising from Maine Wind Resources

1. Analysis

ISO-New England manages a wholesale electric energy market system that identifies clearing prices based on bids from power generators in each hour of the day. Typically, all available power generators are present in a supply curve representing a diversity of resources, including coal, natural gas, oil, nuclear, hydroelectric, pumped storage, imports (from New York or Canada) and non-hydro renewable supplies. Natural-gas fired units currently represent a plurality of generation resources in New England. In 2010, natural gas generated 57,579 GWh, or 45.6% of the ISO-New England region's energy.[37] Natural gas is generally the

[36] ISO-NE commissioned a study to evaluate transmission needs, among other things, when considering a 2030 power system in New England that included significantly increased levels of wind, including large quantities in Maine. Available at http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/reports/2010/economicstudyreportfinal_022610.pdf.

[37] ISO-NE, 2011 Regional System Plan, October 2011, page 9.

"marginal fuel" for dispatch of the New England power system for most periods[38], which means that any increases in wind energy injected onto the ISO-New England transmission grid would generally be accompanied by decreases in natural gas generation.

However, as the ISO-NE Wind Integration Study (NEWIS) notes[39], on average wind does displace a small amount of non-gas resources also (in particular coal and imports), during some hours.[40] The graphic below illustrates displaced energy from various wind penetration regimes in New England. The graph is based on the results of the NEWIS production cost runs, using dispatch assumptions selected by the NEWIS authors to model New England generation resources for different scenarios of wind penetration.[41]

Figure 1. ISO-NE Wind Integration Study – Displaced Energy Resources from Wind

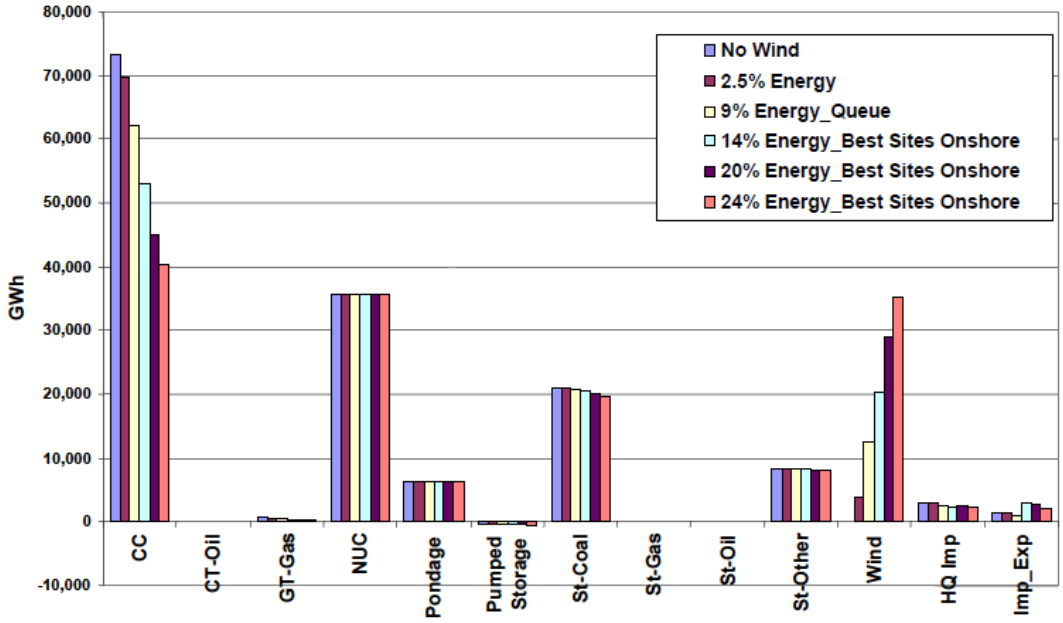


Figure 5–3 ISO-NE generation by type, S-o-A forecast, Best Sites Onshore

[38] ISO-NE, 2010 Annual Markets Report. "In wholesale electricity markets, the price is set by the marginal resource (i.e., the one that will serve the next increment of load). In New England, the marginal resource typically is a natural gas unit, but when loads are high, the marginal resource may be a more expensive oil unit." Page 1. Available at http://www.iso-ne.com/markets/mkt_anlys_rpts/annl_mkt_rpts/2010/amr10_final_060311.pdf.

[39] GE Energy Applications and System Engineering, EnerNex Corporation, AWS Truepower, "Final Report: New England Wind Integration Study", December 5, 2010, prepared for ISO New England.

[40] For example, during periods of low load and high wind output, gas-fired resources may be turned off or turned down to their lowest operating levels, and the next lowest-cost supply resource, the costliest-to-operate coal units, would then be turned down or off. The actual dispatch economics could be more complex, involving not just short-term dispatch algorithms but also longer-term (day-ahead, multiple-day-ahead) unit commitment decisions.

[41] NEWIS, Section 5.1 Assumptions, page 208-211.

Source: ISO-NE Wind Integration Study, page 213.

As is seen in Figure 1 above, when wind output increases, gas-fired combined cycle ("CC") resources drop from modeled output levels of roughly 73,000 GWh per year ("No Wind" scenario) to as low as roughly 40,000 GWh per year ("24% EnergyBest Sites Onshore" scenario). Gas turbine output ("GT-gas") also declines, albeit from a very small base level. With the exception of steam coal ("ST-coal") and imports ("HQ imp"), other generation resources remain roughly flat. It is the combined cycle natural gas generators that show the greatest impact from incremental additions of wind generation to the New England grid.

The wind scenarios modeled include significant levels of Maine wind. For example, the wind integration study assumes the following levels of wind in Maine for the purposes of determining the displaced energy shown in the graph above:

- 2.5% Energy.....429 MW in Maine
- 9% Energy Queue.....2,681 MW in Maine
- 20% Energy Best Sites Onshore:.....7,001 MW in Maine

Regardless of the particular level of new wind generation in Maine, the production simulation results illustrate that the existence of Maine wind results in reduced energy from resources across New England, concentrated primarily on gas-fired generation.

The figure below, taken from the NEWIS, is one representation of the emission reductions arising from wind energy injected onto the New England grid. Generally, the range of greenhouse gas ("GHG") reductions – represented by the "CO2 rate" seen below – is in line with the saved emissions from natural gas-fired combined cycle power plants, blended with some displacement of other resources that include Hydro Quebec imports and steam coal. The value is roughly 850 lbs per MWh in the graph below. Note that the graph below is from a GE MAPS production cost run conducted as part of the NEWIS.

Figure 2. ISO-NE Wind Integration Study – Emission Reductions from Wind

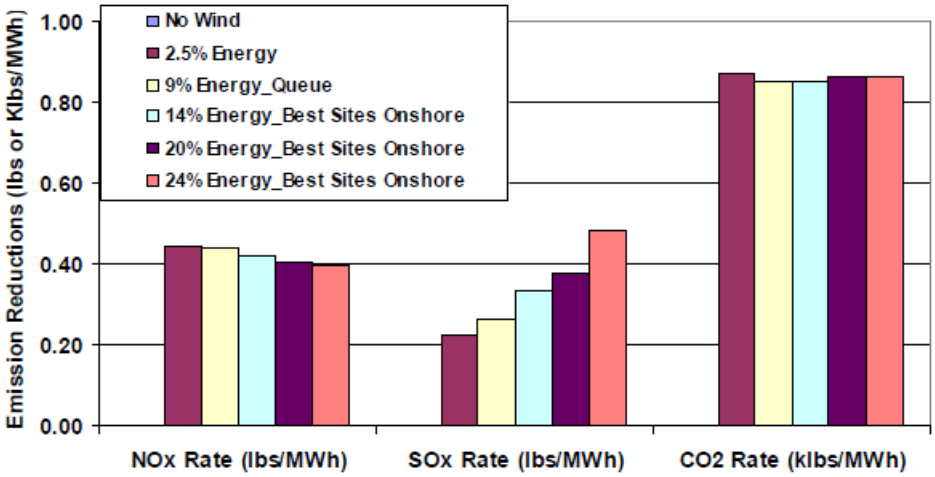


Figure 5–9 ISO-NE total emission reduction per MWh of wind generation S-o-A forecast, Best Sites Onshore

Source: ISO-NE Wind Integration Study, Final Report, December 17, 2010, page 217.

Another ISO-New England study of emissions by marginal generation, for example, shows slightly higher "average" marginal emission rates[42] of 930 lbs./MWh in 2009, and even higher rates for selected earlier years.[43] For example, marginal emission rates for CO2 in 2005 were 1,107 lbs./MWh, and 1,004 lbs./MWh in 2007. Year-to-year variation in "average" marginal emission rates will depend on the relative load level and the available generation resources. For example, higher loads require moving "up" the regional system supply curve, usually tapping into higher-heat-rate units whose emission rates will be higher, all else equal. Over time, the resource base itself will change, as retirements and additions will affect the set of marginal units applicable in any given year.

Thus, it is reasonable to estimate that wind generation in Maine will generally displace natural gas-fired generation in the dispatch order, and produce greenhouse gas reductions in proportion to gas-fired generation's GHG emissions. The table below summarizes GHG (CO2) emission rate reductions for different Maine wind penetration rates, assuming the 2009 marginal emission rate for CO2 in New England, and making assumptions about the capacity factor of Maine wind resources:

[42] Marginal emission rates vary by hour, as different generators (individual, or multiple) comprise the "marginal" economic unit. The "average" marginal emission rate is the average annual hourly rate associated with the units that are marginal for each hour.
[43] ISO-NE, 2009 ISO-NE Electric Generator Air Emissions Report, June 2011, Table 5.10, page 24.

Table 3. New England GHG Reduction Due to Maine Wind

Time-frame	On-shore MW	Est'd Capacity Factor Onshore	Onshore Energy GWh/yr	Off-shore MW	Est'd Capacity Factor Offshore	Offshore Energy GWh/yr	Total Energy GWh/yr	Est'd GHG Reduction Factor (lbs/MWh)	Est'd GHG Reduction (Tons)
2011	346	32.6%	988	0			988	930	459,465
2015 Target	2,000	33.0%	5,782	0			5,782	930	2,688,444
2020 Target	2,700	33.0%	7,805	300	40%	1,051	8,856	930	4,118,207
2030 Target	3,000	33.0%	8,672	5,000	40%	17,520	26,192	930	12,179,466

Source: Synapse Energy Economics, tabulation based on current Maine wind plants, ISO-NE data on marginal emissions, capacity factor estimates for wind, and Maine wind targets.

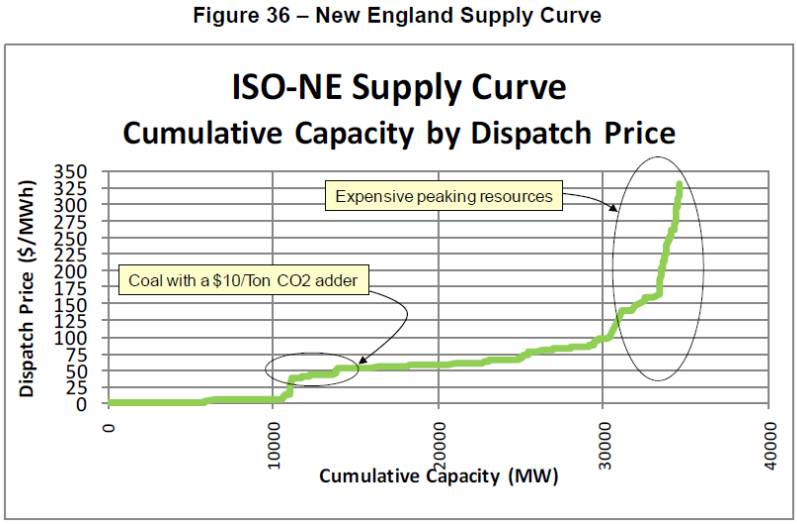
Thus, if Maine were to achieve the wind energy goal for 2015 of 2,000 MW and if those turbines actually operated with a capacity factor of 33%, we estimate that these wind turbines would cause an annual Greenhouse Gas reduction of 2,688,444 tons that otherwise would have been emitted in New England, primarily by natural gas-fired generators. That 2.6 million reduction corresponds to 5.4% of all New England's CO2 emissions in 2009 and the 4.1 million ton and 12.1 million ton reductions shown in Table 3 for 2020 and 2030 respectively account for 8.3% and 24.7% of New England's total CO2 in 2009. New England's 2009 total was 49,380,000 tons.

The accuracy of the estimates of greenhouse gas reductions arising from wind resources in Maine depends, of course, on the set of assumptions used in the modeling of displaced energy. Variations in estimates of greenhouse gas reduction arising from injection of wind onto the grid are not unusual – there are several factors that must be considered, and they can reasonably vary. Those factors include the set of resources that make up the system supply curve; their heat rates (either "average" heat rates or "incremental" heat rates[44]) and capacity factors; estimates of variable O&M costs for all resources; and the fuel price forecast. These factors define the shape and sequencing of elements of the system supply curve. For example, below[45] is a representation of New England's supply curve that illustrates both low-cost base-load resources like coal units and high-price peaking resources:

[44] An average heat rate is usually associated with the full plant output, and is sometimes referred to as the Full Load Heat Rate. In reality, thermal power plants have different heat rates (i.e., the measure of efficiency of converting fuel (BTUs) to electricity (MWh)) depending on the level of output of the given plant. Some modeling tools utilize only the average heat rate, and some allow greater granularity and use a set of incremental heat rates at different points of output for the plant.

[45] ISO New England, "New York/New England Economic Study Process Report and Illustrative Results", June 29, 2011, page 44.

Figure 3. Representation of New England's System Supply Curve



Source: ISO-NE, New York/New England Economic Study Process Report and Illustrative Results, page 44.

Additionally, estimating Greenhouse Gas Reductions that are attributable to wind generation must necessarily look at wind output at different hours of the year in order to determine which energy is displaced in those hours from the system supply of resources. Wind supply curves usually take into account variations in output across the seasons, and diurnally. Depending on location and weather, the actual output of any given wind plant or collection of plants will vary and sites with the same average annual capacity factor could have temporal output patterns that differ, sometimes dramatically. A good example is the comparison between onshore and offshore wind resources. Offshore wind resources not only exhibit relatively higher average annual capacity factors than "average" onshore wind resources, but they tend to have greater output levels during summer peak periods. In New England, the marginal emission rate of the system during summer peak periods is greater than average annual marginal emission rates, since higher heat rate units are brought online to meet higher summer peak loads. Thus estimates of Greenhouse Gas reductions attributable to off-shore wind turbines are likely to be higher than those attributable to on-shore wind generators, all things being equal.

2. Observations and Opportunities

We urge that future analysis of this issue in Maine utilize the most up-to-date information available from ISO-New England on actual and projected marginal emission rates from New England marginal generation when GHG reduction effects are estimated in the future. For the near-term, this generally implies GHG reduction factors on the order of 1,000 lbs. CO2/MWh of wind energy output.

However, the best way to ensure accuracy is to run a production cost simulation with the most up-to-date inputs for supply and demand levels and patterns, fuel prices, and variable operation and maintenance costs.

XIII. Decommissioning Planning

LURC's "Application Guidance and Checklist" for wind projects provides general requirements for decommissioning planning in three areas: 1) demonstrate that the applicant's present and future finances are adequate to fully fund necessary decommissioning costs; 2) identify all physical structures on the site to be removed and restored, consistent with a final detailed plan; and 3) explain under what conditions decommissioning would commence and the agency would be notified. More detailed requirements are presented in an appendix to LURC's "Application Guidance and Checklist" which are virtually identical to those employed in DEP's review of wind permit applications.

Over time both agencies have come to focus on a set of key considerations, as the permitting of wind facilities has evolved since the Mars Hill project. These key considerations include: the size of the fund itself (net of estimated salvage values); the date by which the decommissioning reserve will be fully funded; the mechanism for ensuring that funds are not diverted for unrelated purposes; and criteria that trigger the start-up of decommissioning or allow its deferral. We will turn to each of these factors in turn, in light of comments made by interviewees about each factor.

1. Adequacy of Decommissioning Fund Amounts

It is clear to all participants in debates over wind permitting that an adequate and workable plan for dismantling a turbine farm at the end of its life is necessary. There is no dispute over the necessity of removing from ridgelines and other remote sites structures that, at the end of their useful lives, cannot be converted to another use. What is in dispute is the framework for assembling a dollar estimate for an event presumed to occur in the distant future. Environmental regulators have not had much experience with an actual decommissioning or in verifying the financial capacity of project owners. It is not usual for environmental regulators to delve in depth into the financial capability of a project owner, for any type of Site Law application. In fact, to date most industrial permits move forward without any type of decommissioning requirement at all. The only noteworthy exceptions are nuclear power plants and their related facilities, and solid waste facilities. Generally environmental agencies are not required to consider how to fund an engineering effort that will likely take place fifteen years in the future.

What also is subject to dispute is the reasonableness of accounting for future salvage values for steel and turbine equipment. Because most wind turbine manufacturers claim at least an expected twenty year life for a turbine (and provide warranties for the first two to five years of operation), regulators are required to rely on distant projections of value at the end of a project's life. Inevitably these estimates are challenged by critics as speculative and defended by the project developer as conservative. In fact, project developers routinely refer to the possibility of "repowering" a wind project for another twenty years of operation at the same site, after key components are replaced and upgraded. Developers also assume that there will be a market for old equipment and for used turbines twenty years in the future. The sites themselves unquestionably could have value for future wind operations, given the fact that "it will be increasingly difficult to permit anything", in the words of one developer. Some opponents agree with this assessment. Access to the transmission grid by itself is regarded as so valuable that, for some developers, repowering is more likely than decommissioning in year 20.

The reason that surplus values loom large in decommissioning discussions at LURC and DEP is that developers of these projects assume them to be nearly as large as the costs of physically restoring the site, removing all equipment and footings to a depth of 24 inches and taking away (or using as fill for roads) all decommissioned material from the site. [46] As shown below, estimates of surplus value can come to as much as 97% of total projected decommissioning costs. Projects are listed in the order of final permits from January 2008 for Stetson I to the pending application for Bowers Mountain (now withdrawn). The Highland application has been withdrawn and the Saddleback Ridge permit has been appealed.

[46] It is noteworthy that in its most recent decision granting a Certificate of Public Good to a wind project proposed by Green Mountain Power, the Vermont Public Service Board specifically declined to credit in advance any surplus value as an offset to decommissioning funds: "The amount of the fund may not net out the projected salvage value of the infrastructure." Joint Petition...Lowell Mountain, Docket No. 2626, Findings and Order, May 31, 2011, p. 174. Available at: http://psb.vermont.gov/sites/psb/files/orders/2011/7628FinalOrder%20CPG%20Attachment%20A-2.pdf

Table 4: Permitted Projects from January 2008

Project	# Turbines	MW/ turbine	$ Collection	Year Fully Funded	% Surplus
Stetson I	38	1.5	$1,336,550	Year 15	NA
Stetson II	17	1.5	$374,000	Year 15	96.5%
Kibby Wind	44	3.0	$3,149,514	Year 10	NA
Kibby II	11	3.0	$2,458,281	Year 15	56.5%
Rollins	40	1.5	$794,000	Year 15	96.9%
Record Hill	22	2.3	$828,215	Year 15	NA
Oakfield	34	1.5	$935,531	Year 15	94.9%
Oakfield II	50	1.5	$1,425,000	Year 15	74.6%
Spruce Mtn	10	2.0	$349,052	Year 13	73.9%
Saddleback	12	2.75	$558,414	Year 12	59.0%
Highland	39	2.3	$1,212,186	Year 15	83.6%
Bull Hill	19	1.8	$545,000	Year 7	86.8%
Bowers	27	2.3/3.0	$537,600	Year 7	95.8%

Table 5: Summary of Decommissioning Costs

Range of decommissioning collections per turbine	$163,885 high and $19,850 low
Average for sample of decommissioning collections, per turbine	$39,844/turbine
Average for 10-project sample of surplus/scrap value as % of collection	81.9%

Note: This sample excludes two projects that are below-utility scale in size (Beaver Ridge and Vinalhaven) plus a number of projects that are under development but not yet at the permitting stage. "NA" means not available. The 42 MW Mars Hill project is excluded because its permit preceded the 2008 Wind Law.

As the chart demonstrates, there has been a recent trend towards having decommissioning reserves fully funded at an earlier date. More recent permits have also required the periodic updating of decommissioning plans with a "regulatory check-in" every three years at LURC (Bull Hill) or six years at DEP (Saddleback Ridge, Spruce Mountain). There is evident value in the notion of LURC and DEP periodically revisiting decommissioning estimates for each project, given present-day uncertainty about future scrap or resale estimates that make up the surplus value element in each decommissioning estimate. Additionally, that surplus value component corresponds to a very large share of total decommissioning reserve

requirements, at 82% on average in the above project sample and as much as 97% in individual cases like Rollins or Stetson II.

Finally, there is a noteworthy amount of variation in the decommissioning reserve requirements for different projects. The variation between the most expensive project on a per-turbine basis, Kibby I and II, and the least costly, Rollins Mountain, could be explained by the length of the transmission line required for an especially remote site or by a decision to bury transmission cable more than 24 inches below the surface, thus permitting it to remain in place (and not be removed) during decommissioning. But this degree of variability among successive decommissioning estimates is another reason justifying a periodic "regulatory check-in" for decommissioning cost assumptions, on a pre-determined schedule.

2. Date for Full Funding of Decommissioning Reserve

Similarly, over time the expectations of regulators as to when the decommissioning collection must reach 100% of the permitted amount have changed as well. With little variation, earlier permits set the date for full funding at year 15 with the expectation that a twenty year (or more) useful life for all turbine equipment provides comfort that projects would operate reliably at least that long. Critics have expressed strong doubts on that score, arguing that projects could be abandoned well before year 15, even just after operations begin, if the market for wind power or RECs were to dry up in the face of more attractive alternatives. They also contend that the availability of federal production tax credits, TIFs and low finance costs mean that developers don't have "much skin in the game" and could opt to walk away from an unprofitable project at any time.

Whether regulators have found these arguments persuasive or not, by 2010 DEP was prepared to require full funding of decommissioning reserves by year 12 or 13 and by 2011 LURC was requiring full funding by year 7. Recent trends in the permitting of Spruce Mountain, Saddleback Ridge, Bowers Mountain and Bull Hill appear to favor 100% funding of estimated decommissioning requirements years prior to the 15th year of operation.

3. Mechanisms for Protecting Funds for Use When Needed

Regulators are mindful of the risk that a Limited Liability Corporation that owns only one asset could prefer bankruptcy to actually performing – and paying for – the decommissioning of a wind farm. Some opponents have referred to this as "the Enron example" where an underfinanced project collapses with spectacular harm. For this reason, standard permit conditions for wind projects include requirements

that decommissioning payments be made "in the form of a performance bond, surety bond, letter of credit, parental guaranty or other acceptable form of financial assurance." DEP's most recent permits require that initial payments supporting a third-party letter of credit or escrow account begin before commercial operation and increase by 20% through year 12, reaching 100% in year 13. DEP further requires that it become an "obligee of any performance bond" with a "right to call the bond in the event of any non-performance".

Critics and intervenors in the LURC and DEP permitting process generally have argued that the harm resulting from non-performance is so severe that the risk of early abandonment of a project must be protected against by requiring full funding of the decommissioning reserve before commercial operation actually begins. They point to the difficulty that developers have in contracting for the sale of all of a project's output to a single electric purchaser in New England's complicated wholesale power market, and the resulting risk of power sales not covering project costs, including decommissioning. They argue that taxpayers could be compelled to cover substantial short-falls in the funding that would be available to pay for decommissioning the project. To date, neither LURC nor DEP has accepted these arguments for 100% prefunding but recently both agencies have specified the annual amount that an owner must pay into the decommissioning reserve beginning prior to the first year of commercial operation.

In the case of the owner of the Kibby projects, TransCanada, LURC has accepted a "Parental Guarantee" from the parent corporation (whose assets total more than $20 billion in value) as long as the parent's credit rating remains above investment grade. In other cases, the agencies have required binding Letters of Credit, sometimes supplemented with cash payments. While there are instances in which LURC or DEP hasn't yet specified the particular form of financial assurance, DEP Commissioner Patricia Aho ranks providing financial assurance for fully funding decommissioning plans "a higher priority" than all other wind permitting considerations. It appears likely that the periodic re-visits of decommissioning issues for permittees will represent an opportunity to act on this priority.

4. Criteria for Triggering Actual Decommissioning Activity

The final question concerning the reliability of any decommissioning plan is: "how iron-clad is the triggering mechanism that actually starts the process of decommissioning a wind project?" A typical LURC provision in 2008 required that 60 days after a project ceases to generate electricity, the owner must submit a final decommissioning plan "unless the permittee can demonstrate a plan to recommence power generation". Beginning in 2009, the time period for

submission of a final plan has been expanded to 12 consecutive months of no power production in the case of the Stetson II, Rollins, Record Hill, Oakfield I, Spruce Mountain, Kibby II, Saddleback Ridge, Highland, Bull Hill and Bowers Mountain projects.

This rebuttable presumption that a 12-month cessation of power generation will trigger actual decommissioning is, however, subject to claims by the owner that a "Force Majeure" event has occurred entirely relieving the owner of responsibility for immediate decommissioning. The interpretation of "Force Majeure" clauses in contracts or permits is complex and demanding. There is for this reason significant potential in the case of all post-2008 permits for argument over whether decommissioning should actually get underway or not – even if a wind farm has generated no electricity for a full year.

XIV. Number of Turbines

1. Analysis

Maine's 2008 Wind Energy Act established ambitious goals for the development of wind resources for power generation in the state by the years 2015, 2020 and 2030. These goals were a frequent topic of discussion during our interviews with wind power opponents and supporters. Table 6 summarizes these goals.

Table 6. Maine Installed Wind Goals

Total Wind MW	On-shore	Off-shore	By When
2,000	**2,000**	**-**	**2015**
3,000	**2,700**	**300**	**2020**
8,000	**3,000**	**5,000**	**2030**

Table 7 below lists wind plants in Maine currently operating, exclusive of a number of non-utility scale wind projects that also are operational.[47] Current wind capacity totals 345.5 MW, or roughly 17% of Maine's 2015 goal of 2,000 MW. These projects contain a total of 183 turbines, at an average size of 1.9 MW per turbine. As is seen in Table 7, most of the projects use 1.5 MW turbines, with two projects using 2 MW and 3 MW turbines.

[47] Operational or planned small wind projects include those at the Saco train station, Port Service Authority in Jackman, University of Maine at Presque Isle, Beaulieu (Madawaska), and Camden Hills Regional School. These projects total 1 MW; others may also exist.

Table 7. Currently Operating Maine Wind Plants

Project	MW Installed	# Turbines	Ave. Size (MW)
Kibby	132.0	44	3
Rollins	60.0	40	1.5
Stetson I	57.0	38	1.5
Mars Hill	42.0	28	1.5
Stetson II	25.5	17	1.5
Spruce Mtn	20.0	10	2
Beaver Ridge	4.5	3	1.5
Vinalhaven	4.5	3	1.5
Total	**345.5**	**183**	**1.9**

Note: Excludes small wind.
Source: Synapse Energy Economics, tabulation of data from multiple sources, including NRCM, US DOE/EE/RE Wind Power America New England Wind Project database, Maine developer web sites

Table 8 below lists planned, proposed wind plants or projects under construction in Maine. As is shown, the average turbine size is greater than that seen with the existing set of wind plants in Maine. In general, there has been a gradual increase in average turbine size throughout the United States[48], as the economies of scale of larger turbine size are captured.

Table 8. Planned, Proposed or Under Construction Wind Plants in Maine

Project	MW Installed	# Turbines	Ave. Turbine Size (MW)	Turbine Size Comments
Bingham	49.7	22	2.3	Estimated
Bowers Mtn/ Passadumkeag	69.1	27	2.6	2.3/3.0 MW Mix
Blue Hill	34.2	19	1.8	
Dundee	32.0	21	1.5	
Fletcher Mtn	60.0	26	2.3	Estimated
Highland	117.0	39	3.0	
Kibby Expansion	33.0	11	3.0	
Longfellow/ Black Mtn	40.0	19	2.1	
Record Hill	50.6	22	2.3	

[48] Wiser, Ryan and Mark Bolinger, US DOE, Energy Efficiency and Renewable Energy, Lawrence Berkeley National Laboratory. 2010 Wind Technologies Market Report, page 29.

Revised Oakfield	150.0	50	3.0	
Saddleback Ridge Wind Project	33.0	12	2.8	
Spruce Mtn Increase	18.0	9	2.0	Estimated
Timber Wind – Canton	22.0	8	2.8	
Timber Wind – Dixfield	33.0	13	2.5	
Wind Proj. Phase 4 (MPS Queue #8)	250.0	110	2.3	Estimated
Wind Proj. Phase 5 (MPS Queue #9)	150.0	65	2.3	Estimated
Total	**1,141.6**	**473**	**2.4**	

Source: Synapse Energy Economics, tabulation of data from multiple sources, including NRCM, US DOE/EE/RE Wind Power America New England Wind Project database, Maine developer web sites, ISO-NE interconnection queue, MPS interconnection queue.

The combination of existing and proposed, planned or under-construction wind farms in Maine shown in Tables 7 and 8 currently totals 1,487.1 MW (345.5 MW existing plus 1,141.6 planned). It includes an estimate of 400 MW of proposed wind in a part of Aroostook County[49] that may underestimate the actual level of current development interest in that region.

If all of these proposed projects were completed with the currently proposed number of turbines and turbine size, the total installed MW falls short of Maine's 2015 goal (2,000 MW of onshore wind) by fully 513 MW. Note, however, that if the earlier, aggressive plans for the full 800 MW of Aroostook County wind were still considered as part of conceptual plans for Maine, the shortage towards the goal reduces to 113 MW, a gap which could be bridged through use of larger turbine sizes than currently proposed at some locations.

[49] The two remaining "active" queue entries associated with an originally-planned 800 MW phased wind development (located at the southern end of the Maine Public Service territory) total 400 MW, and have been included in this tabulation. Other "phases" of this proposal have been withdrawn from the queue, though their likelihood of development is unclear at this time.

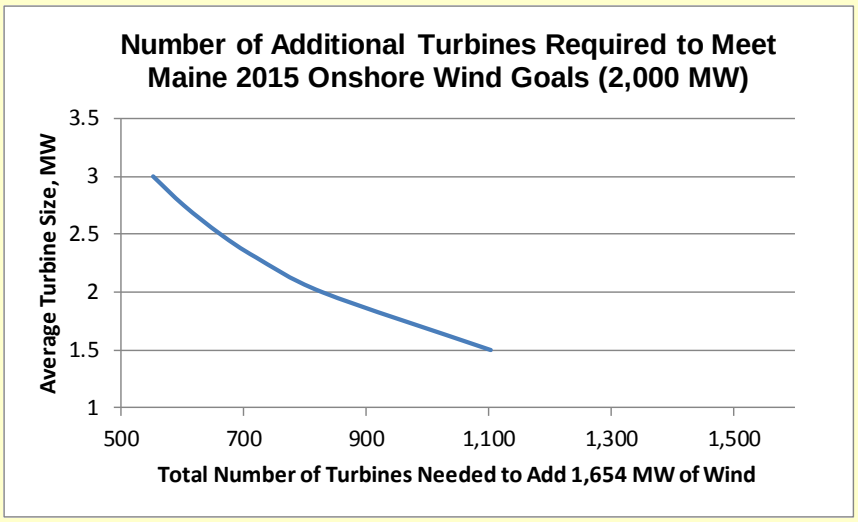
To attain Maine's 2015 goal of 2,000 MW of onshore wind, a total of 1,654.5 MW of wind would need be installed between now and 2015 (2,000 minus 345.5 MW existing). The total of proposed or planned wind plants shown in Table 8 (1,141.6 MW) falls short of this target by 513 MW. Using the ISO-New England "active" generation interconnection queue as a stand-alone data source, the level of queued wind generation in Maine totals 1,675 MW, slightly exceeding the number of MW required to meet Maine's 2015 onshore installed wind goal. That listing contains unnamed entries, some of which likely overlap with the entries listed in Table 8.

Beyond existing wind plants, the number of turbines required to meet the 2015 onshore goal (equal to an incremental 1,654.5 MW) or the 2020 onshore goal of 2,700 MW of wind (an incremental 2,354.5 MW) depends on the mix of turbine sizes considered and used by potential projects. The figures below illustrate the range in the total number of turbines required under different mixes of turbine sizes available on the market today; the maximum size available is roughly 3 MW.[50] Generally, we would expect that developers would utilize larger turbine sizes and capture economies of scale, where feasible. To reach the 2015 goal using solely 1.5 MW wind plants, no less than 1,103 turbines would be required. If the average turbine size reflected that of proposed plants shown in Table 8 (at 2.4 MW per turbine),[51] the number of turbines required would be 685. If the average turbine size were 3 MW, no fewer than 552 turbines would be required.

[50] Given current offshore turbine sizes exceeding 3 MW and ongoing industry development, onshore turbine size increases above 3 MW would be expected over the next decade.

[51] Alternatively, if the currently-proposed plants all used 3 MW turbines, the shortfall would be reduced (to 236 MW, from 513 MW) and could be made up with 79 additional turbines at 3 MW each, or roughly the size of two additional wind farms (beyond those currently proposed) at 40 turbines each.

Figure 4. Range of Number of Additional Turbines Required to Meet Maine's 2015 Onshore Wind Goals



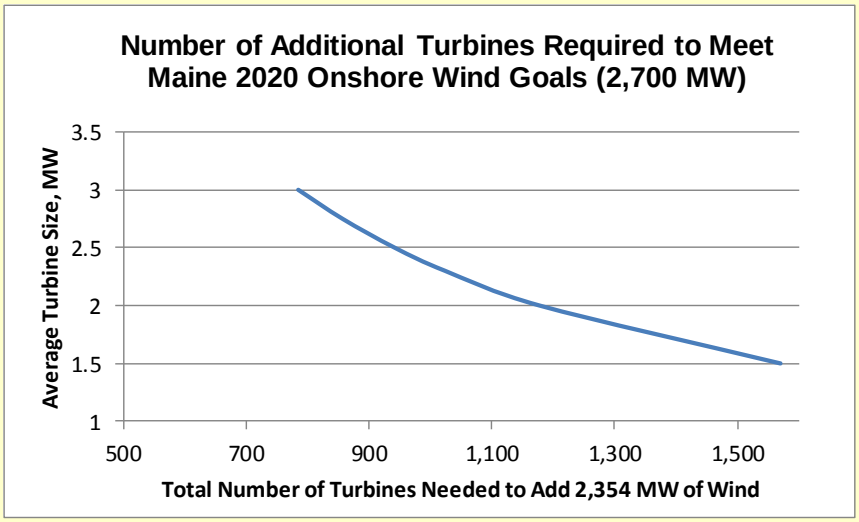
Incremental MW Needed

# turbines	Ave. MW	MW Total
1,103	1.5	1,655
828	2	1,656
720	2.3	1,656
662	2.5	1,655
602	2.8	1,656
552	3	1,656

Source: Synapse Energy Economics, based on data in Tables 7 and 8.
Note: If the 2015 goal were to be met in part with smaller turbines at "small wind" or similar types of sites, the total number of turbines would be greater, but subsequently the number of utility-scale turbines required at larger wind farm developments would be lower than the totals shown here.

The figure below lists the incremental number of turbines required to meet Maine's 2020 onshore wind goal (2,354.5 MW = 2,700 MW goal minus 345.5 MW existing).

Figure 5. Range of Number of Additional Turbines Required to Meet Maine's 2020 Onshore Wind Goals



Incremental MW Needed

# turbines	Ave. MW	MW Total
1,570	1.5	2,355
1,178	2	2,356
1,024	2.3	2,355
942	2.5	2,355
857	2.8	2,357
785	3	2,355

Source: Synapse Energy Economics, based on data in Tables 7 and 8.

To reach the 2020 goal for on-shore wind generation, using 1.5 MW wind plants, no less than 1,570 additional turbines would be required. If the average turbine size were identical to that of proposed plants shown in Table 8 (at 2.4 MW per turbine), the number required comes to 976 turbines. If the average turbine size were 3 MW, no fewer than 785 additional turbines would be required at on-shore locations.

Because the 2020 Wind Energy Act goals specify that 300 MW of new capacity are to be at off-shore locations in coastal Maine, in addition to the totals shown in the figures above, offshore locations would need on the order of 60 to 100 turbines, less than the size of the Cape wind project. Offshore turbine sizes currently installed in Europe average 3.2 MW and prospective projects plan to utilize 5 MW class turbines.[52] The Cape Wind project proposes 130, 3.6 MW turbines.[53]

Regardless of the ultimate choice of onshore turbine size, it is clear that the pace of utility-scale wind development in Maine would have to significantly accelerate (relative to the pace of installations – roughly 75 MW per year on average - seen in the four years from January 2008 through the end of 2011) in order to achieve the 2015 Wind Energy Act onshore goal, or the 2020 Wind Energy Act goal at both on-shore and off-shore locations.

To summarize, achieving in three years the 2015 statutory goal will require installation of 1,654.5 MW of new wind capacity. Sixty-nine percent of this goal could be met by the 1,142 MW of proposed projects in Maine (if they all came to fruition). But the shortfall – 513 MW – would still require an additional 213 turbines (at an average turbine size of 2.4 MW), or roughly 4-6 medium-to-large wind farms in addition to those already proposed.[54]

Thus, there is still a significant shortfall to meeting 2015 goals even assuming all the proposed plants come online.[55] In the prior four years of intense wind development in Maine (January 2008 through year-end 2011) only 302.5 MW had come to commercial operation (see Table 7 total of 345.5 MW, less the Mars Hill project at 42 MW, online in 2007). This represents roughly 75 MW per year on

[52] European Wind Energy Association, "The European Offshore Wind Industry Key Trends and Statistics 2010", January 2011.
[53] See www.capewind.org.
[54] For example, at an average turbine size equal to the current set of proposed plants, 2.414 MW, 4 wind farms at 53 turbines each (512 MW), or 6 wind farms at 35 turbines each (507 MW) would essentially meet the shortage.
[55] We note that it is unlikely that all pending applications will be granted in view of FirstWind's withdrawal of its 69 MW Bowers application and the withdrawal of the 117 MW Highland application. There is at the least some doubt that this 186 MW total for both projects will come on line.

average. To meet the January 1, 2015 goal, Maine will need to average 552 MW per year (in years 2012, 2013, and 2014). Granted, development and permitting activity for some of the existing queue is well along and the average annual installation rate could well increase (beyond the rate seen for 2008-2011) over the next few years without a change to the current permitting processes; but nonetheless, the 2015 goal can be met *only* if wind permitting accelerates in Maine over the next three years. The average installation rate of 552 MW per year (above what currently is operational) required to meet the 2015 goal clearly is also significantly more aggressive than the rate required for the 2020 goal – which averages out as 294 MW per year between 2012 and 2020.

2. Observations and Opportunities

Many interviewees commented on how aggressive these Wind Energy Act goals are – or how unrealistic. Industry representatives in a few cases spoke with disillusionment about how the enthusiastic level of political support for wind development that accompanied enactment of the 2008 Wind Energy Act has faded today and how widespread town moratoria have become in restraining further development. According to an industry spokesperson "...it has not turned out to be the case" that wind permitting in Maine is easy or not contentious. One developer stated frankly that the major problem with siting wind projects in Maine is the "Not in My Back Yard" phenomenon which, over time, has strengthened statewide and grown more effective in opposing new projects. "The basic objection to change has become quite fierce" in the words of an industry spokesperson. In short, the statutory deadlines – in particular, for 2015 - increasingly look unattainable. Thus many developers appear to accept the notion that the pace of wind siting that the 2008 Act contemplated simply will not be achieved.

At the same time, critics of the wind industry in Maine find the 2015 and 2020 on-shore wind goals unacceptable, based on their understanding of the goals' impacts, and their perception of the implications for Northern and Western Maine. According to a representative of the opponents in Western Maine, the state today is divided into two communities: the people with homes near the wind projects who daily are exposed to a major change in quality of life and property values; and everyone else in the state that seems unaware and unconcerned by these significant but local effects. According to these critics, people who live near turbine sites essentially today are "casualties" of a biased siting policy.

If the 2015 goal appears today increasingly difficult to achieve, there is reason to consider modifications or alternatives that strike a new balance between wind energy output and disrupting mountainous habitat in Northern and Western Maine.

The current goals were selected by a stakeholder process in 2007 that sought consensus behind closed doors on the greatest acceptable scope of wind development in the state. Today after nearly five years of experience we now know much more about how those goals work and what their effects locally and regionally actually are. We also now know how slow wind siting has turned out to be, even with an expedited process. (See endnote on page 55.)

The Appalachian Mountain Club has focused recent attention on the long-range implications of Maine's statutory goals for sensitive high-altitude locales in Western and Northern Maine. As shown, for example, on pages 22-24 of their 2011 publication "Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts" (appended as Attachment 2), the study's authors have identified a set of relatively lower-impact[56] potential locations of sites for new turbine farms as part of their assessment of Maine's statewide goals and cumulative impacts. The authors paint a pessimistic picture of the impact on Maine's ridgelines if the current goals were to be met.[57]

For example, in its "pessimistic" scenario[58], the report notes that development of all of the potentially available sites would *still* result in a shortfall towards Maine's 2015, 2020 and 2030 onshore wind goals. This conclusion is premised on an average wind turbine density of 11.5 MW/mile of ridgeline, which is the average density of the currently installed and permitted sites, as seen in Table 9 below.

Table 9 – AMC Report Data on Existing and Permitted Onshore Sites

	# Turbines	Turbine Size	MW	Ridgeline (Miles)	MW/Mile of Ridgeline	Turbines/ Mile of Ridgeline
Kibby	44	3	132.0	7.8	16.9	5.64
Mars Hill	28	1.5	42.0	3.5	12.0	8.00
Stetson	39	1.5	58.5	6.7	8.7	5.82
Stetson II	17	1.5	25.5	2.5	10.2	6.80
Rollins	40	1.5	60.0	6.8	8.8	5.88
Kibby	11	3	33.0	1.6	20.6	6.88

[56] AMC's report characterizes a potential total of 267 sites along 670 miles of mountain ridgeline throughout the state. Sixty-three of these sites are characterized as "resource value scores less than 12", which means they have the lowest level of ecological impact among the total number of considered sites. See Executive Summary, pages ii-iii.
[57] AMC's analysis of the potential for Maine to achieve its current goals presumes average wind turbine ridgeline density equal to the currently-installed or permitted wind farm sites. If greater turbine sizes were assumed for more of the ridgeline, the cumulative impact would be lower as fewer numbers of turbines would be required to meet the goals.
[58] Page 23.

Exp.						
Oakfield	34	1.5	51.0	6.8	7.5	5.00
Record Hill	22	2.3	50.6	3.7	13.7	5.95
Spruce Mtn.	10	2	20.0	1.8	11.1	5.56
	245	1.9	472.6	41.2	11.5	5.95

Source: AMC Report, Table 1 (page 12) and Synapse computation.

This does not mean that the turbines will not have an impact on viewsheds if the goals are met and a significant portion of the low-resource-value sites are developed. It just means that the goals themselves are of approximately the correct magnitude if the sites to be considered are restricted to the "low resource value" sites that the AMC report categorized, when considering the "pessimistic" scenario. If the more optimistic scenario is considered, then the goals could be met using even less of the "low resource value" ridgeline.

The report's authors note that sufficient wind development to meet the 2030 goals (under the authors' 11.5 MW/mile assumption for ridgeline density requirements) would affect the viewshed[59]:

> "While projects would not be visible from all areas within the eight-mile buffers, it is likely that many significant viewpoints would have one or more projects visible within their viewshed." "If a 15-mile buffer is used, the potential area of impact encompasses the entire Western Mountains region from the New Hampshire border to Moosehead Lake, including large regions outside of the expedited permitting area". (page 24)

It is noteworthy that the 2015, 2020 and 2030 goals are seen in an entirely different light by wind developers and wind critics. Generally speaking, the wind developers we interviewed saw the statutory goals as, at best, aspirational: that is, they were not intended as mandates, established no actual deadlines and represented no commitment by the state about necessary outcomes. They merely were hopes, according to developer interviewees. In contrast, wind critics that we interviewed point to the statutory deadlines as the best available evidence for how far and how fast Maine intends to go in developing the wind resource. The critics see them as binding and compulsory in ways that the industry interviewees never did. Given

[59] See report Map 6, and accompanying narrative on page 24 for a viewshed discussion.

this confusion over what the 2015, 2020 and 2030 goals actually do, it is reasonable to give them a second and closer look.

We suggest three alternatives for making an adjustment to the Wind Energy Act goals that take account of these changed circumstances. There doubtless are many reasonable adjustments to the 2008 Act that the Legislature could make and we don't intend to present these suggestions as superior to all other possibilities. But we do think that it is desirable to engage in discussions that reconsider the appropriateness and value of key aspects of the 2008 Wind Energy Act, particularly with respect to the pace of project development.

First, one could simply choose to eliminate the statutory goal for 2015 in order to buy time for a less drastic transformation of Maine's mountain environments where wind speeds are highest. This change would permit a more realistic pace for wind development in the near future – rather than the near-doubling which the current 2015 goal requires (from 303 MW per year to 552 MW per year). Retaining the 2020 and 2030 goals would ensure that energy policy in Maine would still be guided by a major commitment to the development of the wind resource. More time could also permit a more thoughtful consideration of the role that off-shore wind may be able to play in achieving future wind power goals.

Second, the Governor, the Legislature or DEP could convene a panel of disinterested parties to identify where in Maine expedited permitting could go forward in a way that causes no harm to local residents or environments; this would amount to re-doing the work of the 2007 Wind Energy Task Force that, largely behind closed doors, assembled the original criteria for expedited permitting and its listing of scenic features. The benefit of a public process for moving forward with new wind siting criteria is that it could confer an element of legitimacy that, to date, the expedited permitting process seemingly has lacked. To do so, the process for designating a revised Expedited Permitting Area would have to be considerably more transparent to public review and comment than was the case in 2007, in the opinion of many observers. It may also be desirable to convene a group that is not composed entirely of interested stakeholders as also was the case in 2007. A model that was previously used for a public process that designated an important energy resource was the public consultation that preceded the adoption of the Maine Rivers Act in the 1980s. That process identified three categories of rivers in terms of their suitability for hydro-electric development that are still in place today.

Finally, either as part of a reconvened Task Force for Wind Project Siting or in the form of independent legislation, Maine's Wind Act could be amended to incorporate a notable observation made in the Appalachian Mountain Club "Ridgeline Windpower" study of 2011:

> "The most controversial ecological issue in previous wind power permit applications has been the presence of high-elevation subalpine forest. Undisturbed examples of this community are rare in the state, with only 19 occurrences documented by the Maine Natural Areas Program. This community provides the primary habitat for Bicknell's thrush. These areas may also have important adaptive value by maintaining a component of coniferous forest habitat in a warmer climate future when this habitat has been reduced or eliminated at lower elevations...A comprehensive inventory of this community and associated critical Bicknell's thrush habitat would be invaluable in pro-actively identifying sites that are unsuitable for development and reducing future controversy."[60]

In order to ensure that this rare and sensitive habitat does not become a casualty of headlong wind development in high-elevation portions of Maine, the 2008 Wind Law could be amended to grant authority for excluding high-elevation sub-alpine forest regions and the associated habitat of Bicknell's thrush from eligibility for Expedited Permitting. As small a step as this may be in adjusting Maine's wind permitting process, it is worth considering as a way of avoiding permanent harm to Maine's ecosystems and the state's long-term legacy.

Each of these three possibilities for adjusting the 2008 wind goals or modifying the 2007 Task Force Expedited Permitting designations deserves consideration, in our opinion, in future policy debates over Maine's wind resource. These suggestions are offered in the hope that Maine can achieve a broader consensus in support of its wind energy policies than now exists. Finally, consideration of these three possibilities may create an opportunity to find a better balance than currently exists between capturing the benefits of a zero-fuel cost, non-emitting resource and the costs of its development in precious and sensitive environments.

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[60] "Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts", AMC Technical Report 2011-1, Publicover, Kimball and Poppenwimer, pages 26-27.

ENDNOTE:Using a recent estimate in First Wind's permit applications for the Bowers and Oakfield projects, a considerable amount of terrain is disturbed at the site itself; relying on that estimate of 12,000 square feet per turbine, at least 12 million square feet of mountainous terrain will be disturbed in order to site 1,000 new wind turbines in Maine, an amount greater than 275 acres. There will be additional areas disturbed due to the construction of roads and transmission lines to distant locations.

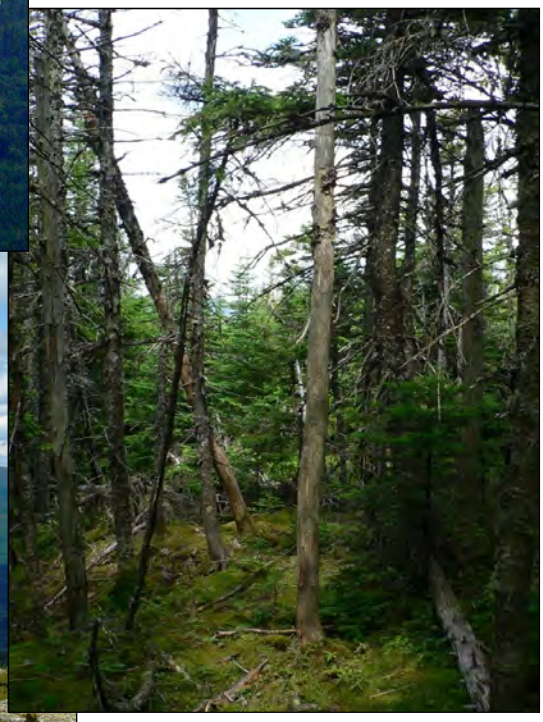
Attachment 1: OEIS Wind Assessment Interviews

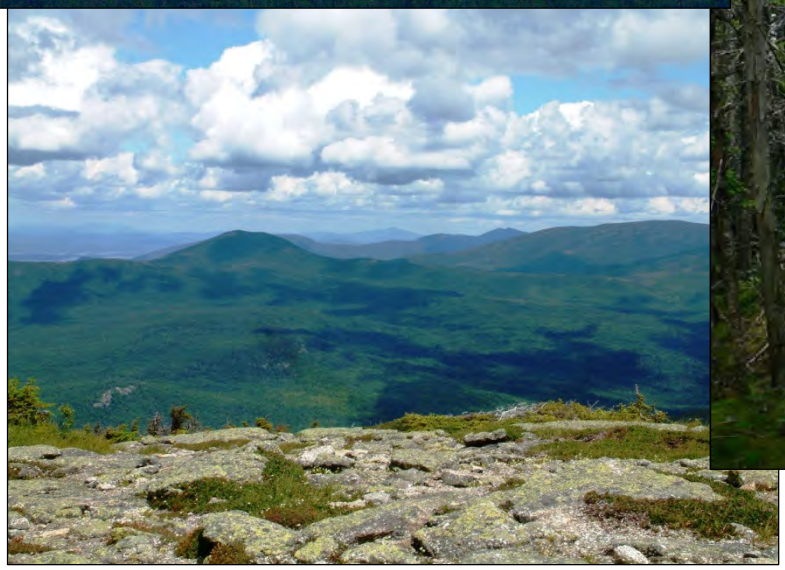
Organizations and Individuals Interviewed for the 2012 Wind Assessment

1. **Appalachian Mountain Club**: David Publicover, Kenneth Kimball
2. **Juliet Browne, Esq.**: Attorney, Verrill Dana
3. **Citizens' Task Force on Wind Power**: Steve Thurston, Monique Aniel
4. **Community Energy Partners**: Sue Jones
5. **Conservation Law Foundation**: Sean Mahoney
6. **Department of Environmental Protection**: Commissioner Patricia Aho, Marybeth Richardson, Mike Mullen, Dawn Hallowell
7. **Terry DeWan**: Landscape Architect, Terrence J. DeWan & Associates
8. **Environment Northeast**: Dan Sosland, Beth Nagusky
9. **Eolian Renewble Energy**: Jack Kenworthy
10. **FirstWind**: Dave Wilby, Neil Kiely
11. **Friends of the Boundary Mountains**: Bob Weingarten
12. **Friends of the Highland Mountains**: Alan Michka
13. **Friends of Lincoln Lakes**: Mike DeCenso
14. **Friends of Maine's Mountains**: Chris O'Neil
15. **Iberdrola**: Neil Habig, Dave DeCaro
16. **Independence Wind**: Rob Gardiner
17. **Island Institute**: Philip Conkling
18. **Land Use Regulation Commission**: Marcia Spencer-Famous, Fred Todd, Samantha Horn-Olsen
19. **Maine Audubon**: Susan Gallo
20. **Maine Geologic Survey**: Bob Marvinney
21. **Maine Office of Tourism**: Abbie Levin, Carolann Ouelette
22. **Maine Public Utilities Commission:** Mitch Tannenbaum
23. **Maine Renewable Energy Association:** Jeremy Payne
24. **NRCM**: Dylan Vorhees
25. **James Palmer**: Scenic Quality Consultants
26. **Partnership for the Preservation of Downeast Lakes**: Kevin Gurall
27. **Patriot Renewables**: Todd Presson
28. **Roxbury Selectman**: John Sutton
29. **Stantec**: Brooke Barnes
30. **TransCanada:** Nick DiDomenico, Christine Langell, Tom Patterson
31. **Vermont DPS/Clean Energy Fu**nd: Andy Perchlik
32. **Lynne Williams, Esq.**: attorney
33. **Woodstock Town Manager**: Vern Maxfield

Attachment 2: Appalachian Mountain Club Technical Report 2011-1

RIDGELINE WINDPOWER DEVELOPMENT IN MAINE: AN ANALYSIS OF POTENTIAL NATURAL RESOURCE CONFLICTS





David A. Publicover, Kenneth D. Kimball and Catherine J. Poppenwimer
Appalachian Mountain Club
Gorham, NH
AMC Technical Report 2011-1

EXECUTIVE SUMMARY

Wind is one of the primary indigenous sources of renewable energy in New England. Encouraged by state and federal energy policies, the last decade has seen the rise of a commercial wind power industry in the region. However, this development has generated considerable controversy. In New England the commercially viable terrestrial wind resource is primarily limited to ridgelines – generally the least developed, most "natural" parts of the landscape and often areas of significant ecological, recreational and scenic value. This has created a potential conflict between two worthy public policy goals – open space conservation and renewable energy development.

This report presents the results of a GIS-based analysis that assesses the relationship between potential ridgeline wind power development sites in Maine and natural resource values of recognized state, regional or national significance for which information is available. The study was undertaken to inform the debate over how to balance ridgeline wind power development with conservation of important high-elevation areas within the state, to provide a comparison of the relative resource value of various potential development sites, and to help understand the tradeoffs that might be involved in promoting particular levels of ridgeline wind power development.

When this project was started there were no operating commercial wind power facilities in the state. Over the past few years, however, there have been significant changes in the industry, technology and public policy. At this time Maine can draw experience from 1) the completion of four commercial "grid-scale" wind power projects, the permitting of five others, and the identification of numerous other projects in earlier stages of development; 2) technological and economic changes that enhance the feasibility of development in lower wind regimes at lower elevation than considered in this study; 3) the work of the Governor's Task Force on Wind Power Development, resulting in the passage of the 2008 Wind Siting law and the delineation of the expedited permitting area; and 4) the initial attempts by the Land Use Regulation Commission to assess the cumulative visual impacts of multiple developments. Where possible these developments were incorporated into the analysis as it progressed[1].

The analysis used publicly available wind resource data to delineate potential development sites, defined as primary ridgelines at least one mile long underlain by modeled Class 4 or greater wind resource. A total of 670 miles of ridgeline at 267 separate sites was delineated. Individual sites were evaluated for their conservation and regulatory status, as well as the extent to which they overlay the following resource values: extent above 2700 and 3500 feet in elevation; rare plant, animal and natural community occurrences; Beginning with Habitat Focus Areas; priority summit ecosystems identified by The Nature Conservancy; large roadless areas; potential Bicknell's thrush habitat; steep slopes; ridgeline ponds; hiking trails; Appalachian Trail viewshed; and statutorily defined scenic resources within three miles. A simple scoring system was used to create a composite resource value score for each ridgeline. Finally, an assessment

[1] There have also been notable advances in the ability to mitigate certain adverse impacts of wind power development that are not directly related to this analysis. These include the availability of FAA-approved technologies that allow for a reduction in night lighting and more subdued tower coloration, and the use of higher turbine cut-in speeds to reduce bat mortality .

was done of the potential cumulative impact of development at a level necessary to meet the legislatively-established goals for wind power development.

Thirty-five percent of the sites lie wholly on conservation land (including conservation easements), another 16% lie partially on conservation land, and 49% wholly on unrestricted private land. Thirty-one percent of the sites lie wholly within the expedited permitting area, another 13% lie partially within the area, and 56% lie outside of it. However, there is a marked difference between conserved and unconserved sites; 75% of the sites on conservation land but only 45% of the sites on private land lie outside of the expedited permitting area. Nearly two-thirds of the sites lie entirely within the jurisdiction of the Land Use Regulation Commission, with only 16% entirely within organized towns. Eleven percent lie partially within LURC jurisdiction and 8% within Baxter State Park.

The results of the individual resource overlays include:

- 48% of the sites (but only 34% of the total length of ridgeline) extends above 2700 feet.
- 44% of the sites have current or historical records for rare plants or natural communities.
- 28% of the sites lie wholly within a Beginning with Habitat Focus Area.
- 8% of the sites have documented rare animal occurrences.
- 19% of the sites overlay priority summit ecosystems identified by The Nature Conservancy's Northern Appalachian – Boreal Ecoregional Analysis.
- 24% of the sites lie entirely within a roadless area of at least 5,000 acres identified by AMC.
- 25% of the sites have at least half their length classified as potential Bicknell's thrush habitat (based on a model developed by the Vermont Institute of Natural Science).
- 6% of the sites contain ridgeline ponds.
- 33% of the sites are accessed by one or more hiking trails, with 13% traversed or crossed by the Appalachian Trail.
- 87% of the sites have at least one significant scenic resource within three miles, with 41% having three or more.

There is a strong relationship between the presence of natural resource features considered in this analysis and the conservation status of the ridgelines. For example, 87% of the sites on "reserve" land[2] but only 8% of the sites on private land lie within a Beginning with Habitat Focus Area, 69% of the sites on reserve land but only 7% of the sites on private land lie entirely within a large roadless area, and 71% of the sites on reserve land but only 8% of the sites on private land contain a hiking trail. This result is not surprising, as conservation of mountains has focused on those areas with the highest known resource value.

The composite resource scoring system weighted all resources equally and allowed a maximum score of 12[3]. The results show a strong concentration of sites at the lower end of the scale (i.e., sites with few identified resources values), with over half the sites scoring less than 2 and nearly

[2] "Reserve" is one of the classifications of conservation land used in the study. About three-quarters of the sites on conservation land lie on reserve land.
[3] An alternative approach that excluded the two scenic resource categories and differentially weighted the others did not lead to significantly different results.

one-third less than 1. The highest scoring sites (between 6.5 and 7.8) were The Horns, Bigelow Mountain, Old Speck and Mount Katahdin.

The clear distinction between conservation and private lands is strongly present in the composite resource scores as well. Over half of the private land sites, but only three sites on conservation land, scored less than 1. Over 80% of the private land sites, but only 12% of the conservation land sites, scored less than 2. At the other end of the scale, 49% of the conservation land sites, but only a single private land site, scored higher than 4.

There is a clear spatial pattern in the distribution of high-scoring sites. Of the 28 highest-scoring sites, 27 are concentrated in four areas – the Mahoosucs, the Western High Mountains, the 100-Mile Wilderness, and Baxter State Park. Fifty-five of the 59 highest-scoring sites, and 83 of the top 100, are concentrated in seven areas – the four previously mentioned plus the White Mountain National Forest, Acadia National Park and the northern Boundary Mountains. Of the top 100 sites, only two - Moxie Mountain and Burnt Hill (the eastern ridgeline of Sugarloaf Mountain) - lie entirely on private land within the expedited permitting area[4].

Of these seven areas, the northern Boundary Mountains (extending from Sisk Mountain across Kibby to the Tumbledown range south of the Moose River) is the only one where sites lie primarily on private land. Sites in the other areas are either completely conserved (Baxter State Park, Acadia National Park), almost completely conserved (White Mountain National Forest, Mahoosuc Range) or located in areas of high conservation interest with a significant component of conservation land (the 100-Mile Wilderness, Western High Mountains).

At the other end of the scale there are 63 sites totaling 147 miles of ridgeline that are in private or mixed ownership[5], have a composite resource score of less than 2, and lie wholly or predominately within the expedited permitting area. These sites also tend to be spatially clustered, with the greatest concentrations in the Androscoggin Valley region of southern Oxford and Franklin counties and the area north and east of Coburn Mountain. Three of these sites have operating wind power projects, and three others have approved permits. How many others may be suitable for development is difficult to determine. *It is critical that readers understand that identification of these sites does not constitute a finding that they are suitable for development.* Many may have limitations related to topography, road access, transmission capacity or the availability of land. The level of local support for or opposition to development at these sites is unknown. Some may contain significant ecological features that will not be known until site-specific analyses are conducted. A particular area of uncertainty is the potential scenic impact, which can only be evaluated by more detailed site-specific analyses.

Of the remaining 104 sites, (i.e. those not in the top 100 or the 63 described above) few if any appear to be realistic candidates for development at this time, as most lie either on conservation land or outside of the expedited permitting area.

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[4] Two other high-scoring private land sites (Kibby and Sisk mountains) have about one-third of their length within the expedited permitting area; both are the site of operating or permitted projects.

[5] If in mixed ownership, the portion on conservation land does not lie within a state or national park, wilderness or reserve area.

Assessing the cumulative development potential relative to the legislatively-established goals for terrestrial wind power development[6] presents a pessimistic picture. Developing every private land site within the expedited permitting area identified in this analysis, combined with operating and permitted projects, would provide about 2,000 MW of capacity – far short of the 2030 goal. Even under a very optimistic scenario (which assumes that a 500-MW project will be developed in Aroostook County, and 40% of other future development will occur at sites not included in this analysis), nearly 90% of the privately-owned ridgeline within the expedited permitting area without obvious resource conflicts would need to be developed to meet the 2030 goal. Clearly not all sites identified in this analysis will be available or suitable for development, and where the additional 40% of future capacity (the equivalent of nearly 20 Mars Hill-sized projects) would be located is unknown. This raises a significant question as to whether the 2030 development goal for terrestrial wind power can realistically be met.

Development of this magnitude would result in a massive transformation of Maine's scenic landscape. Nearly the entire western mountains region from the New Hampshire border to Moosehead Lake could be within 15 miles of a project. Multiple projects would likely be visible from most of the region's significant high-elevation viewpoints. Concentrations of development in certain parts of the state raise questions of social justice for the residents of those areas who will bear most of the impacts of development. Whether the citizens of the state are willing to accept this level of cumulative impact is a critical public policy question.

[6] 2,000 MW of installed capacity by 2015 and 3,000 MW by 2030.

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INTRODUCTION

Wind is one of the primary indigenous sources of renewable energy in New England. Encouraged by state and federal energy policies, the last decade has seen the rise of a commercial wind power industry in the region. However, this development has generated considerable controversy. In New England the commercially viable terrestrial wind resource is primarily limited to ridgelines – generally the least developed, most "natural" parts of the landscape and often areas of significant ecological, recreational and scenic value. This has created a potential conflict between two worthy public policy goals – open space conservation and renewable energy development.

This report presents the results of a GIS-based overlay analysis that assesses the relationship between potential ridgeline wind power development sites in Maine and natural resource values of recognized state, regional or national significance for which information is available, and which lend themselves to this type of analysis. The report is intended to provide interested parties with a basis for discussion of how to balance ridgeline wind power development with conservation of important high-elevation areas within the state, to provide a comparison of the relative resource value of various potential development sites, and to help understand the tradeoffs that might be involved in promoting particular levels of ridgeline wind power development.

When this project was started there were no operating commercial wind power facilities in the state. When this project was started there were no operating commercial wind power facilities in the state. Over the past few years, however, there have been significant changes in the industry, technology and public policy. At this time Maine can draw experience from 1) the completion of four commercial "grid-scale" wind power projects, the permitting of five others, and the identification of numerous other projects in earlier stages of development; 2) technological and economic changes that enhance the feasibility of development in lower wind regimes at lower elevation than considered in this study; 3) the work of the Governor's Task Force on Wind Power Development, resulting in the passage of the 2008 Wind Siting law and the delineation of the expedited permitting area; and 4) the initial attempts by the Land Use Regulation Commission to assess the cumulative visual impacts of multiple developments. Where possible these developments were incorporated into the analysis as it progressed[7].

In 2007 Governor Baldacci established the Task Force, charged with making recommendations that would make Maine a leader in wind power development while protecting the state's quality of place and important natural resource values[8]. The recommendations of the Task Force were enacted into legislation in 2008 (LD 2283). The most significant recommendations were 1) the establishment of aggressive goals for wind power development in the state (which have since been increased by the legislature), 2) the creation of an "expedited permitting area", encompassing all organized towns and about one-third of the unorganized territory, and 3) a

[7] There have also been notable advances in the ability to mitigate certain adverse impacts of wind power development that are not directly related to this analysis. These include the availability of FAA-approved technologies that allow for a reduction in night lighting and more subdued tower coloration, and the use of higher turbine cut-in speeds to reduce bat mortality .

[8] The Appalachian Mountain Club served as an alternate member of the Task Force.

relaxation of the standards for review of scenic impact within the expedited permitting area (while retaining a high level of protection for specified scenic resources of state or national significance). Both the Task Force and the subsequent legislation recognized that delineation of the expedited permitting area within the unorganized territories was at a fairly coarse landscape scale, and that it did not resolve all issues related to wind power development at the more detailed site-specific level. This study addresses two questions related to the Wind Siting Law: 1) how effective is the expedited permitting area in guiding wind power development to suitable areas, and 2) How realistic are the wind power development goals, and what types of cumulative impacts might occur if the state were to meet them?

Currently there are four large facilities in operation (Mars Hill, Stetson Mountain I and II and Kibby Mountain, totaling 258 megawatts [MW] of capacity), five others totaling 215 MW that have been permitted[9], and many others in various stages of permitting review or pre-application development. One project (Redington/ Black Nubble) has been denied a permit. The most controversial projects have been those located above 2700 feet in elevation (Redington/Black Nubble, Kibby Mountain and Sisk Mountain, as well as the Granite Reliable Windpark in northern New Hampshire), with the primary concerns being the impact on relatively undisturbed high elevation ecosystems and associated rare habitats and species, and projects located in close proximity to highly scenic portions of the Appalachian Trail (Redington/Black Nubble and Highland Plantation). Most projects located below 2700 feet or away from the Appalachian Trail have been less controversial, though all projects have created varying levels of opposition (as indicated by the appeal of most permitting decisions).

This analysis focuses on ridgelines at least one mile in length underlain by Class 4 and above wind resource as delineated by widely-used modeled wind resource data[10] (Map 1). These types of sites have been the focus of most commercial wind power proposals in the Northeast. However, these are just a subset of the areas available for wind power development in the state:

- Increasing attention is being given by developers to areas designated as Class 3 in the model data. These areas may possess higher-than-modeled winds, or may have become economically viable with changes in technology and economics. Areas mapped as Class 3 expand the extent of ridgeline available for development[11] and open up additional types of areas, including agricultural and coastal areas[12].
- There is an extensive high wind resource in coastal and offshore areas. These areas involve their own set of technical and economic challenges but have great potential if

[9] Rollins, Kibby expansion, Oakfield, Record Hill and Spruce Mountain; the latter four of these are under appeal.
[10] The analysis used data on windpower class at 50 meters above ground level developed by AWS Scientific, Inc. (AWS TrueWind) as part of a project jointly funded by the Connecticut Clean Energy Fund, the Massachusetts Technology Collaborative, and Northeast Utilities System. Wind resource class, which uses values from 1 (lowest) to 7 (highest) is a measure of the energy that can be extracted from wind and is based primarily on average wind speed. The report accompanying the model data states, "Generally speaking, commercial wind power projects using large turbines require a resource with a mean speed of at least 7 m/s or mean power of at least 400 W/m^2 (National Renewable Energy Laboratory class 4)."
[11] For example, the Stetson Mountain I and II, Rollins Mountain, Oakfield, Bowers Mountain and Bull Hill sites were not included in this analysis as the wind resource data did not include a sufficient extent of Class 4 wind.
[12] AMC is considering expanding this analysis to include these sites if funding permits.

these can be solved. There is a concentrated effort underway in the state to develop the state's offshore wind resource.

- Considerable attention is being given to opportunities for "community-scale" wind power. These are smaller facilities that are often designed for local or on-site electrical generation. They are generally located in more developed areas where the necessary infrastructure is in close proximity.

Not all information relevant to assessing these ridgelines is available in a form that can be included in the analysis. Information not included in the analysis is described later in the report. In addition, readers should pay close attention to the limitations and caveats that are expressed throughout this report.

The discussion of the results presents information on sites which possess natural resource values that may conflict with or constrain development. We believe that this analysis provides guidance and valuable information for an initial review on the relative suitability of different sites for development. However, it is not intended to be the final word on where wind power should and should not go. Determination of the suitability for development of any particular site or region needs to include site-specific information beyond that available for this analysis, and involves a balancing between the benefits of renewable energy and the impacts created by development.

Finally, it is important to recognize that this information is presented as a planning tool, and does not represent any position on the part of AMC as to either the suitability of any particular site for development or the appropriate level of overall wind power development across the state.

METHODS

Identification of potential ridgeline development sites

Potential wind power ridgeline development sites were identified with reference to the modeled wind resource data developed by AWS TrueWind. This data was developed using a combination of topographic and climatic modeling, and provides information on mean wind speed as well as the energy available at different wind speeds at a 200-meter grid scale. Data on wind power class at 50 meter height were used for this analysis. All ridgelines underlain by Class 4 and above wind resource were digitized on-screen using contour line data overlaid on the wind power class data. In some cases longer continuous ridgelines were broken into two or more separate sites at prominent saddles in order to provide a more precise spatial focus for the analysis.

A total of 1,091 miles of ridgeline was delineated. Some part of this length consists of short ridgelines or side ridges off of longer main ridges. In order to focus on sites with the greatest potential for commercial development, we considered only primary ridgelines at least one mile in length. Shorter ridgelines are generally insufficient to support commercial-scale projects. Side ridges may expand the potential of a site but are unlikely to be developed in the absence of development of the main ridge. This left 670 miles of ridgeline at 267 separate sites (Map 2), which averaged about 2.5 miles in length and ranged from 1.0 to 7.8 miles.

Data included in overlay analysis

The analysis incorporates data relevant to assessing the natural resource value of potential development sites that was available at the time of the analysis. The data includes resource values of recognized national, regional or statewide significance that have been developed through public processes or detailed scientific analysis. For each site, the information includes:

Conservation and regulatory status

- The conservation and ownership status of the ridgeline. Ridgelines were classified as follows based on the nature of the underlying land ownership:

  Reserve – Ridgelines on land owned in fee by public agencies or non-profit conservation organizations where development is legally prohibited or clearly inconsistent with the goals of ownership or management (e.g., Appalachian Trail corridor, designated wilderness areas and ecological reserves, state and national parks, and land owned by groups such as The Nature Conservancy[13, 14]).

  Easement – Ridgelines on land covered by a conservation easement that prohibits development[15].

  Other Conservation – Ridgelines on conservation land on which development is not legally prohibited and could potentially be considered (including WMNF management areas where wind power development would be allowed, other federal land [the US Navy Redington SERE school tract], MBPL land outside of ecological reserves, and town forests).

  Private – Ridgelines on private land where development is not restricted by easement.

  Some ridgelines extend across multiple ownership and conservation categories. Ridgelines were assigned to the Reserve, Easement or Other Conservation categories if less than one mile of the ridgeline extended on to unrestricted private land. Sites lying partially on conservation land but with at least one mile on unrestricted private land were classified as Mixed Ownership.

- Expedited Permitting Area. The percentage of the ridgeline lying within the legislatively-established Expedited Permitting Area was recorded.

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[13] Within the White Mountain National Forest, management areas in which windpower would be prohibited under the current management plan were included in this category. Similar data on management areas for Maine Bureau of Parks and Lands was not available so was not considered (with the exception of designated ecological reserves). MBPL lands outside of ecological reserves were included in the Other Conservation category, though some management areas (such as Non-Mechanized Backcountry Recreation) would more appropriately be considered under Reserve lands.

[14] We recognize that private non-profit conservation organizations have the right to consider windpower development on their lands (unless restricted by easement or other provisions). However, it is likely that such development would strongly conflict with the goals of these conservation ownerships.

[15] In a few cases ridgelines form the boundary of conservation easements. In these cases the ridgeline was treated as though it was fully covered by the easement, since a prohibition of development on one side of a ridgeline is likely to be a serious impediment to development.

- Land Use Regulation Commission (LURC) jurisdiction. The percent of the ridgeline that lies within LURC jurisdiction was recorded.

- LURC P-MA (Protection – Mountain Area) zones. The percentage of the ridgeline within P-MA zones was recorded[16].

Site-specific resource data[17]

- High elevation land. The length of each ridgeline lying above 2700 feet and 3500 feet in elevation was calculated. 2700 feet is the approximate beginning of the high-elevation ecological zone, characterized by thinner soils, harsher climate, and a transition to spruce-fir forest. It is the basis for the designation of LURC's P-MA zone. Lands above 3500 feet encompass rarer subalpine and alpine vegetation communities, and because timber harvesting rarely occurs above this elevation are the most likely parts of the landscape to have remained in a relatively natural condition.

- Natural Heritage Inventory Element Occurrences. The delineated ridgelines were submitted to the Maine Natural Areas Program, which provided information for each ridgeline on the presence of rare plant or natural community element occurrence (EO) records. Information included the number of plant or community EOs intersected by the ridgeline, separated into current (i.e., verified within the last 20 years) or historic records. No information was provided on the specific identity or location of the EOs or how much of the ridgeline was affected; in many cases the area underlain by EOs may represent a small portion of the ridgeline. It is important to note that NHI records are not complete; many sites (especially on private land) have not been surveyed and the results are thus biased toward public land and areas of known ecological significance.

- Beginning With Habitat Focus Areas. These areas were delineated as part of the development of the Comprehensive Wildlife Conservation Strategy by the Maine Department of Inland Fisheries and Wildlife[18]. These are described as "Landscape scale areas that contain exceptionally rich concentrations of at-risk species and natural communities and high quality common natural communities, significant wildlife habitats, and their intersection with large blocks of undeveloped habitat." The proportion of each ridgeline lying within a BWH Focus Area was calculated.

- Rare animal species occurrences. Data obtained from the Maine Department of Inland Fisheries and Wildlife includes recorded occurrences of state-listed Endangered, Threatened

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[16] P-MA zones are specifically included as they are the zoning district most likely to affect ridgeline windpower development in the state. However, under the revised permitting rules wind power is an allowed use in P-MA zones within the expedited permitting area, so this designation is less constraining than zones outside the expedited area. Other LURC protection zones affect very limited parts of these ridgelines and were not considered.

[17] We recognize that these resource categories are not totally independent. The designation of both Beginning With Habitat focus areas and TNC critical summit ecosystems is influenced by the presence of Natural Heritage Inventory Element Occurrences. There are strong correlations between Bicknell's thrush habitat and high elevation lands and between hiking trails and the Appalachian Trail viewshed. However, we believe these categories include sufficiently distinct information that it is appropriate to consider them separately.

[18] See www.state.me.us/ifw/wildlife/groups_programs/comprehensive_strategy/pdfs/statewide_focus_area_map.pdf.

or Special Concern species. Occurrences are shown as an 800-meter diameter circle. For each ridgeline, occurrences were counted if this circle overlapped a 100-meter buffer around the ridgeline. It is important to note that these records, like natural community and rare plant records, are incomplete and do not provide a full picture of the distribution of rare species across the state.

- TNC critical summit ecosystems[19]. Summits (described as "mountain peaks, hilltops, ridgelines, knolls") are one of six special landform/ecosystem types identified as being of particular importance to the conservation of regional biodiversity in The Nature Conservancy's Northern Appalachian-Acadian Ecoregional Assessment[20]. Critical occurrences are considered "crucial to the conservation of biodiversity in the ecoregion" and have passed a screening process that considers size, landscape quality and verification. For each ridgeline the proportion of the ridgeline and surrounding 100-meter buffer that overlay a priority summit ecosystem was calculated.

- Large roadless areas. These are areas of at least 5,000 acres delineated by AMC from satellite imagery from the year 2000 and other imagery dating back to 1973, and which contain no obvious evidence of roads or forest clearing dating back to the earliest imagery (though they may contain minor roads not visible on the imagery, as well as areas of partial harvesting)[21, 22]. They represent those portions of the landscape that have seen the least impact from human activity over the past few decades. Development of sites within large minimally roaded forest blocks raises greater concerns about habitat fragmentation. The proportion of each ridgeline lying within a large roadless area was calculated.

- Potential Bicknell's thrush habitat. Bicknell's thrush is the rarest migratory songbird in the east and is endemic to subalpine spruce-fir forest in the northeastern United States and maritime Canada. The analysis used a model of potential Bicknell's thrush habitat developed by the Vermont Institute of Natural Sciences[23]. The model (which originally used 30-meter-resolution National Land Cover Data from 1992 to delineate spruce-fir forest) was updated using 5-meter-resolution Maine Land Cover Data from 2004[24]. It is important to recognize that this model does not assess the quality of the modeled habitat or the actual presence of Bicknell's thrush within the modeled habitat. The proportion of each ridgeline and surrounding 100-meter buffer lying within potential Bicknell's thrush habitat was calculated.

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[19] The inclusion of this data is not intended to represent any position on the part of The Nature Conservancy regarding windpower development in these areas.
[20] Anderson, Mark et al. 2006. Northern Appalachian – Acadian Ecoregional Assessment Resource CD. The Nature Conservancy, Eastern Conservation Science, Boston, MA.
[21] Publicover, David and Cathy Poppenwimer. 2006. Roadless Areas in Northern New England: An Updated Inventory. AMC Technical Report 06-1, Appalachian Mountain Club, Gorham, NH.
[22] Because road construction and harvesting has altered these areas since the 2000 base year, the current condition of roadless areas containing ridgelines was assessed using recent aerial photography available on Google Earth and adjustments made if appropriate.
[23] Lambert, J. Daniel et al. 2005. A practical model of Bicknell's thrush distribution in the northeastern United States. The Wilson Bulletin 117(1): 1-12. (Data provided on CD by VINS.)
[24] Dan Lambert of VINS has indicated that he considers this an appropriate modification to the model.

- Steep slopes. Steep slopes were defined as slopes greater than 25% as determined from USGS 30-meter Digital Elevation Model data[25, 26]. Sites were evaluated by two measures – the percent of ridgeline (site plus surrounding 25-meter buffer) consisting of steep slopes, and the percent of adjacent upper slopes (extending from 25 to 250 meters from the site) consisting of steep slopes. Ridgeline topography will have the greatest effect on the ability to site turbines, while upper slope topography will affect the options for siting access roads to the ridgeline[27].

- Ridgeline ponds. Ridgeline ponds are a relatively rare feature in the state, may potentially be of high ecological and/or recreational value, and may create a significant impediment to development. The presence of a pond shown in USGS 1:100,000 Digital Line Graph data within 100 meters of the designated ridgeline, and whether or not is was classified as a designated Remote Pond, was noted[28].

- Hiking trails. Hiking trail data includes all trails referenced in AMC's Maine Mountain Guide as well as additional trails shown in the Maine Delorme Atlas or known from other sources. Ridgelines were classified as to whether they were traversed or crossed by the Appalachian Trail or traversed or accessed by a trail other than the AT. The number of trail access points to the ridgeline was also noted. (Multiple access points originating from a single trailhead were counted as a single access point.)

- Appalachian Trail viewshed. The Appalachian Trail Conservancy provided data on a viewshed analysis they have conducted for the Appalachian Trail in Maine. USGS 30-meter Digital Elevation Model data was used as the basis for the analysis. The analysis involved placing virtual viewpoints every ¼ mile along the length of the trail. For each DEM pixel within 10 miles of the trail, a value was calculated representing from how many of the viewpoints on the trail (and which lay within 10 miles of that pixel) that pixel was visible.

  The ATC viewshed analysis does not consider distance from the AT. In order to incorporate this factor, all pixels within 2 miles of the AT were weighted by a factor of 4, and all points between 2 and 4 miles were weighted by a factor of 2[29].

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[25] This is relatively conservative; various wind resource availability assessments conducted by the USDOE National Renewable Energy Laboratory use an exclusion of slopes greater than 20%.

[26] USDA National Resource Conservation Service county-level soils data could also be used to assess this parameter, however this data is not yet available for the entire study area. Soil map units with slope classes D or E are generally classified as "highly erodible" and would be an appropriate delineation of steep slopes.

[27] We recognize that sites with a high proportion of steep upper slope may still have suitable access pathways across less steep slope, and that detailed site evaluation is necessary to determine the actual topographic limitations to development.

[28] There were other ridgelines that had mid- or upper-slope ponds in close proximity to the ridgeline (though greater than 100 meters). If designated as Remote Ponds the LURC P-RR zone around the pond would extend across the ridgeline and would need to be considered if development were proposed. However, these ponds were not included in the analysis.

[29] These zones do not correspond to the visual sensitivity zones specified in the recently-enacted wind permitting legislation, which specifies a primary zone within 3 miles of a project (in which a visual analysis of impact to specified scenic resources will be required) and a secondary zone out to 8 miles from a project (in which an analysis may be required). However, the viewshed analysis was not adjusted to reflect these zones.

Each ridgeline was buffered by 100 meters. The average value of all weighted viewshed pixels within the buffered area was calculated. Resulting values were pro-rated to a 0 to 100 scale, with higher values representing greater potential visibility.

It is important to note that the analysis considers only potential visibility at ground level given the shape of the topography. It does not consider screening effects of vegetation, the visibility of turbines extending above ground level, or scenic context. In addition, this type of analysis may be sensitive to minor errors in the placement of the viewpoints (i.e., which side of the high point of the ridgeline they are located on).

- Significant scenic resources. The recently-enacted revisions to Maine wind power permitting legislation set forth a list of "scenic resources of state or national significance" that must be considered during permitting. A visual assessment will be required for projects lying within 3 miles of a listed resource, and may be required for resources within 8 miles of a project[30]. The following listed resources were included in this analysis:

  - National Natural Landmarks and federally designated Wilderness areas.
  - National and state parks[31].
  - Great Ponds identified as having outstanding or significant scenic quality in the Maine Wildlands Lakes Assessment and the Maine Lakes Study.
  - Scenic rivers identified in the Maine Rivers Study.

  Other scenic resources identified in the legislation were not included in the analysis because data was not readily available or implementing rules are still being developed:

  - Properties listed on the National Register of Historic Places.
  - Scenic viewpoints located on state public reserved land or on a trail that is used exclusively for pedestrian use[32].
  - Scenic turnouts on designated scenic highways.
  - Scenic viewpoints located in the coastal area.

  For each ridgeline, the number of listed scenic resources lying within a 3-mile buffer around the ridgeline was assessed[33]. This evaluation is admittedly crude, as it does not assess issues such as the actual visibility of the ridgeline from the feature or the nature and extent of the potential visual impact relative to the standards set forth in the legislation[34]. The presence of

[30] Upon a finding of the permitting agency, an analysis of the visual impact of a project's "associated facilities" (roads, turbine pads, generator lead lines, etc) may be required for resources beyond eight miles, using the evaluation standards in place prior to the enactment of the Wind Siting Law.
[31] As an element of the National Park System, the Appalachian Trail is included in this category. We have used the trail itself, not the corridor lands owned by the National Park Service.
[32] The rule identifying these viewpoints has been adopted, but the analysis was not adjusted to include these.
[33] We used the three mile rather than the eight mile limit because scenic resources within three miles of a project are the ones most likely to have a view of the project and to be signficantly impacted by it. Consideration of resources out to eight miles is also necessary for the visual impact analysis but there is greater uncertainty as to their significance in evaluating a site.
[34] The legislation states that consideration shall be given to: the significance of the potentially affected scenic resource; the existing character of the surrounding area; the expectations of the typical viewer; the development's purpose and the context of the proposed activity; the extent, nature and duration of potentially affected public uses

a significant scenic resource within the 3-mile zone does not mean the project will necessarily have an adverse impact on that resource.

Landscape analysis information

There have been two significant landscape analyses of the Northern Appalachian – Acadian ecoregion that can help inform decisions about wind power siting. These sources are not included in the analysis of specific sites, but are described here in general terms so that developers and planners can be aware of the information they include.

First, the Nature Conservancy's Northern Appalachian – Acadian Ecoregional Analysis[35] identified a number of priority ("Tier 1") matrix forest blocks, representing large (>25,000 acres) areas that were at the time of the analysis relatively unfragmented by major roads or permanent human development. These areas, if conserved through a combination of core reserve and sustainably managed buffer, would comprise a portfolio of areas that encompass the full range of ecological diversity across the ecoregion. The priority blocks were chosen based on their condition at the time of the analysis (i.e., the extent to which they have been impacted by human activity), their contribution to representation of different biophysical characteristics of the landscape, the extent to which they contain specific rare or high-quality ecological elements and their landscape context.

Nearly 40% of the potential wind power development sites lie in these priority matrix blocks. However, about 70% of these are concentrated in four areas – the Caribou-Speckled region of the White Mountain National Forest, the Mahoosucs region, the Western High Mountains (Saddleback-Sugarloaf-Bigelow) region, and Baxter State Park. In these areas the mountains (as well as the relatively undeveloped nature of these mountainous regions) are important parts of the rationale for the selection of these areas as priorities. However, in other areas, the potential development sites may or may not be critical features – in some cases they may be included in priority blocks that were selected for other reasons.

Second, the Wildlife Conservation Society (WCS) has developed a global analysis of the "human footprint" on natural ecosystems[36]. This analysis combines information on population density, land use and land cover, infrastructure and other features to develop a relative scale of the intensity of human activity on the landscape. As part of the Two Countries One Forest initiative, WCS-Canada has developed a more refined human footprint analysis for the Northern Appalachian – Acadian ecoregion[37]. Among the information presented is the identification of the "Last of the Wild" – the 10 largest areas of low human footprint within each ecological subsection[38].

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of the scenic resource; and the scope and scale of the potential effect of views of the generating facilities on the scenic resource.

[35] Anderson et al. 2006 op. cit. As with the priority summits discussed earlier, inclusion of this information is not intended to represent any position on the part of The Nature Conservancy regarding windpower development in these areas.

[36] See http://www.wcs.org/sw-high_tech_tools/landscapeecology/humanfootprint.

[37] See http://www.wcscanada.org/humanfootprint.

[38] See http://www.wcscanada.org/media/file/LTW.pdf.

These areas must be interpreted with caution. Within the large undeveloped portions of the Maine landscape, the primary drivers of the human footprint are timber management roads and harvesting patterns. Data on both of these factors is not fully up-to-date, and because of on-going road construction and the shifting nature of harvesting patterns the "lowest human footprint" areas within the working forest are likely to change over time. However, the "lowest human footprint" areas centered on mountainous regions are likely to be more robust, giving the lower suitability of these areas for road construction and timber management. The primary mountainous regions designated as "Last of the Wild" areas by the WCS analysis are the Mahoosucs region west of Route 26, the Saddleback-Sugarloaf-Abraham region, the Lily Bay-Baker-Whitecap Mountains region, and Baxter State Park.

Composite Resource Value

Sometimes a single resource value will be enough to determine that a particular site is inappropriate for development. However, of greater interest is the identification of sites that contain multiple resource values that in combination create a higher level of significance than individual values considered in isolation. Within LURC's Comprehensive Land Use Plan, one of the policies for mountain resources is to "Identify and protect high mountain resources with particularly high natural resource values or sensitivity which are not appropriate for most development." One of the polices for energy resources is "Prohibit energy developments and related land uses in areas identified as environmentally sensitive where there are overriding, conflicting environmental and other public values requiring protection." Both of these policies use the plural "values", implying consideration of how a concentration of individual resource values creates a particularly high level of significance for particular areas. Sites with multiple resource values are more likely to be of high priority for conservation (and consequently less appropriate for development.)

There are many possible ways to combine multiple resource values into a single composite score. The approach we have taken has the advantage of being relatively straightforward, though the raw data can easily be used to explore other possible approaches.

For each of the twelve resource categories, each site was scored as described below. Scores within a category were prorated to a maximum value of one to normalize widely varying raw values between categories. This puts all categories on an equal footing, and allows the categories to be differentially weighted if so desired.

- High elevation land. The length of ridgeline between 2700 and 3500 feet was added to twice the length of ridgeline above 3500 feet. Land above 3500 feet was given twice the weight because of its greater rarity and generally greater ecological and scenic value.
- Natural Heritage Inventory Element Occurrences. 5 points were given for each current natural community record, 3 points for each historic natural community record, 2 points for each current rare plant record, and 1 point for each historic rare plant record.
- Beginning With Habitat Focus Areas. The percentage of the ridgeline within a BWH focus area.
- Rare animal species occurrences. 1 point for each occurrence record.

- TNC critical summit ecosystems. The percentage of the ridgeline and surrounding 100-meter buffer overlaying a critical summit ecosystem.
- Large roadless areas. The percentage of the ridgeline within a roadless area.
- Potential Bicknell's thrush habitat. The percentage of the ridgeline and surrounding 100-meter buffer mapped as potential habitat.
- Steep slopes. Twice the percentage of steep slope within 25 meters of the ridgeline was added to the percentage of steep slope between 25 and 250 meters of the ridgeline. Ridgeline slope is weighted more heavily because it is likely to have a more direct effect on project design and viability; steep sideslopes can be more readily avoided.
- Ridgeline ponds. 3 points were given for a designated Remote Pond and 1 point for other ridgeline ponds.
- Hiking trails. 5 points were given if a site is traversed by the Appalachian Trail, 3 points if it is crossed by the AT, 3 points if it is traversed by a trail other than the AT, 2 points if it is accessed by a trail other than the AT, and 1 point for each access point beyond the first.
- Appalachian Trail viewshed. The raw AT viewshed score was used.
- Significant scenic resources. 1 point was given for each listed scenic resource within 3 miles of the ridgeline.

Two different approaches were taken to combining the scores from the different resource categories:

- *All resources weighted equally*. For each site, the scores from the individual resource categories were summed (giving a maximum possible value of 12).
- *Weighted with scenic excluded*. Scores from the ten non-scenic resource categories were differentially weighted as follows. The two scenic resource categories were excluded because of the uncertainty in how well they reflect actual scenic impact.

Category	Weight
High elevation land	3
Natural Heritage Inventory EOs	3
Beginning With Habitat Focus Areas	3
Rare animal species occurrences	2
TNC critical summit ecosystems	3
Large roadless areas	2
Potential Bicknell's thrush habitat	2
Steep slopes	1
Ridgeline ponds	1
Hiking trails	2

Potential cumulative impacts

In order to investigate questions related to cumulative impacts of potential buildout scenarios, the average statewide capacity (in MW/mile of ridgeline) was determined from projects that have already been approved by permitting agencies. Currently there are nine such projects (Table

1)[39]. Cumulatively they have a capacity of 472.6 MW and occupy about 41.2 miles of ridgeline, for an average capacity density of 11.5 MW/mile.

Table 1. Existing and permitted projects. (Projects in italics were not included in this study.)

Project	Status	Turbines	MW/ turbine	MW (total)	Ridgeline (mi.)
Kibby	Operating	44	3	132	7.8
Mars Hill	Operating	28	1.5	42	3.5
Stetson	Operating	39	1.5	58.5	6.7
Stetson II	Operating	17	1.5	25.5	2.5
Rollins	Under construction	40	1.5	60	6.8
Kibby exp.	Permitted	11	3	33	1.6
Oakfield	Permitted/appealed	34	1.5	51	6.8
Record Hill	Permitted/appealed	22	2.3	50.6	3.7
Spruce Mtn.	Permitted/appealed	10	2	20	1.8
Total				**472.6**	**41.2**

Data not included in analysis

This analysis includes only a subset of the information that is relevant to considering the potential conflict between ridgeline development and natural resource values and the suitability of a site for development. The information included is that which was available at the time of the analysis, lends itself to GIS overlay analysis, and describes resource values of recognized state, regional or national significance. Information that is relevant but which was not part of the analysis includes:

- Topographic suitability, including whether the site is properly aligned to the prevailing winds.
- The presence of fragile or unsuitable soils (though the consideration of steep slopes in some ways serves as a proxy for unsuitable soils).
- The availability of and distance to access roads or transmission capacity.
- Landowner willingness to consider development.
- Economic viability.
- The level of local and broad-based acceptance of or opposition to development.
- Consistency with organized town zoning and regulations.
- The presence of ridgeline wetlands.
- The occurrence of priority wildlife species that are not officially state-listed (other than Bicknell's thrush), such as those identified as Species of Greatest Conservation Need in the Maine Comprehensive Wildlife Conservation Strategy.
- The presence of important wildlife habitats outside of CWCS focus areas (other than potential Bicknell's thrush habitat and roadless areas, which are a proxy for large unfragmented forest blocks)[40].

[39] Two smaller projects that do not meet the regulatory threshhold of "grid scale" projects (the 4.5 MW Beaver Ridge project in Freedom and Fox Island project in Vinalhaven) were not included.

- Whether the site is a significant migratory pathway for birds or bats, or the level of potential mortality risk to these groups.
- Recreational use other than hiking trails.
- Landscape context, i.e., whether the site lies within a broader region recognized for its high natural resource value or in a more heavily developed landscape.
- The level of conservation interest in a site.

Some of these factors (particularly the last two) are considered in the discussion of the results.

RESULTS

Comprehensive results of the overlay analysis for the 267 study sites are given in Table 2 at the end of the report.

Conservation and regulatory status

- Conservation status. Of the 670 miles of ridgeline, about one-third lies on conservation land (24% on Reserve land, 6% lies on Easement land and 2% on Other Conservation land) (Table 3). Forty-six percent lies on unrestricted private land, and another 22% on Mixed Ownership.

Table 3. Distribution of study sites by conservation and expedited permitting area (EPA) status.

Conservation Status	Within EPA		Partially w/in EPA		Outside EPA		Total	
	# of sites	miles	# of sites	miles	# of sites	miles	# of sites	miles
Reserve	16	33	3	7	51	123	70 (26%)	163 (24%)
Other Cons.	2	3			5	8	7 (3%)	11 (2%)
Easement	1	2	1	4	15	36	17 (6%)	41 (6%)
Mixed Own.	11	34	13	55	19	59	43 (16%)	148 (21%)
Private	54	128	18	59	58	121	130 (49%)	307 (46%)
Total	84 (31%)	199 (30%)	35 (13%)	123 (18%)	148 (56%)	348 (52%)	267	670

Future developments could change the conservation status of a number of ridgelines. All or part of eight ridgelines totaling 26 miles lie within the Moosehead Legacy conservation easement approved by LURC as part of the Plum Creek Concept Plan, though only two lie within the expedited permitting area[41]. (Four other ridgelines in the western part of the easement lie in an area where wind power development would be allowed under the terms of the easement.) Several other conservation projects in various stages of progress contain

[40] Legally-recognized Significant Wildlife Habitats include deer wintering areas, waterfowl and wading bird habitat and significant vernal pools. There was no overlap between the study ridgelines and deer wintering areas or waterfowl and wading bird habitat. Digital data on significant vernal pools is not available.
[41] These ridgelines are noted in Table 1. Implementation of the easement is on hold pending resolution of legal appeals of LURC's approval of the Concept Plan.

ridgelines included in this study, though for the most part these ridgelines are unlikely targets for development because of their high conservation value.

- Expedited Permitting Area. About 30% of the study ridgeline lies within the expedited permitting area (Table 3). Another 18% lies partially within the area[42], and slightly over half lies outside of it.

  There is a marked difference in the distribution of ridgelines relative to their conservation status. Over three-quarters of the sites on conservation land (Reserve, Other Conservation or Easement) lie outside the expedited area. In contrast, only 45% of the sites on private land lie outside the area.

- LURC jurisdiction. Nearly two-thirds of the sites lie entirely within LURC jurisdiction. Another 11% lie partially within the jurisdiction, while 8% lie within Baxter State Park and 16% lie entirely within organized towns. Excluding sites within Acadia National Park, there are 35 sites encompassing 79 miles of ridgeline lying entirely in organized towns, of which 27 lie on private land.

- P-MA zones. Of the 203 ridgelines lying wholly or partially within LURC jurisdiction, slightly over half (104) lie at least partially within a P-MA zone. About 40% of the total length of ridgeline within LURC jurisdiction lies within a P-MA zone, and about 40% of this lies on conservation land. Of the ridgeline on private land within the P-MA zone, about 20% lies within the expedited permitting area. About one-third of this is the site of the Kibby Mountain project (including the expansion on to Sisk Mountain), leaving about 17 miles of privately owned ridgeline in P-MA zones within the expedited permitting area, where wind power is an allowed use and rezoning is not required. (An additional 7 miles of privately owned ridgeline lies above 2700 feet in organized towns[43].)

Individual resource data

- High elevation land**.** 128 of the 267 sites extend above 2700 feet in elevation, while 44 extend above 3500 feet. In total about 225 miles of ridgeline (34% of the total) lies above 2700 feet and 44 miles (6.5% of the total) lies above 3500 feet.

- Natural Heritage Inventory Element Occurrences (EOs)**.** 66 sites have current records for either plant or natural community EOs along some part of their length (49 sites have only community records, 1 site has only plant records, and 16 sites have both). Many of these sites also have historic records. An additional 52 sites have only historic plant or community records. Overall about 44% of the sites have one or more current or historic EO records. The actual amount of ridgeline affected by EOs is not known as this information was not provided by MNAP. Community occurrences may extend for some distance along a

[42] The legislation establishing the Expedited Permitting Area includes provisions for expanding the expedited area. One of the three criteria that needs to be met is that the proposed addition "Involves a logical geographic extension of the currently designated expedited permitting area." Sites partially within the expedited area are potential candidates for addition to the area assuming the other criteria are satisfied.
[43] See Table 8 in the Discussion section for a listing of specific sites.

ridgeline (especially at higher elevations), while plant records are point locations and are often located within a community occurrence.

- Beginning With Habitat Focus Areas. 74 sites lie wholly within a Beginning with Habitat Focus Area, and another 19 lie partially within one. Overall about 205 miles of ridgeline (31% of the total) lie within these areas.

- Rare animal species. There are 22 sites that overlap a total of 29 documented rare species occurrences, with three of these sites containing two occurrences and two sites containing three occurrences. The 29 occurrences include peregrine falcon (12), rock vole (7), golden eagle (6), northern bog lemming (2), arctic pipit (1) and Katahdin arctic butterfly (1).

- TNC critical summit ecosystems. 51 sites totaling 152 miles (23% of the total length) overlay an area designated as a Priority Summit Ecosystem by TNC for at least part of their length. Of these sites, 34 lie on conservation land, with the great majority in Reserve areas.

- Large roadless areas. 102 sites lie at least partially within AMC-identified roadless areas. Of these, 96 have at least half their length within a roadless area and 65 lie entirely within one. In total about 250 miles of ridgeline (37% of the total) lie within a roadless area. This reflects the fact that high elevation areas are the least likely parts of the landscape to contain roads due to challenging topography and lower-quality timber.

- Potential Bicknell's thrush habitat. 151 sites overlay modeled potential Bicknell's thrush habitat along at least part of their length. However, of these only 66 have at least half of the area within their 100-meter buffer classed as potential Bicknell's habitat, and only 29 have at least three-quarters of the buffered area classed as potential Bicknell's habitat. In total about 29% of the buffered area is potential Bicknell's habitat.

- Steep slopes. Sites vary widely in the extent of steep slopes. Ridgeline areas (the linear site plus a 25-meter buffer) range from 0 to 68% of their area in steep slopes, with a median of 24%. Upper slope areas (from 25 to 250 meters from the ridgeline) range from 1 to 91% of their area in steep slopes, with a median of 53%.

- Ridgeline ponds. Only 16 sites had ridgeline ponds, with one site (Tumbledown Mountain north of Weld) having two. Of these, seven had LURC-designated Remote Ponds[44].

- Hiking trails. 87 sites are accessed by one or more hiking trails. Of these, 30 are traversed by Appalachian Trail along at least part of their length and another 5 are crossed by the AT. Another 52 sites are traversed or accessed by other trails. Of the sites with trails, 87% lie wholly or partially on conservation land.

- Appalachian Trail viewshed. Of the 267 sites, 35 are contiguous with the Appalachian Trail, 45 are within 3 miles at their closest point, and 42 are between 3 and 8 miles at their closest

[44] In one case, the pond (Speck Pond) lay at the junction of two sites (Mahoosuc Mountain and Old Speck Mountain) and thus was counted for both.

point. Of the total ridgeline included in the study, 26% is within 3 miles of the Trail and another 22% is within 8 miles.

The calculated values shown in Table 2 are an index of relative potential visibility, and have no meaning in and of themselves. However, they do allow sites within 10 miles of the trail to be ranked, and indicate which ridgelines have greater or lesser degrees of potential scenic sensitivity (though it is important to remember the limitations of this viewshed analysis). As would be expected, there is a strong relationship between proximity to the trail and potential visibility. Sites contiguous with the trail has a median viewshed index score of 32, whereas the median value for sites within 3 miles of the trail was 21 and for sites within 8 miles of the trail the median value was 6. The greatest concentrations of high-scoring sites were in the 100-Mile Wilderness (Whitecap Mountain range) and Western High Mountains region.

- Significant scenic resources. 232 of the 267 sites (87%) have at least one significant scenic resource within three miles, though 157 sites (59%) have two or fewer resources within three miles. Seventeen sites (6%) have six or more, 14 of which lie in either Baxter State Park or the 100-Mile Wilderness.

  Admittedly this assessment does not provide the full picture as to the scenic significance of a particular ridgeline. For example, two mountains widely recognized for their scenic value (Big Spencer and Tumbledown [north of Weld]) contain no listed scenic resources within three miles[45]. Several others contain only one, including the numerous ridgelines within Acadia National Park (which have the park itself within three miles[46]) and several major peaks along the Appalachian Trail (Mount Carlo, Goose Eye, Spaulding and Sugarloaf, which have only the trail itself within three miles). All of these are off-limits to development, so the point is somewhat moot, but it does illustrate the limitations of the assessment. However, the assessment does provide an initial approximation of those ridgelines that are located in close proximity to a high concentration of scenically significant features.

Relationship between individual resources and conservation status

There is a strong relationship between the presence of natural resource features considered in this analysis and the conservation status of the ridgelines. Table 4 shows the proportional distribution of sites overlaying a particular resource feature by conservation status[47]. For all resources except ridgeline ponds, Reserve lands encompass a disproportionately high share of the sites overlaying that feature.

Table 5 shows the percentage of sites within conservation status categories that overlay various resource features. For every resource feature, the proportion of sites on Reserve lands overlaying

[45] Both of these sites would contain viewpoints on public reserved lands, which is a category listed in the statute but which was not included in this analysis.
[46] Scenic coastal viewpoints, another category included in the statute but not this analysis, would likely be located within three miles of most if not all of these peaks.
[47] Only ridgelines in Reserve or Private status are shown; these encompass about three-quarters of all ridgelines and represent the extreme ends of the conservation status scale.

that feature is higher than the proportion of sites on Private land overlaying that feature. For many features the differences are dramatic - for example, 87% of the Reserve land sites but only 8% of the Private land sites lie at least partially within a Beginning With Habitat focus area, and 71% of the Reserve land sites but only 8% of the Private land sites are accessed by a hiking trail.

Table 4. Proportion of sites containing particular resource features by conservation status[48].

Resource feature	Percent of sites overlaying resource feature	
	Reserve land	Unrestricted private land
All sites	26	49
Site extends above 2700'	33	41
Site extends above 3500'	43	23
Current plant or community EOs	56	20
BWH focus area	66	12
Documented rare animal species	50	18
TNC priority summit	63	12
100% in roadless area	74	14
>50% Bicknell's thrush habitat	35	39
≥33% steep slope (ridgeline only)	45	42
Ridgeline pond	25	44
Hiking trail	57	11
Top 1/3 of AT viewshed scores	38	22
≥3 significant scenic features	36	36

Table 5. Proportion of sites of different conservation status that contain resource features[49].

Resource feature	Percent of sites overlaying resource feature		
	All sites	Reserve land	Unrestricted private land
Site extends above 2700'	48	60	40
Site extends above 3500'	16	27	8
Current plant or community EOs	25	53	10
BWH focus area	35	87	8
Documented rare animal species	8	16	3
TNC priority summit	19	46	5
100% in roadless area	24	69	7
>50% Bicknell's thrush habitat	25	33	20
≥33% steep slope (ridgeline only)	28	49	25
Ridgeline pond	6	6	5
Hiking trail	33	71	8
Top 1/3 of AT viewshed scores	17	24	8
≥3 significant scenic features	40	54	30

[48] The entries in this table should be read horizontally. For example, of all the sites that extend above 3500 feet, 43% are on Reserve land while 23% are on Private land.

[49] The entries in this table should be read vertically. For example, of all the sites on Reserve land, 60% extend above 2700 feet, 27% extend above 3500 feet, etc.

Composite Resource Value

All resources weighted equally

The composite resource scores resulting from considering all resources equally show a strong concentration at the lower end of the scale (Table 6), with ever-decreasing numbers of sites as one moves up the scale. Over half the sites scored less than 2 and about three-quarters scored less than 3. The three sites that scored above 7 include two sites in the Bigelow Range (The Horns and Bigelow Mountain) and Old Speck Mountain in the Mahoosucs. The state's highest peak, Mount Katahdin, ranked fourth.

Table 6. Distribution of sites by composite resource score (all resources equally weighted) and conservation status groups.

Composite Resource Score	Number of sites (percent of sites within conservation status group)				
	All sites	Conservation land (Reserve and Other)	Easement Land	Mixed Ownership	Private Land
0 – 1	82 (31%)	3 (4%)	4 (24%)	7 (16%)	68 (52%)
1 – 2	68 (25%)	6 (8%)	8 (47%)	15 (35%)	39 (30%)
2 – 3	47 (18%)	16 (21%)	5 (29%)	12 (28%)	14 (11%)
3 – 4	26 (10%)	15 (19%)		3 (7%)	8 (6%)
4 – 5	23 (9%)	19 (25%)		3 (7%)	1 (1%)
5 – 6	11 (4%)	9 (12%)		2 (5%)	
6 – 7	7 (3%)	6 (8%)		1 (2%)	
7 - 8	3 (1%)	3 (4%)			

The clear distinction in the distribution of individual resources between conservation and private lands is strongly present in the composite scores as well. Over half of the private land sites, but only three sites on conservation land, scored less than 1. Over 80% of the private land sites, but only 12% of the conservation land sites, scored less than 2. At the other end of the scale, 49% of the conservation land sites, but only a single private land site (Number Six Mountain), scored higher than 4. The distribution of scores for sites on conservation easement lands is similar to that for private lands, while the distribution for sites of mixed ownership is similar to that for sites fully on conservation land.

This pattern is not surprising, as conservation of mountains has tended to focus on those areas with the greatest resource value. However, the fact that ridgelines have been conserved can also enhance their value over time in several ways. Roadless areas are more likely to be maintained, hiking trails more likely to be constructed, and Natural Heritage surveys more likely to be conducted on land that has been conserved.

The distribution of scores by rank order (Fig. 1) shows that scores gradually increase, with values at the upper end of the scale increasing more rapidly, reflecting the higher scores of the state's most significant mountains. Below the upper end of the scale there are no clear inflections or break points that could separate higher-value from lower-value sites.

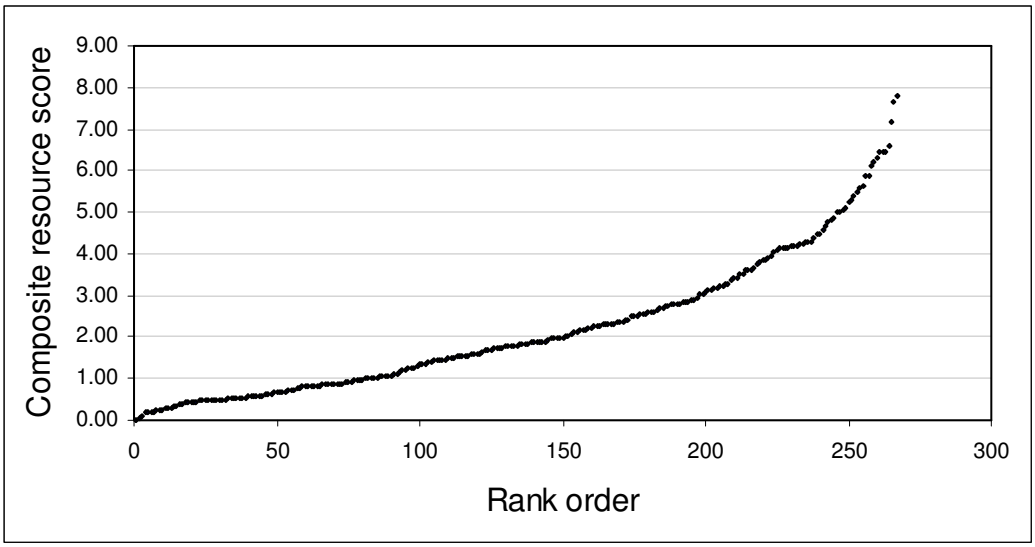

Figure 1. Distribution of composite resource scores (all resources weighted equally) by rank order.

Weighted without scenic

The second approach to assessing composite resource value included ten of the twelve resource categories, differentially weighted as described on page 11, but excluded the two scenic resource categories.

The results of this approach are not noticeably different than the approach of weighting all resources equally. There is a high degree of correlation between both the scores and rankings resulting from the two approaches (r^2 of 0.95 and 0.93 respectively). While sites move up or down in the rankings to varying degrees between the two approaches, most remain in the same general part of the rankings. Twenty-three of the top 28 sites, 52 of the top 59, and 94 of the top 100 are the same for both scoring systems. The two scenic resource categories, while they contribute to the evaluation when all resources are considered, are not a dominant part of the result. Using different weightings would not change the results significantly.

This indicates that the evaluation of the value of various sites is relatively insensitive to how the resources are scored. What is important is the presence or absence of important resource values. Sites that end up at the top of the rankings contain multiple resource values, and sites at the bottom of the rankings lack them. Changing the way in which these resources are scored will alter the relative value of different sites to some degree (in ways that for the most part are not particularly meaningful) but will not alter the overall pattern of resource value that emerges from the evaluation.

Spatial Patterns and Development Potential

There is a clear spatial pattern in the distribution of high-scoring sites (based on all resources weighted equally). Of the 28 highest-scoring sites (scores above 4.46), 27 are concentrated in

four areas – the Mahoosucs, the Western High Mountains, the 100-Mile Wilderness, and Baxter State Park. To a large degree they represent a list of the state's most iconic mountains[50]:

- *Mahoosuc Range*: Goose Eye, Fulling Mill, Old Speck, North Peak, Mahoosuc, Baldpate
- *Western High Peaks*: Saddleback, The Horn, Saddleback Junior, Abraham, Spaulding, Sugarloaf, Redington, Crocker, Cranberry Peak, The Horns, Bigelow, Little Bigelow
- *100-Mile Wilderness*: Barren, Columbus, Whitecap
- *Baxter State Park*: Mount Katahdin, Howe Peaks, North Brother, Mount O-J-I, Doubletop, Barren
- *Other*: Tumbledown (T6 north of Weld)

This concentration of high-scoring sites in a few areas continues down the scale. Fifty-five of the 59 highest-scoring sites (scores greater than 3.30), and 83 of the top 100 (scores greater than 2.33), are concentrated in seven areas – the four previously mentioned plus the White Mountain National Forest, Acadia National Park and the northern Boundary Mountains (Map 3).

Of these seven areas, the northern Boundary Mountains (extending from Sisk Mountain across Kibby to the Tumbledown range south of the Moose River) is the only one where sites lie primarily on private land. Sites in the other areas are either completely conserved (Baxter State Park, Acadia National Park), almost completely conserved (White Mountain National Forest, Mahoosuc Range) or located in areas of high conservation interest with a significant component of conservation land (the 100-Mile Wilderness, Western High Mountains). The latter two areas contain extensive high-value ridgeline in private ownership, but ongoing conservation activity could lead to additional conservation of sites in these areas in coming years.

Of these top 100 sites, the majority are located entirely on conservation land, are located outside the expedited permitting area, or both (Table 7). Only two sites – Moxie Mountain and Burnt Hill (the eastern ridgeline of Sugarloaf Mountain) - lie entirely on private land within the expedited permitting area.

Table 7. Distribution of the top 100 scoring sites by conservation and expedited permitting status.

Conservation Status	Expedited permitting area			Total
	In	Partial	Out	
Totally conserved	13	3	51	67
Mixed ownership	5	6	3	14
Private land	2	5	12	19
Total	20	14	66	100

Of these 100 highest-scoring sites, only Kibby Mountain is the location of an operating wind farm. However, the wind project is located at the southern end of this long ridgeline, to a large degree outside of the features which give Kibby its high score (including extensive high-

[50] Though these sites are concentrated along the Appalachian Trail, the same 27 sites are at the top of the list if the Appalachian Trail viewshed is eliminated from the scoring (though with the trail still included in the hiking trails category).

elevation land, the presence of a rare subalpine forest natural community and potential Bicknell's thrush habitat, and its location within a large roadless area). One other site (Sisk Mountain) is the location of a proposed expansion of the Kibby project whose permit application was recently approved by LURC. Two sites (Redington Pond Range and Black Nubble) were the location of a project whose application was denied by LURC[51].

At the other end of the scale, there are 63 sites totaling 147 miles of ridgeline (about 22% of the total) that meet the following criteria:

- Composite resource score less than 2.
- Private or mixed ownership; if in mixed ownership then the portion on conservation land does not lie within a state or national park, wilderness or reserve area[52].
- More than half of length within the expedited permitting area[53].

As with higher-scoring sites, the majority of these sites are clustered in a relatively small number of areas (Map 4):

- The Androscoggin Valley region of southern Oxford and Franklin counties (generally within 15 miles of Rumford).
- The eastern Coburn Mountain region.
- The Sandy Bay Township region at the northern end of Route 201.
- The southern Chain of Ponds region at the northern end of Route 27.
- South and east of Carrabassett Valley (primarily Highland Plantation).

Three of these 63 sites have operating wind power projects (Mars Hill and the two Kibby Range sites). Three others are the location of permitted projects (Record Hill and Flathead Mountain in Roxbury and Spruce Mountain in Woodstock), and four others are sites of projects that have submitted permit applications to LURC (three sites in Highland Plantation) or DEP (Saddleback Mountain in Carthage).

Of these 63 sites, how many may be suitable for development is difficult to determine. Many may have limitations related to topography, road access, transmission capacity or the availability of land. The level of local support or opposition is unknown. Some may contain significant ecological features that will not be known until site-specific analyses are conducted[54]. And while none possess the multiple resource values that put them at the upper end of the scale, some contain specific resource values that may present significant conflicts with development. (For example, both Puzzle and Long Mountains within the Mahoosuc region contain parts of the Grafton Loop hiking trail.)

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[51] The Appalachian Mountain Club supported the Kibby Mountain project and opposed the Redington/Black Nubble and Sisk Mountain (Kibby expansion) projects.
[52] Of the 63 sites, 58 lie entirely in private ownership.
[53] Of these 63 sites, 54 lie entirely within the expedited permitting area.
[54] For example, the presence of high-quality occurrences of the rare Fir-Heartleaved Birch Subalpine Forest natural community on both Black Nubble and Sisk Mountain was not documented until field surveys were conducted by the developers.

The inclusion of the Highland Plantation area as a potentially low conflict site provides the best example of the limitations of this analysis. Three of these sites (Stewart Mountain, Witham Mountain and Burnt Hill) are included in the proposed Highland Plantation wind power development. Though the analysis scored these sites as having relatively low resource value, a number of significant issues have arisen during permitting review. In addition to concerns about visual impact (see the discussion of Stewart Mountain in the next paragraph), potential impacts to three state-listed Endangered, Threatened or Special Concern species and three Significant Wildlife Habitats have been identified. Information on the presence of these resources was not available for inclusion the analysis.

A particular area of uncertainty in the potential of these sites for development is the scenic impact, which can only be evaluated by more detailed site-specific analyses. The scenic analysis included in this assessment is admittedly rudimentary. An example of this is Stewart Mountain, one of the sites within Highland Plantation for which a development application is currently under review. Though Stewart Mountain's composite resource score is quite low, the proposed project has generated considerable controversy because of the potential scenic impact on the Appalachian Trail within the Bigelow Preserve. The potential for this type of controversy is indicated by the fact that Stewart Mountain has the second highest Appalachian Trail viewshed score of all private land sites within the expedited permitting area. However, this score does not adequately reflect the actual impact, as it does not encompass the full range of factors that go into a comprehensive scenic evaluation, such as the significance of the viewpoints, the nature of the landscape, the expectations of the viewers, and the severity of the visual impact[55].

Of the remaining 104 sites (those not highlighted on either Map 3 or 4), few if any appear to be potential candidates for development at this time. Twenty seven lie entirely on conservation land. Another 62 lie entirely outside the expedited permitting area, while nine more have less than half of their length within the area. Three lie along the Appalachian Trail, and Mount Blue mostly in a state park. That leaves just two small sites – unnamed ridgelines in Gilead (lying partially within the White Mountain National Forest) and Carrabassett Valley (directly south of the Bigelow Preserve).

Statewide development goals and cumulative impacts

The Maine Wind Energy Act, first passed in 2004 and subsequently amended, sets forth ambitious goals for wind energy production in Maine: 2,000 MW of installed capacity by 2015, 3,000 MW of installed capacity by 2020 (of which 300 MW will be offshore), and 8,000 MW of installed capacity by 2030 (of which 5,000 MW will be offshore). The information developed in this study allows a preliminary assessment of what a buildout of 2,000 to 3,000 MW of terrestrial capacity would look like on the landscape.

Currently there are 473 MW of capacity that are operating or which have been permitted, although some projects are still under appeal (Table 1). If all of the permitted projects are constructed, the state would need an additional 1527 MW to meet the 2015 goal and an additional 2527 MW to meet the 2030 goal.

[55] This project was revised from the original version to remove some of the turbines on Stewart Mountain due to visual impact on the Appalachian Trail. The application for the project was subsequently withdrawn.

In assessing whether the state can meet these goals, and what types of cumulative impacts might result if they are met, there are at least three major unknowns: 1) whether a large project proposed for low hills and fields of northern Aroostook County (variously described as 350 to 500 MW) is developed, 2) how many of the sites included in this analysis are realistic candidates for development, and 3) how many additional sites not included in this analysis are available for development. (About 40% total capacity of the nine projects that have been permitted is at sites not included in this analysis, but it is not known whether this proportional distribution will hold true as additional sites are developed.)

In the analysis that follows, we assume that development will take place only within the expedited permitting area, and that all sites identified in this study are developable (though this is certainly optimistic). We considered two scenarios:

- Pessimistic: Large Aroostook County project is not developed; development takes place only on sites identified in this analysis.
- Optimistic: 500 MW project in Aroostook County is developed; development takes place on additional sites not identified in this analysis in the same proportion as existing permitted projects (60% at sites included in this analysis, 40% at other unidentified sites).

We started with the 63 previously identified sites on private land within the expedited permitting area that have cumulative resource values scores less than 2. We excluded six of these sites that have already permitted projects (two Kibby Range sites, Mars Hill, Spruce Mountain, and Record Hill/Flathead Mountain), two sites where development would be prohibited by the Moosehead Legacy easement, and the two sites traversed by the Grafton Loop Trail (Long and Puzzle mountains). That left 53 sites totaling 120 miles of ridgeline[56]. If developed at an average density of 11.5 MW/mile, an additional 1377 MW of capacity would be added, for a total of 1850 MW including operating and permitted projects.

The conclusion to the pessimistic scenario is in fact pessimistic: *Developing every potentially available site identified in this analysis would be insufficient to meet the state's 2015 goal and would fall well short of the 2030 goal*[57].

Under the optimistic scenario, in which the large Aroostook County project contributes 500 MW, 1027 additional MW would be needed to meet the 2015 goal, and 2027 MW to meet the 2030 goal. We assume sixty percent of this would come from sites included in this analysis, or 616 MW by 2015 and 1216 MW by 2030. *Even under this very optimistic scenario, nearly 90% of the potentially available ridgeline identified in this analysis would be needed to meet the 2030 goal.* An additional 811 MW would need to be developed by 2030 at other unidentified sites.

In order to assess the potential cumulative impact on the state's scenic landscape, we deleted five additional sites that could be particularly controversial[58]. The remaining 48 sites encompass

[56] These are the sites shown in Figure 4, minus the 10 sites excluded as described in this paragraph.
[57] Even if the four remaining private land sites within the expedited permitting area (Long, Puzzle and Moxie mountains and Burnt Hill) were included, the total would only rise to 2041 MW – still far short of the 2030 goal.
[58] Stewart Mountain (Highland Plantation), Deer Mountain (west of Cupsuptic Lake), East Kennebago Mountain (western ridge), Ragged Mountain (Rockport) and Perry Mountain (south of Saddleback).

about 108 miles, which would provide 1236 MW of capacity – enough to meet the 2030 goal under the optimistic scenario. At this level of development, the Androscoggin Valley and Route 201 corridors would see major development (Map 5). One or more projects would lie within eight miles of many major viewpoints in the Western Mountains region, including Bigelow Mountain, Saddleback Mountain, Mount Abraham, Mount Blue, Tumbledown Mountain (near Weld), Bald Mountain (Rangeley), Big Moose Mountain and parts of the Mahoosuc Range. Over 70 percent of the Appalachian Trail between the New Hampshire border and the Kennebec River would lie within eight miles of a project, as would the southern part of Moosehead Lake and the eastern parts of the Rangeley and Attean lakes. While projects would not be visible from all areas within the eight-mile buffers, it is likely that many significant viewpoints would have one or more projects visible within their viewshed. Changing which projects were excluded from this analysis would alter the specific areas affected but would not significantly change the magnitude of the impact.

There are two reasons why this analysis significantly understates the potential level of impact:

– Wind power projects do not become invisible at a distance of eight miles. For example, on clear days the Kibby Mountain project can be clearly seen from the summit of Bigelow Mountain at a distance of eighteen or more miles. As stated in a report from the National Academy of Sciences:

"*Modern wind turbines of 1.5-3 MW can be seen in the landscape from 20 miles away or more (barring topographic or vegetative screening), but as one moves away from the project itself, the turbines appear smaller and smaller, and occupy an increasingly small part of the overall view. The most significant impacts are likely to occur within 3 miles of the project, with impacts possible from sensitive viewing areas up to 8 miles of the project. At 10 miles away the project is less likely to result in significant impacts unless it is located in or can be seen from a particularly sensitive site or the project is in an area that might be considered a regional focal point. Thus, a 10-mile radius provides a good basis for analysis including viewshed mapping and field assessment for current turbines. In some landscapes a 15-mile radius may be preferred if highly sensitive viewpoints occur at these distances, the overall scale of the project warrants a broader assessment, or if more than one project is proposed in an area.*"[59]

If a 15-mile buffer is used, the potential area of impact encompasses the entire Western Mountains region from the New Hampshire border to Moosehead Lake, including large regions outside of the expedited permitting area (Map 6).

– Meeting the remaining part of the 2030 goal (the portion to be developed at sites not included in this analysis) would require an additional 800+ MW – the equivalent of nearly 20 Mars Hill-sized projects. While it is unknown where these projects might be located, their development would either expand the proportion of the state in proximity to a project or increase the density of projects within viewsheds.

[59] National Academy of Sciences. 2007. *Environmental Impacts of Wind-Energy Projects.* Committee on Environmental Impacts of Wind Energy Projects, National Research Council. Page 101.

DISCUSSION

This analysis represents the first comprehensive evaluation of Maine's mountain resources. It is similar in many ways to the Maine Rivers Study and Maine Wildland Lakes Assessment/Maine Lakes Study of the 1980s, which were undertaken for the purpose of better understanding the resource values of the state's rivers and lakes, guiding development to appropriate locations, and protecting the important values of the most significant rivers and lakes. This study was undertaken for similar purposes.

The analysis does not include all potential wind power development sites in the state. Two existing projects (Stetson Mountain I and II), two permitted projects (Oakfield and Rollins), two projects under permitting review (Bowers Mountain and Bull Hill) and other sites that are under consideration were not included in the analysis because they did not contain sufficient Class 4 wind resource in the data used to delineate study sites. However, any site not included in the analysis can be evaluated by the same methods and its place on the composite resource scale determined[60].

This study is not the final word on the value of specific sites and their relative suitability for wind power development, but rather a starting point. ***It is critical that readers understand that identification of a site as having low resource value in this analysis does not constitute a finding that they are suitable for development.*** It would be clearly inappropriate to draw a line at some point on the composite resource value scale and state that sites above this score were suitable for development and those below it were unsuitable. The resources included in this analysis do not provide a complete picture of any particular site, and additional site-specific information (including ecological field studies and scenic assessment) is critical to a full evaluation of any particular site. Other information (such as topographic suitability, the availability of land, road access, available transmission capacity, and degree of local support) is also critical but beyond the scope of this analysis.

However, the information developed in this study is valuable for several reasons. First, it provides a picture of what known factors may conflict with development at any particular site. Second, it identifies a number of areas where there are concentrations of sites with multiple known resource values, and where landscape-level conservation should take priority over renewable energy development[61]. Third, while the information has somewhat limited value for distinguishing between sites in the middle of the resource value scale, it does a good job of distinguishing between high-value sites at one end of the scale and *potentially* lower value (and potentially low conflict) sites at the other end of the scale. The information can thus help narrow the range of conflict over what types of sites (and what parts of the state) are suitable for development.

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[60] Stetson I and II, Oakfield and Rollins all score at the very low end of the scale when the analysis is applied to those sites.

[61] Of the three high-value regions identified on Map 3 that have a considerable extent of ridgeline on private land, two (the Western High Mountains and the 100-Mile Wilderness) are already areas of high conservation interest. The third (the northern Boundary Mountains) is somewhat of an anomaly in that it is a high-value mountain area that has seen little conservation activity, though one grassroots organization (Friends of the Boundary Mountains) has been advocating for greater conservation in this region since the 1990s.

The delineation of the expedited permitting area by the Governor's Task Force and its subsequent adoption by the legislature represents a determination of what parts of the state are most appropriate for consideration of wind power development at a broad landscape scale. This analysis indicates that the delineation is generally appropriate, at least for ecological values. (Potential scenic impacts are more problematic.) Sites outside the expedited area are generally of high value, encompassed within high value regions or areas with a high potential for conflict, or remote from transportation and transmission corridors. Of the 19 sites lying entirely on private land that scored in the top 100 of the composite resource scale, only two (Moxie Mountain and Burnt Hill [the eastern ridge of Sugarloaf Mountain]) are located entirely within the expedited permitting area[62]. On the flip side, of the 68 sites lying entirely on private land with composite resource scores of less than 1.00, over half (39) are located within the expedited permitting area.

An assessment of the state's ability to meet its 2030 goal of 3,000 MW of installed capacity presents a pessimistic picture. Even under a very optimistic scenario (which assumes that a 500 MW project will be built in Aroostook County and 800 MW will be developed at sites not included in this analysis), nearly all of the sites in this analysis with relatively low resource value on private lands within the expedited permitting area would need to be developed to meet this goal. Clearly not all these sites can, should or will be developed, and it is not clear where the many additional sites necessary to meet the 2030 goal will be found.

This level of development would likely lead to one or more projects being visible from most of the significant viewpoints in the Western Mountains region. The Androscoggin Valley of southern Oxford and Franklin counties could see a particularly high concentration of development; the area already has multiple projects that are in various stages of planning or permitting. It is clear that meeting the state's 2030 goal will require a very significant transformation of the state's landscape, one in which wind power projects become a common part of the landscape from even relatively remote and undeveloped viewpoints. Whether this was fully understood when the goal was adopted is not clear, and whether Maine's citizens will support it once the consequences of the goal are better known is an open question.

There are at least two areas where more complete information would greatly enhance the value of this analysis. The most controversial ecological issue in previous wind power permit applications has been the presence of high-elevation subalpine forest[63]. Undisturbed examples of this community are rare in the state, with only 19 occurrences documented by the Maine Natural Areas Program[64]. This community provides the primary habitat for Bicknell's thrush[65]. These areas may also have important adaptive value by maintaining a component of coniferous forest habitat in a warmer future climate when this habitat has been reduced or eliminated at lower elevations. While the most significant occurrences of this community are well-documented and mostly conserved, there are very likely additional areas on high-elevation private lands where

[62] Two other sites (Kibby Mountain and Sisk Mountain) have more than a third of their length within the expedited area. Both of these are the site of permitted projects.
[63] Classified as Fir-Heartleaved Birch Subalpine Forest and ranked S3 (Rare) by the Maine Natural Areas Program.
[64] These occurrences were included in the analysis in the Natural Heritage Inventory Element Occurrences category.
[65] The Potential Bicknell's Thrush Habitat data included in this analysis is a fairly broad delineation, essentially including all softwood forest above 2700 feet in the state. The subalpine forest community, which provides the most critical habitat for Bicknell's thrush, is a fairly small subset of this broader potential habitat.

this habitat has not been documented. This study identified 26 sites on private land within the expedited permitting area that extend above 2700 feet, encompassing about 24 miles of ridgeline[66] (Table 8), some of which could be a considered for development. A comprehensive inventory of this community and associated critical Bicknell's thrush habitat would be invaluable in pro-actively identifying sites that are unsuitable for development and reducing future controversy. Efforts to conduct such an inventory are currently being undertaken by AMC and others.

The second area is the need for a more comprehensive and rigorous analysis of the potential cumulative impacts on Maine's landscape (ecological, cultural and scenic) of the level of development necessary to meet the state's 2030 goal of 3,000 MW of installed terrestrial capacity. The Western Mountains region in particular is likely to be heavily altered by wind power development at this scale. This is a region prized for its scenic character and heavily dependent on the recreation and tourism economy. One of the three primary objectives of the Governor's Task Force on Wind Power Development was "To protect Maine's quality of place and natural resources." Whether this objective is compatible with the level of wind power development necessary to meet the Legislatively-established goals is a critical public policy question. The Land Use Regulation Commission has begun assessing the potential cumulative visual impact of wind power development within the unorganized territories and the regulatory tools that might be available to minimize this impact (such as clustering). However, since visual impacts (both individually and cumulatively) cross jurisdictional boundaries, such an assessment should include the entire state in order to provide a comprehensive picture.

Finally, though beyond the scope of this analysis, there is a need for continual effort to reduce the adverse affects of wind power development. Two recent developments are notable:

- The availability of FAA-approved technologies that use on-site radar to detect approaching aircraft, which allow nighttime warning lights to be turned on only when necessary, and which provide an audible warning to approaching aircraft, allowing turbines to be painted a more neutral color[67]. (A primary reason for the bright white color of turbines is to make them visible to approaching aircraft.)
- The use of higher turbine cut-in speeds to reduce bat mortality.[68] Research by Bat Conservation International has shown that slight changes to wind turbine operations at times of relatively low wind can result in significant reductions in bat mortality.

[66] By comparison, there is about 90 miles of privately owned ridgeline above 2700 feet outside of the expedited permitting area.
[67] One example is the Obstacle Collision and Avoidance System ("OCAS"); see http://www.ocasinc.com/turbine-avoidance-solutions.cfm.
[68] See for example http://www.batsandwind.org/pdf/Arnett%20et%20al.%202010%20-%20Changing%20Turbine%20Cut-in%20Speed.pdf.

Table 8. Privately-owned ridgeline above 2700 feet within the expedited permitting area. (Sites with less than 0.25 miles above 2700 feet are not shown.)

Site	Town	Miles >2700'	Notes
Sugarloaf Mountain/ Burnt Hill	Carrabassett Valley	3.5	<8 miles from Appalachian Trail (Bigelow Preserve)
Deer Mountain	Adamstown Twp	2.9	
Sandy Bay Mountain	Sandy Bay Twp	1.9	
Round Mountain	Alder Stream Twp	1.8	
East Kennebago Mtn. (western ridge)	Lang Twp	1.7	
Mount Pisgah	Chain of Ponds Twp	1.5	
Coburn Mountain	Johnson Mountain Twp	1.4	
Long Mountain	Newry/Andover	1.0	Crossed by Grafton Loop Trail
Beaver Mountain	Rangeley Plt	0.9	<8 miles from Appalachian Trail (Saddleback Mountain)
Puzzle Mountain	Newry	0.8	Traversed by Grafton Loop Trail
Saddleback Mountain	Sandy River Plt	0.8	<3 miles from Appalachian Trail (Saddleback Mountain)
Bag Pond Mountain	Alder Stream Twp	0.7	
Old Blue Mountain	Byron	0.7	Lower end of ridge; majority outside of EPA; <3 miles from AT
Big Moose Mountain	Big Moose Twp	0.7	
East Kennebago Mtn. (main ridge)	Lang Twp	0.6	Majority of ridge outside of EPA
Sandy Stream Mtn	Sandy Bay Twp	0.5	
Four Ponds Mountain	Rangeley Plt	0.5	<¼ mile from Appalachian Trail
Snow Mountain	Alder Stream Twp	0.4	Majority of site on conservation land or outside of EPA
Redington Pond Range	Carrabassett Valley	0.4	Majority of site outside of EPA; site of application rejected by LURC
Moxie Mountain	Caratunk	0.3	

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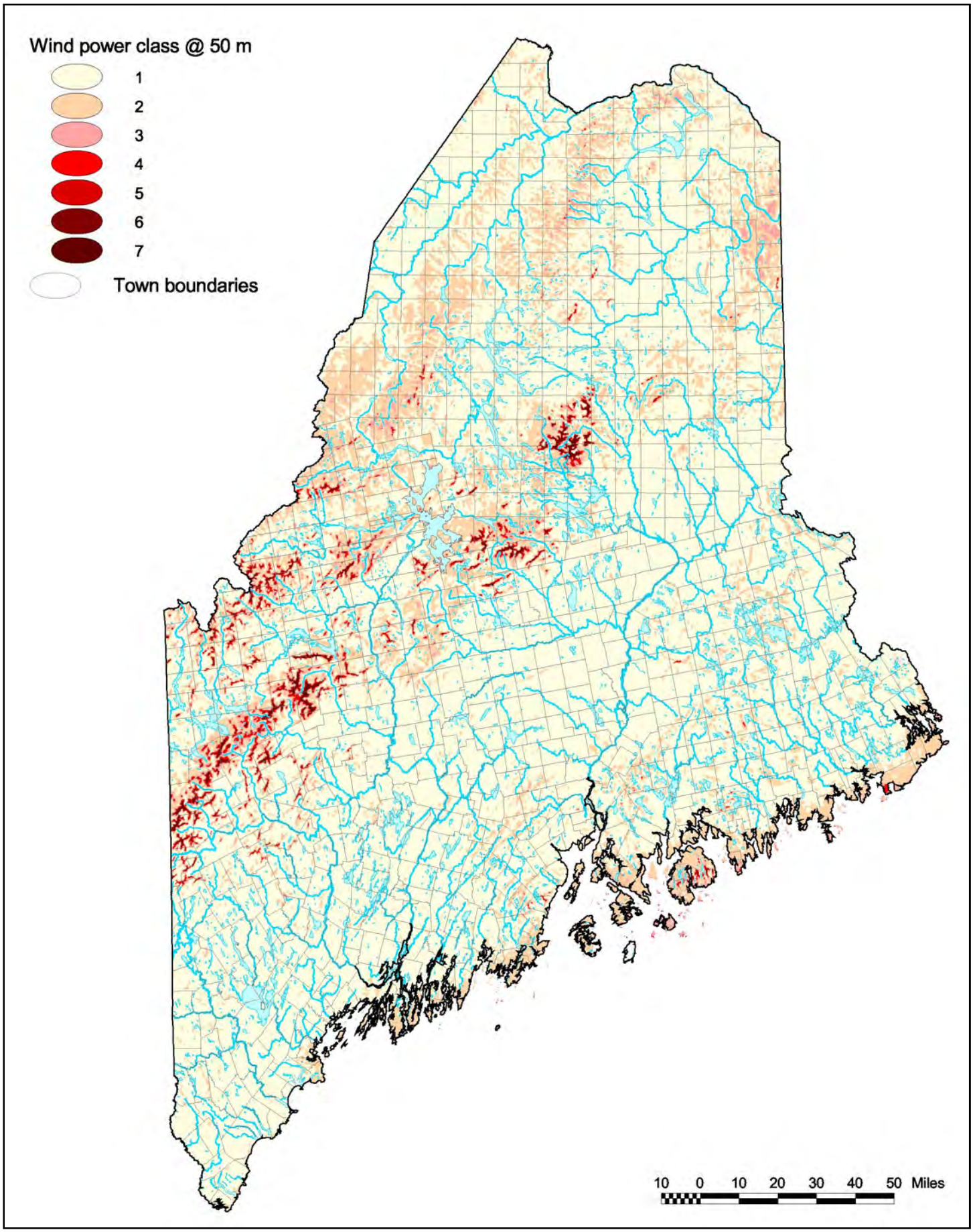
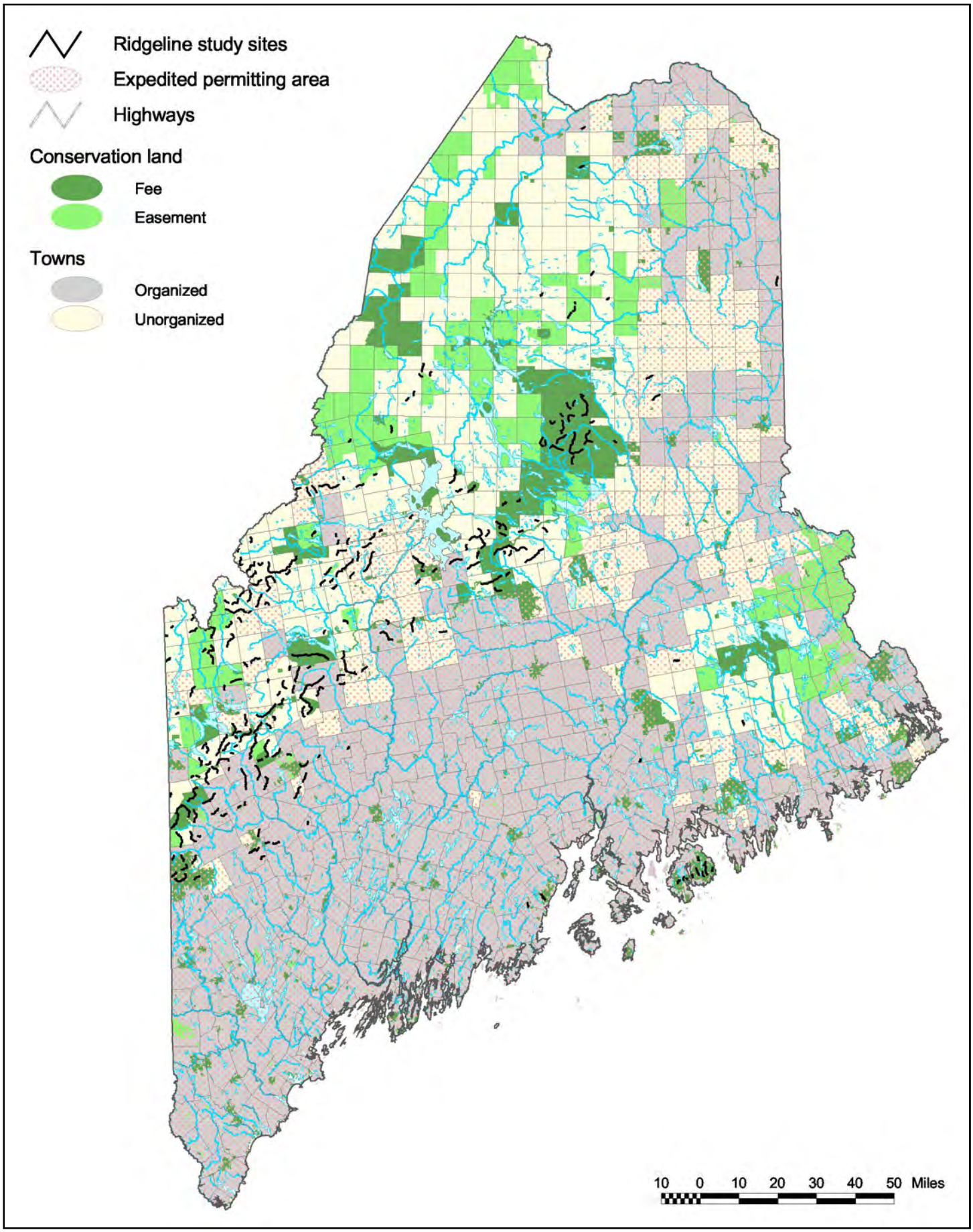
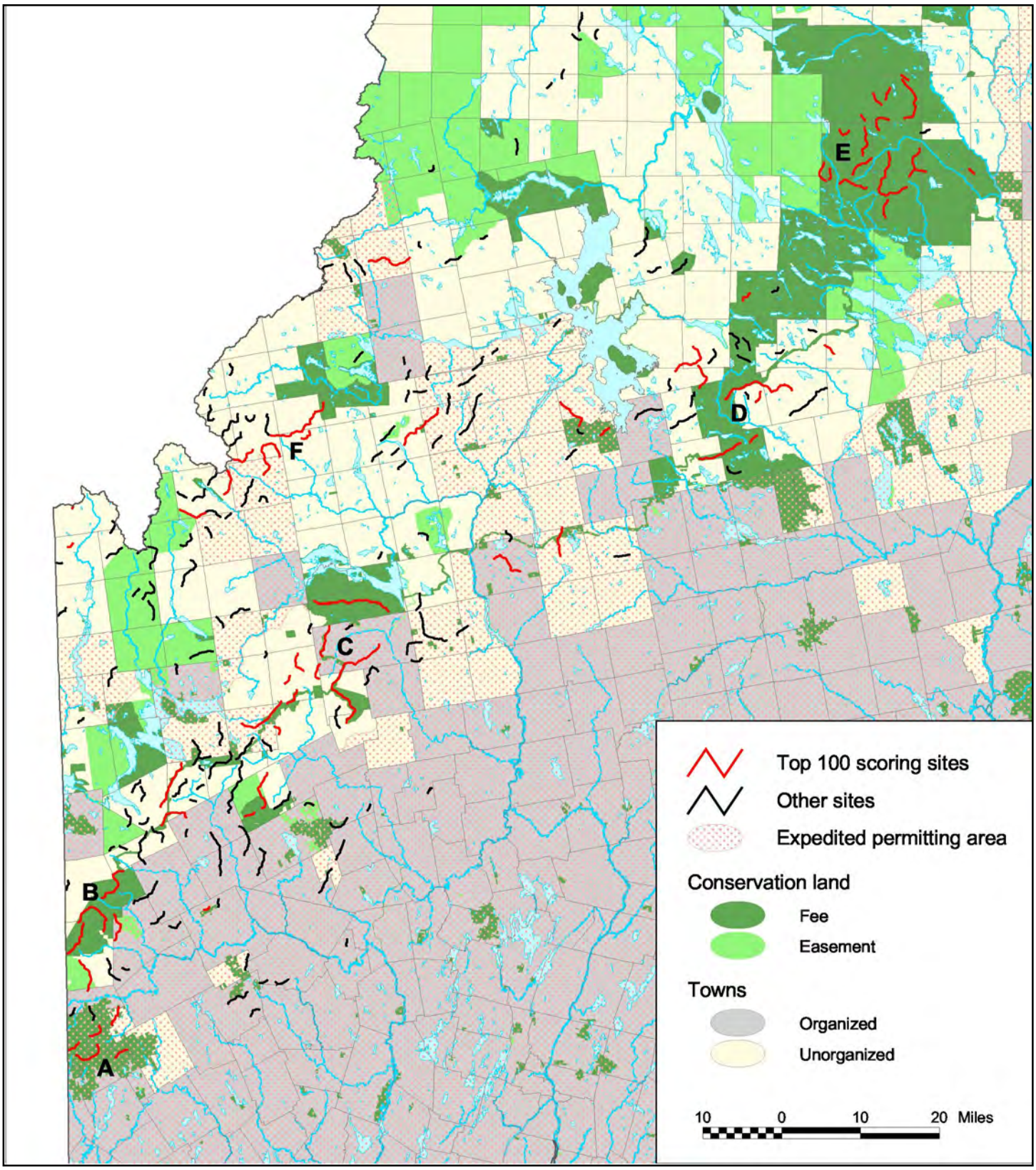


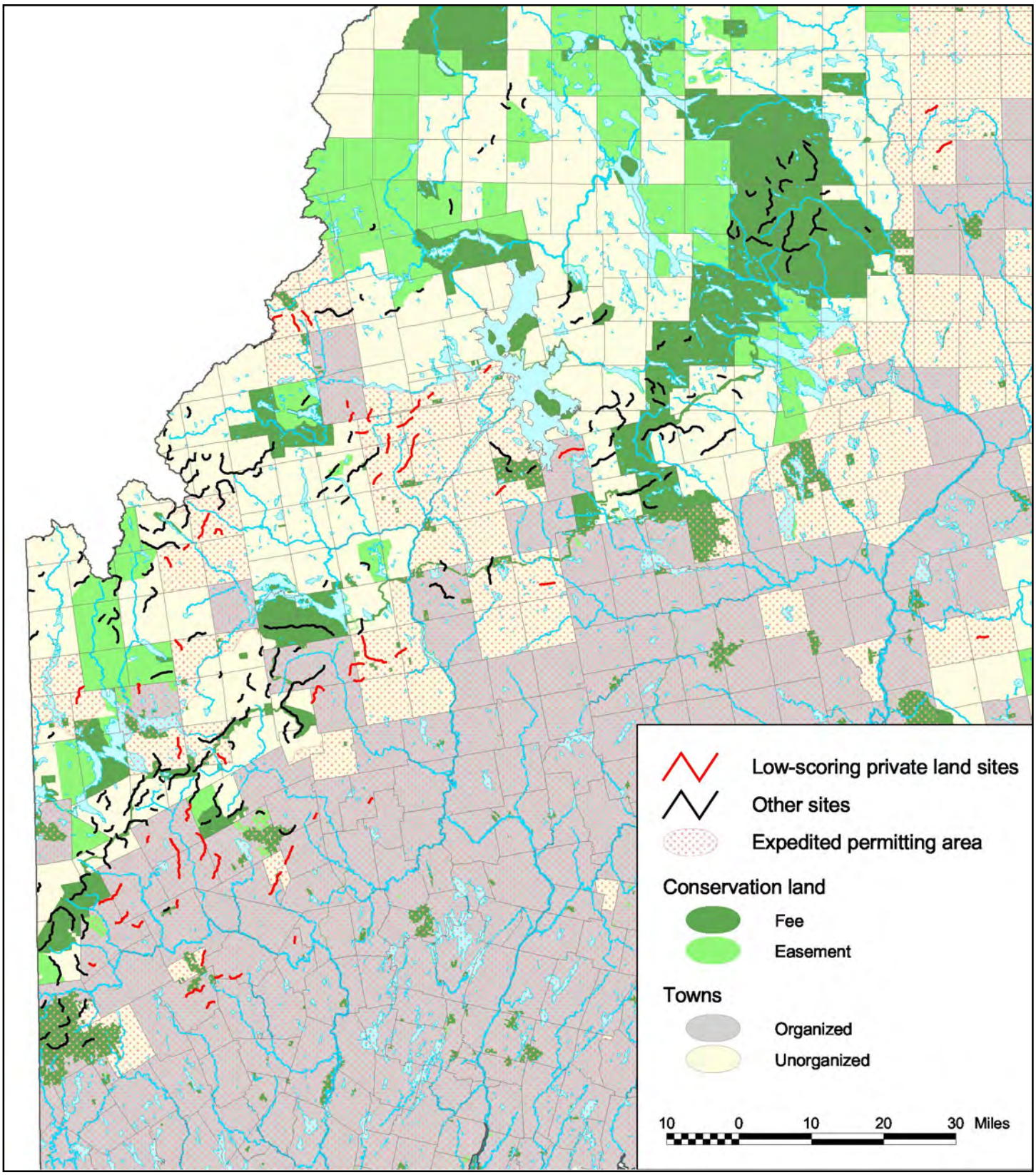
Map 1. Wind resource data used in the delineation of ridgeline study sites.



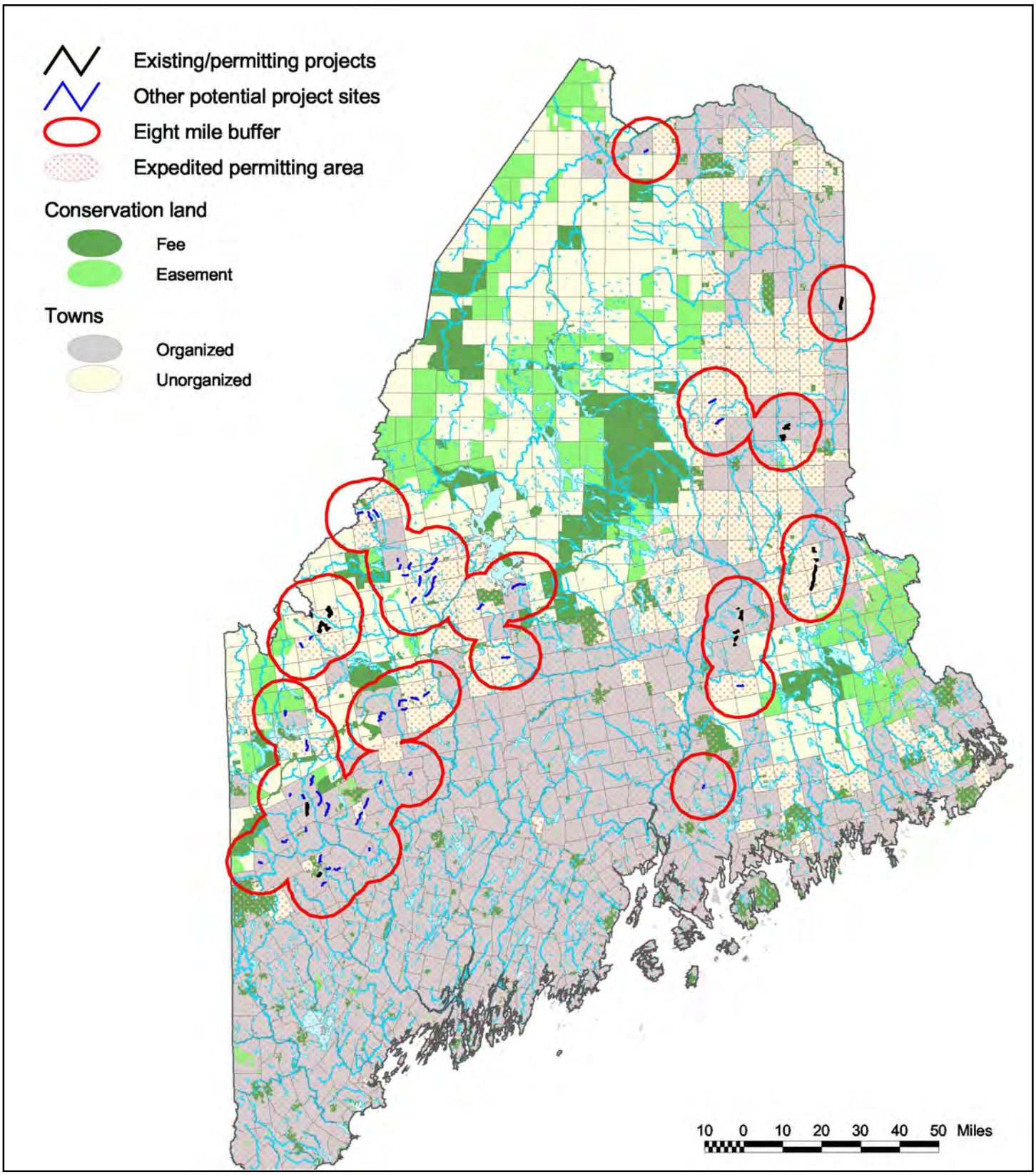
Map 2. Ridgeline study sites, encompassing 670 miles of ridgeline at 267 sites.



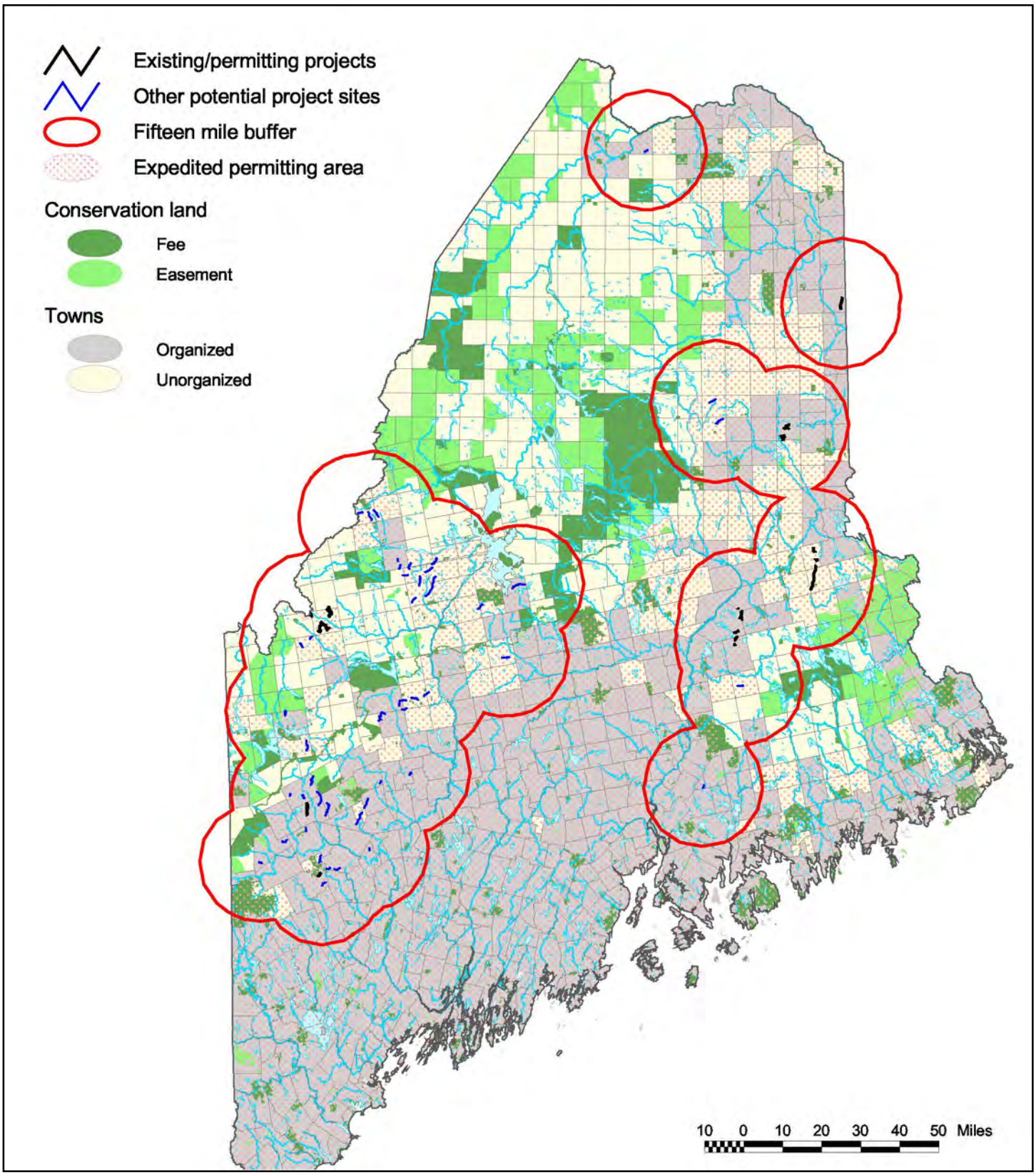
Map 3. The top 100 scoring sites in the composite resource analysis. The majority of these sites are concentrated in seven areas – White Mountain National Forest (A), Mahoosuc Range (B), Western High Mountains (C), 100-Mile Wilderness (D), Baxter State Park (E), northern Boundary Mountains (F) and Acadia National Park (not shown). (Map shows the area extending from the New Hampshire border to Baxter State Park. Only the high-scoring sites in Acadia National Park and Deboullie Mountain lie outside of this area.)



Map 4. Sites on private land within the expedited permitting area with a composite resource value score of less than 2. Three additional sites meeting these criteria lie beyond the extent of the map – Mars Hill, McLean Mountain in St. Francis and Ragged Mountain in Rockport.



Map 5. Eight-mile buffer around existing, permitted and potential projects that would provide sufficient capacity to meet state's 2030 goal of 3,000 MW of installed terrestrial capacity, assuming 1) a 500 MW project in northern Aroostook County is also developed, and 2) 800 MW of additional capacity at sites not included in this analysis is also developed.



Map 6. Fifteen-mile buffer around projects shown in Map 5.

Table 1.

Table 1 on the following pages shows the results of the resource overlay analysis for the 267 individual ridgeline study sites. Sites are arranged alphabetically by county, town and site name. Detailed information on the data can be found on pages 4 - 9.

- **Length (miles)**
- **% Expedited**: the proportion of the ridgeline that lies within the expedited permitting area.
- **% LURC**: the proportion of the ridgeline that lies within LURC jurisdiction.
- **% P-MA**: the proportion of the ridgeline that lies within a LURC Protection-Mountain Area zoning subdistrict.
- **% Conserved**: the proportion of the ridgeline that lies on conservation land (including Reserve, Other Conservation, and Easement).
- **Conservation status**: R – Reserve, OC – Other conservation, E – Easement, Pr – Private land, Mx – Mixed ownership. Sites marked with '*' would have all or part of their length on Plum Creek ownership protected from development under the terms of the Moosehead Legacy conservation easement.
- **Length above 2700' (miles)**
- **Length above 3500' (miles)**
- **Current community EOs**: number of rare (S1, S2 or S3) natural vegetation community Element Occurrences verified in the past 20 years that are intersected by the ridgeline.
- **Historic community EOs**: number of rare (S1, S2 or S3) natural vegetation community Element Occurrences not verified in the past 20 years that are intersected by the ridgeline.
- **Current species EOs**: number of rare (S1, S2 or S3) plant species Element Occurrences verified in the past 20 years that are intersected by the ridgeline.
- **Historic species EOs**: number of rare (S1, S2 or S3) plant species Element Occurrences not verified in the past 20 years that are intersected by the ridgeline.
- **% BwH Focus Area**: the proportion of the ridgeline that lies within a habitat focus area defined by the Beginning with Habitat program.
- **# RTE species**: the number of documented occurrences of rare, threatened or endangered animal species that are intersected by the ridgeline plus a 100-meter buffer.
- **% TNC summit**: the proportion of the ridgeline that lies within a Priority Summit Ecosystem identified by The Nature Conservancy's Northern Appalachian – Acadian Ecoregional Assessment.
- **% Roadless**: the proportion of the ridgeline that lies within a roadless area of greater than 5,000 acres identified by a previous AMC study.
- **% Bicknell's habitat**: the proportion of a 100-meter buffer around the ridgeline classified as potential Bicknell's thrush habitat in a model developed by the Vermont Institute of Natural Science.
- **% Steep (ridgeline)**: the proportion of a 25-meter buffer around the ridgeline with slope greater than 25% as determined from USGS 30-meter resolution Digital Elevation Model data.
- **% Steep (upper slope)**: the proportion of the area between 25 and 250 meters around the ridgeline with slope greater than 25% as determined from USGS 30-meter resolution Digital Elevation Model data.

- **Ridgeline pond**: the presence of a pond shown in USGS 1:100,000 Digital Line Graph data within 100 meters of the designated ridgeline. RP – Remote Pond; O – other pond.
- **Appalachian Trail**: T – site is traversed for most of its length by the Appalachian Trail; t- site is traversed for part of its length by the Appalachian Trail; X – site is crossed by the Appalachian Trail.
- **Other hiking trails**: T – site is traversed by a hiking trail (other than the Appalachian Trail); A – site is accessed by a hiking trail.
- **Trail access points**: number of separate access points (trailheads) from which trails lead to the site.
- **AT viewshed score**: an index (ranging from 0 to 100) indicating the potential visibility of the site from the Appalachian Trail. Scores were calculated for sites within 10 miles of the trail.
- **# Scenic features**: the number of scenically significant features (as defined by the 2008 Wind Siting Law) that lie within 3 miles of the site. Not all categories of scenically significant features defined by the law are included in this assessment.)
- **Composite score**: the composite resource value score with all resource categories weighted equally (see page 11).
- **Composite score rank**

TABLE 1

Site name	County	Town	Length (miles)	% Expedited	% LURC	% P-MA	% Conserved	Conservation status	Length above 2700' (mi)	Length above 3500' (mi)	Current Community EOs	Historic Community EOs	Current Species EOs	Historic Species EOs	% BwH Focus Area	# RTE species	% TNC summit	% Roadless	% Bicknell's habitat	% Steep (ridgeline)	% Steep (upper slope)	Ridgeline pond	Appalachian Trail	Other hiking trails	Trail access points	AT viewshed score	# Scenic features	Composite score	Composite score rank
Mars Hill	Aroostook	Mars Hill	2.8	100	0	0	0	Pr	0.0	0.0	0	0	0	3	0	0	0	0	0	26	70						0	0.64	222
McLean Mountain	Aroostook	Saint Francis	1.3	100	0	0	0	Pr	0.0	0.0	0	0	0	10	0	0	0	0	0	28	45						0	0.77	210
Peaked Mtn (T11 R8 WELS)	Aroostook	T11 R8 WELS	1.4	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	33	37						0	0.46	245
Deboullie Mountain	Aroostook	T15 R9 WELS	1.4	0	100	0	100	R	0.0	0.0	1	0	0	1	100	1	25	100	0	18	47			A	1		7	3.92	46
Chandler Mountain	Aroostook	T9 R8 WELS	1.2	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	87	0	0	18	71						1	1.54	153
Unnamed (Alder Stream Twp)	Franklin	Alder Stream Twp	1.1	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	1	14	58						3	0.65	221
Round Mountain	Franklin	Alder Stream Twp	1.8	100	100	100	0	Pr	1.8	0.0	0	0	0	0	0	0	0	61	25	41	82						2	1.96	121
Mount Blue	Franklin	Avon	3.1	100	0	0	45	Mx	0.6	0.0	1	0	0	0	91	0	0	0	14	27	66			A	1		2	2.14	112
Day Mountain	Franklin	Avon	1.1	100	0	0	0	Pr	0.0	0.0	1	0	0	3	0	0	0	0	0	36	68						1	0.96	189
Van Dyke Mountain	Franklin	Beattie Twp	1.3	0	100	43	0	Pr	0.6	0.0	0	0	0	0	0	0	0	0	53	68	72						0	1.52	155
Number Seven Mountain	Franklin	Beattie Twp	1.2	0	100	2	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	21	17	49						0	0.58	225
Unnamed (Carrabassett Valley)	Franklin	Carrabassett Valley	1.2	100	0	0	0	Pr	0.0	0.0	0	0	0	2	69	0	0	72	0	27	32					21	3	2.32	101
Sugarloaf Mountain	Franklin	Carrabassett Valley	2.7	100	0	0	46	Mx	2.7	1.5	0	1	0	2	100	1	68	81	85	26	56		T		2	44	1	5.88	12
Poplar Mountain	Franklin	Carrabassett Valley	3.4	100	35	0	0	Pr	0.0	0.0	0	0	0	2	0	0	0	85	4	9	49					8	0	1.33	168
Crocker Mountain	Franklin	Carrabassett Valley	4.5	100	0	0	54	Mx	3.1	1.6	1	0	0	2	100	0	14	99	64	26	51		T		2	50	3	5.23	18
Clay Brook Mountain	Franklin	Carrabassett Valley	1.7	100	53	0	0	Pr	0.0	0.0	0	0	0	2	0	0	0	0	0	21	54					2	0	0.51	235
Burnt Hill (Carrabassett Valley)	Franklin	Carrabassett Valley	4.0	100	0	0	0	Pr	1.9	0.4	0	0	0	2	52	0	34	100	45	20	39					16	1	3.27	61
Saddleback Mountain (Carthage)	Franklin	Carthage	3.8	100	43	0	16	Mx	0.0	0.0	0	0	0	0	0	0	0	0	0	22	79			A	1		1	0.80	209
Unnamed (Chain of Ponds Twp)	Franklin	Chain of Ponds Twp	1.6	0	100	11	0	Pr	0.2	0.0	0	0	0	0	0	0	0	100	23	9	54						3	1.83	131
Snow Mtn (Chain of Ponds Twp)	Franklin	Chain of Ponds Twp	3.9	10	100	71	60	Mx	2.8	1.0	0	0	0	0	0	0	0	100	11	24	55			A	1		3	2.41	95
Sisk Mountain	Franklin	Chain of Ponds Twp	3.9	34	100	81	0	Pr	3.2	0.0	1	0	0	0	0	0	0	52	82	24	54						3	2.56	89
Mount Pisgah	Franklin	Chain of Ponds Twp	3.5	48	100	35	0	Pr	1.2	0.0	0	0	0	0	0	0	0	56	35	28	54						2	1.70	143
Indian Stream Mountain	Franklin	Chain of Ponds Twp	3.0	0	100	13	7	Mx	0.4	0.0	0	0	0	0	0	1	0	98	5	39	58						2	2.18	110
Bag Pond Mountain	Franklin	Chain of Ponds Twp	2.4	31	100	87	0	Pr	2.1	0.0	0	0	0	0	0	0	0	72	30	38	76						4	2.26	107
Unnamed (Coplin Plt)	Franklin	Coplin Plt	1.6	0	100	0	14	Mx	0.0	0.0	0	0	0	1	0	0	0	0	0	5	30					42	1	0.71	214
Quill Hill	Franklin	Dallas Plt	1.0	0	100	35	0	Pr	0.3	0.0	0	0	0	0	0	0	0	0	5	21	59					7	1	0.69	216
Spotted Mountain	Franklin	Davis Twp	3.4	0	100	100	100	E	3.4	0.0	0	0	0	0	0	0	0	0	80	23	72						2	1.87	126
Kibby Range 2	Franklin	Kibby Twp	2.1	100	100	59	0	Pr	1.2	0.0	0	0	0	0	0	0	0	0	76	24	70						2	1.58	148
Kibby Range	Franklin	Kibby Twp	4.1	100	100	66	0	Pr	2.7	0.0	0	0	0	0	0	0	0	0	76	31	54						3	1.82	132
Owls Head	Franklin	Kingfield	1.9	100	0	0	0	Pr	0.2	0.0	0	0	0	3	0	0	0	0	19	37	75					9	0	1.06	180
Black Nubble (Kingfield)	Franklin	Kingfield	2.0	88	12	0	0	Pr	0.5	0.0	0	0	0	1	0	0	0	0	37	39	62					8	0	1.17	175
East Kennebago Mountain 2	Franklin	Lang Twp	1.8	95	100	97	0	Pr	1.7	0.6	0	0	0	0	0	0	0	0	79	43	51						1	1.74	140
Clear Pond Mountain	Franklin	Lowelltown Twp	1.8	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	88	0	18	43						0	1.23	172
Unnamed (Madrid)	Franklin	Madrid Twp	1.7	14	100	0	0	Pr	0.0	0.0	0	0	0	0	100	0	0	100	0	1	3					34	2	2.53	91
The Horn	Franklin	Madrid Twp	1.3	0	100	100	100	R	1.3	1.2	3	0	1	0	100	0	88	100	100	52	79		T		2	24	1	6.44	5
Unnamed (Massachusetts Gore)	Franklin	Massachusetts Gore	7.6	0	100	41	100	E	3.1	2.4	0	0	0	0	0	0	69	0	7	18	42						2	1.96	120
Smart Mountain	Franklin	Merrill Strip Twp	4.9	0	100	81	0	Pr	4.0	0.0	0	0	0	0	0	0	0	0	58	38	74						0	1.69	144
Merrill Mountain	Franklin	Merrill Strip Twp	1.8	0	100	92	0	Pr	1.7	0.0	0	0	0	0	0	0	0	0	89	40	81						0	1.79	134
Spaulding Mountain	Franklin	Mount Abram Twp	1.6	12	88	91	100	R	1.6	0.9	0	0	0	2	100	0	68	36	100	40	53		T		2	34	1	4.99	22

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Mount Abraham	Franklin	Mount Abram Twp	7.6	0	100	83	93	R	6.3	2.8	5	0	3	1	100	0	49	74	60	28	50		t	T	3	17	2	6.28	8
Griffin Mountain	Franklin	New Vineyard	1.1	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	57	89						0	0.91	194
White Cap Mountain (Oxbow Twp)	Franklin	Oxbow Twp	5.8	0	100	97	78	Mx	5.6	1.6	0	0	0	0	0	0	8	0	29	25	46						1	1.69	145
Ephraim Ridge	Franklin	Rangeley	1.6	79	21	0	21	Mx	0.0	0.0	0	0	0	1	0	0	0	0	4	16	75						4	0.88	196
Spruce Mountain (Rangeley Plt)	Franklin	Rangeley Plt	4.0	77	100	5	50	Mx	0.2	0.0	0	0	0	1	0	0	0	0	17	7	16		X		2	26	5	1.37	166
Four Ponds Mountain	Franklin	Rangeley Plt	1.5	100	100	35	5	Mx	0.5	0.0	0	0	0	1	0	0	0	0	37	11	33		T		2	48	3	1.93	123
Beaver Mountain	Franklin	Rangeley Plt	3.3	100	100	26	0	Pr	0.9	0.0	0	0	0	1	0	0	0	0	29	12	27	O				14	4	1.46	161
Saddleback Junior	Franklin	Redington Twp	2.6	0	100	88	100	R	2.3	0.2	1	0	0	0	100	0	0	100	85	40	57		T		2	37	3	5.01	21
Redington Pond Range	Franklin	Redington Twp	2.5	16	84	82	36	Mx	2.5	1.8	1	0	0	2	100	1	0	87	91	26	37					41	3	4.86	23
Black Nubble 2 (Redington Twp)	Franklin	Redington Twp	1.4	0	100	0	100	OC	0.0	0.0	0	0	0	0	100	0	0	100	0	29	27					17	3	2.80	78
Black Nubble (Redington Twp)	Franklin	Redington Twp	3.1	0	100	78	0	Pr	2.4	0.3	1	0	0	0	85	0	0	0	47	29	48					16	3	2.65	85
Farmer Mountain	Franklin	Salem Twp	3.4	0	100	23	0	Pr	0.8	0.0	0	0	0	0	100	0	0	0	24	18	39					11	1	1.86	129
Unnamed (Sandy River Plt)	Franklin	Sandy River Plt	3.9	72	100	0	28	Mx	0.0	0.0	0	0	0	0	0	0	0	0	0	1	5	RP	T		2	18	5	2.13	114
Saddleback Mtn (Sandy River Plt)	Franklin	Sandy River Plt	5.7	92	100	58	45	Mx	3.3	1.6	4	0	0	0	76	0	32	93	61	28	49	RP	T		2	31	4	6.43	6
Perry Mountain	Franklin	Sandy River Plt	2.1	90	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	7	16					26	4	0.73	212
Onion Hill	Franklin	Seven Ponds Twp	1.2	0	100	77	0	Pr	0.9	0.0	0	0	0	0	0	0	0	0	71	44	47						2	1.58	149
Boil Mountain	Franklin	Seven Ponds Twp	1.6	0	100	100	38	E	1.6	0.1	0	0	0	0	0	0	0	0	79	41	64					-1	2	1.79	135
Unnamed (Skinner Twp)	Franklin	Skinner Twp	4.5	5	100	80	0	Pr	3.6	0.1	0	0	0	0	0	0	0	95	79	35	63						1	2.82	75
Peaked Mountain (Skinner Twp)	Franklin	Skinner Twp	1.2	0	100	57	0	Pr	0.7	0.0	0	0	0	0	0	0	0	0	55	55	64						1	1.49	157
Moose Mountain	Franklin	Skinner Twp	2.1	0	100	50	0	Pr	1.1	0.0	0	0	0	0	0	0	0	0	54	36	68						0	1.29	169
King Mountain	Franklin	Skinner Twp	1.9	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	29	33						1	0.49	240
Kibby Mountain	Franklin	Skinner Twp	7.8	36	100	89	0	Pr	6.9	0.6	1	0	0	0	0	0	0	82	86	22	53			A	1		2	3.43	57
Caribou Mountain (Skinner Twp)	Franklin	Skinner Twp	3.9	0	100	79	0	Pr	3.1	0.6	0	0	0	0	0	0	0	0	74	32	62						1	1.79	136
Cow Ridge	Franklin	Stetsontown Twp	4.6	0	100	100	0	Pr	4.6	1.3	0	0	0	0	0	0	0	0	43	18	50						1	1.55	152
Tumbledown Mtn (T6 N of Weld)	Franklin	T 6 N of Weld	1.6	0	100	56	100	R	0.9	0.0	3	0	2	1	100	1	49	100	55	40	60			A	2	9	0	5.12	19
Jackson Mountain	Franklin	T 6 N of Weld	5.6	0	100	47	46	Mx	2.6	0.3	1	0	0	0	36	0	0	66	49	8	38			A	1	15	3	2.79	79
Blueberry Mountain	Franklin	T 6 N of Weld	3.4	5	95	14	73	R	0.5	0.0	0	0	0	0	100	0	0	49	13	13	38			A	1	8	1	2.29	103
Wilder Hill	Franklin	Temple	2.9	100	6	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	0	28						1	0.24	259
East Kennebago Mountain	Franklin	Tim Pond Twp	3.1	18	100	99	0	Pr	3.1	1.5	0	0	0	0	0	0	0	0	85	24	60						2	2.00	117
Unnamed 3 (Township D)	Franklin	Township D	1.0	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	0	13					12	4	0.51	234
Unnamed 2 (Township D)	Franklin	Township D	3.4	0	100	57	0	Pr	1.9	0.0	0	0	0	0	0	0	0	0	55	4	12					31	4	1.50	156
Unnamed 1 (Township D)	Franklin	Township D	1.1	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	5	12					45	4	0.88	198
Old Blue Mountain	Franklin	Township D	4.8	17	83	63	47	Mx	3.6	0.6	0	0	0	0	0	0	8	0	72	18	40		T		2	39	3	2.75	81
Elephant Mountain (Township D)	Franklin	Township D	6.8	0	100	80	54	Mx	5.4	1.2	0	0	0	0	0	0	0	0	74	18	35		T	A	3	32	5	3.27	60
Brimstone Mountain	Franklin	Township D	1.2	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	0	6					18	4	0.54	232
Unnamed (Township E)	Franklin	Township E	5.6	11	100	25	64	Mx	1.4	0.0	0	0	0	1	0	0	0	0	34	3	5	O	T		2	31	6	2.22	109
Horn Hill	Franklin	Township E	5.0	0	100	21	32	Mx	1.1	0.0	0	0	0	0	0	0	0	0	23	6	13	O				26	6	1.55	151
Spruce Mountain (Weld)	Franklin	Weld	4.2	100	0	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	17	48						3	0.65	220
Pope Mountain	Franklin	Weld	1.5	100	0	0	85	E	0.0	0.0	0	0	0	0	100	0	0	0	0	21	50					0	2	1.58	150

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The Horns	Franklin	Wyman Twp	3.0	0	100	91	100	R	2.7	0.4	2	0	1	1	100	0	75	100	88	40	77	RP	T	A	4	46	4	7.80	1
Cranberry Peak	Franklin	Wyman Twp	2.1	0	100	64	100	R	1.3	0.0	0	0	0	1	100	0	85	100	74	27	75			T	2	30	4	5.41	16
McFarland Mountain	Hancock	Bar Harbor	1.3	100	0	0	100	R	0.0	0.0	2	0	0	3	100	0	0	0	0	10	42						1	1.77	138
Champlain Mountain	Hancock	Bar Harbor	1.4	100	0	0	100	R	0.0	0.0	1	0	0	3	100	1	73	0	0	21	76			T/A	5		1	3.77	50
Cadillac Mountain	Hancock	Bar Harbor	3.9	100	0	0	100	R	0.0	0.0	3	0	4	5	100	0	40	0	0	7	43			T/A	6		1	3.50	56
Sargent Mountain	Hancock	Mount Desert	2.5	100	0	0	100	R	0.0	0.0	1	0	0	5	100	1	51	0	0	26	44	O		T/A	5		1	3.80	49
Saint Sauveur Mountain	Hancock	Mount Desert	1.0	100	0	0	100	R	0.0	0.0	0	0	1	3	100	1	0	0	0	6	44			T/A	4		1	2.49	94
Pemetic Mountain	Hancock	Mount Desert	1.8	100	0	0	100	R	0.0	0.0	1	0	0	5	100	0	53	0	0	9	62			T/A	5		1	3.10	68
Norumbega Mountain	Hancock	Mount Desert	1.3	100	0	0	100	R	0.0	0.0	1	0	0	3	100	0	0	0	0	9	65			T/A	3		1	2.29	104
Bernard Mountain	Hancock	Southwest Harbor	1.5	100	0	0	100	R	0.0	0.0	0	0	0	1	100	0	73	0	0	26	55			T/A	5		1	3.17	65
Beech Mountain	Hancock	Southwest Harbor	1.2	100	0	0	100	R	0.0	0.0	0	0	0	5	100	1	0	0	0	33	59			T/A	3		1	2.72	83
Mount Megunticook	Knox	Camden	2.1	100	0	0	59	R	0.0	0.0	1	0	0	2	100	0	76	0	0	5	52			T/A	3		1	3.02	70
Ragged Mountain	Knox	Rockport	1.4	100	0	0	0	Pr	0.0	0.0	1	0	0	2	100	0	0	0	0	20	68			A	1		0	1.86	128
Deer Mountain	Oxford	Adamstown Twp	3.1	99	100	94	1	Pr	2.9	0.0	0	0	0	0	0	0	0	0	93	21	61						2	1.87	127
Long Mountain	Oxford	Andover	4.8	100	0	0	0	Pr	1.0	0.0	0	0	0	1	41	0	0	24	20	7	34			A	2	10	5	1.97	119
Wyman Mountain	Oxford	Andover N Surplus	5.1	17	83	42	55	Mx	2.1	0.0	0	0	0	1	0	0	0	0	38	21	39		T		2	29	4	2.13	113
Sawyer Mountain	Oxford	Andover N Surplus	3.1	0	100	0	26	Mx	0.0	0.0	0	0	0	0	0	0	0	0	0	33	66		X		2	16	2	1.25	170
Grady Mountain	Oxford	Andover N Surplus	1.3	0	100	0	14	Mx	0.0	0.0	0	0	0	0	0	0	0	0	0	12	38					42	3	0.94	191
Surplus Mountain	Oxford	Andover W Surplus	1.9	0	100	31	100	R	0.6	0.0	0	0	0	0	100	0	0	100	23	33	65		T		2	45	4	4.17	38
Peabody Mountain	Oxford	Batchelders Grant	2.3	100	63	0	100	R	0.0	0.0	0	0	0	1	4	0	0	98	0	33	47			A	2	0	1	1.89	124
East Royce Mountain	Oxford	Batchelders Grant	2.0	97	97	0	100	R	0.0	0.0	1	0	0	1	100	0	0	46	17	55	81			A	3		2	3.17	64
Caribou Mtn (Batchelders Grant)	Oxford	Batchelders Grant	2.5	100	100	0	100	R	0.0	0.0	2	0	1	1	100	0	59	100	0	39	83			T/A	3	0	1	4.46	29
Unnamed (Bowmantown Twp)	Oxford	Bowmantown Twp	2.0	0	100	13	0	Pr	0.3	0.0	0	0	0	0	0	0	38	0	22	0	19						1	0.84	202
Barker Mtn (Bowmantown Twp)	Oxford	Bowmantown Twp	1.1	0	100	56	0	Pr	0.6	0.0	0	0	0	0	100	1	0	0	39	28	53						1	2.36	99
West Mountain	Oxford	Byron	1.9	100	0	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	5	29	53					4	1	0.70	215
Record Hill	Oxford	Byron	1.7	100	0	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	25	39					3	1	0.54	231
Old Turk Mountain	Oxford	Byron	1.5	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	44	67					5	1	0.83	203
Dunham Hill	Oxford	Byron	1.1	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	0	2					11	1	0.20	262
Dolly Mountain	Oxford	Byron	3.1	79	21	0	22	Mx	0.0	0.0	0	0	0	0	0	0	0	0	0	8	41					5	2	0.47	243
Spruce Mountain (C Surplus)	Oxford	C Surplus	1.0	0	100	0	100	E	0.0	0.0	0	0	0	0	0	0	0	0	0	14	23					47	3	0.95	190
Canton Mountain	Oxford	Canton	1.1	100	0	0	0	Pr	0.0	0.0	0	0	0	4	0	0	0	0	0	2	49						0	0.36	252
Unnamed (Gilead)	Oxford	Gilead	1.3	100	28	0	28	Mx	0.0	0.0	1	0	0	1	43	0	9	0	0	20	32			A	2	0	1	1.38	165
Table Rock	Oxford	Grafton Twp	1.3	0	100	61	100	OC	0.8	0.0	1	0	0	0	100	0	0	100	48	31	65			A	2	16	4	4.03	44
Red Ridge	Oxford	Grafton Twp	1.5	0	100	81	0	Pr	1.2	0.0	0	0	0	0	0	0	0	0	25	6	34					32	1	0.99	187
Old Speck Mountain	Oxford	Grafton Twp	2.9	0	100	100	100	R	2.9	1.5	2	0	0	3	100	0	62	100	100	45	73	RP/2	t	T/A	4	26	3	7.16	3
Mahoosuc Mountain	Oxford	Grafton Twp	2.1	0	100	100	100	R	2.1	0.6	3	0	0	2	100	0	0	100	84	51	75	RP/2	T	A	4	9	3	6.13	10
Baldpate Mountain	Oxford	Grafton Twp	2.9	0	100	76	100	R	2.2	0.9	1	1	1	1	100	0	16	100	42	42	65		T	A	4	39	5	5.59	14
Aziscohos Mountain	Oxford	Lincoln Plt	1.2	0	100	99	0	Pr	1.2	0.0	0	0	0	0	0	0	0	0	99	31	66			A	1		5	2.28	106
Bosebuck Mountain	Oxford	Lynchtown Twp	1.7	0	74	62	26	Mx	1.1	0.0	0	0	0	1	0	0	52	0	61	32	54						2	2.04	116

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Speckled Mountain (Mason Twp)	Oxford	Mason Twp	4.7	100	82	0	100	R	0.0	0.0	1	0	0	1	100	0	45	100	3	27	70			T/A	6		2	4.28	33
Pickett Henry Mountain	Oxford	Mason Twp	2.8	100	94	0	29	Mx	0.0	0.0	0	0	0	0	0	0	72	100	0	29	68					0	2	2.55	90
Mount Zircon	Oxford	Milton Twp	2.3	100	73	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	31	64						3	0.81	205
Sunday River Whitecap	Oxford	Newry	4.1	87	13	7	0	Mx	1.9	0.0	2	0	3	0	61	0	40	76	39	32	63			T	2	5	4	4.20	37
Puzzle Mountain	Oxford	Newry	2.8	100	0	0	0	Pr	0.8	0.0	0	0	0	1	0	0	0	0	29	36	60			T	2	7	1	1.48	158
Plumbago Mountain	Oxford	Newry	2.0	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	12	63					0	0	0.39	251
Barker Mountain (Newry)	Oxford	Newry	1.1	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	88	0	0	18	67					1	0	1.46	160
Heather Mountain	Oxford	Oxbow Twp	2.7	0	100	81	37	Mx	2.2	0.0	0	0	0	0	0	0	0	0	21	15	33						1	0.81	204
Rump Mountain	Oxford	Parmachenee Twp	0.9	0	40	40	60	R	0.4	0.7	0	0	0	3	0	0	0	100	40	17	55						2	2.18	111
Ledge Ridge	Oxford	Parmachenee Twp	1.1	0	100	58	0	Pr	0.6	0.0	0	0	0	3	60	1	0	100	73	9	32						1	3.12	67
Speckled Mountain (Peru)	Oxford	Peru	1.2	100	0	0	14	Mx	0.0	0.0	0	0	0	2	0	0	0	0	0	31	72			A	1		3	1.07	178
Black Mountain (Peru)	Oxford	Peru	2.1	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	25	48			A	1		4	0.94	193
Wheeler Mountain	Oxford	Riley Twp	4.0	28	72	45	0	Pr	1.8	0.0	0	0	0	0	0	0	0	17	32	31	59					2	0	1.25	171
Slide Mountain	Oxford	Riley Twp	2.4	0	100	36	100	OC	0.9	0.0	0	0	0	0	100	0	0	59	35	28	47			A	2	6	4	3.14	66
North Peak	Oxford	Riley Twp	1.3	0	100	100	100	R	1.3	0.5	2	0	0	0	100	0	71	100	73	33	70		T		2	8	1	5.32	17
Mount Carlo	Oxford	Riley Twp	1.7	0	74	74	100	R	1.3	0.3	1	0	0	3	72	0	1	100	71	33	63		T	A	3	2	1	4.29	32
Lary Brook Mountain	Oxford	Riley Twp	1.5	0	100	67	100	E	1.0	0.0	0	0	0	0	0	0	0	100	51	39	72					3	1	2.41	96
Goose Eye Mountain	Oxford	Riley Twp	1.3	0	100	100	100	R	1.3	0.8	2	0	0	0	100	0	80	100	68	38	80		T	A	5	7	1	5.89	11
Fulling Mill Mountain	Oxford	Riley Twp	1.2	0	100	96	100	R	1.2	0.0	2	0	0	1	100	0	0	100	68	45	69		T	A	3	5	2	4.83	24
Bear Mountain	Oxford	Riley Twp	3.5	13	87	57	87	E	2.0	0.0	0	0	0	0	0	0	0	96	52	36	68					2	2	2.52	92
Walker Mountain	Oxford	Roxbury	2.7	100	0	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	20	46						1	0.50	238
Flathead Mountain	Oxford	Roxbury	3.0	100	0	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	6	33					0	1	0.31	255
Whitecap Mountain	Oxford	Rumford	1.1	100	0	0	0	R	0.0	0.0	2	0	0	2	100	0	87	0	0	17	52						0	2.73	82
Black Mountain (Rumford)	Oxford	Rumford	1.3	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	13	49						0	0.33	254
Miles Knob	Oxford	Stoneham	2.2	100	43	0	100	R	0.0	0.0	1	0	0	0	100	0	82	100	0	25	72			A	3		2	4.13	40
Unnamed (Township C)	Oxford	Township C	1.8	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	5	18					18	3	0.56	228
Metallak Mountain 2	Oxford	Township C	2.2	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	2	12					5	1	0.21	261
Metallak Mountain	Oxford	Township C	2.3	0	100	15	0	Pr	0.3	0.0	0	0	0	0	0	0	0	0	18	21	31					10	2	0.81	206
C Bluff Mountain	Oxford	Township C	2.7	0	100	8	26	Mx	0.2	0.0	0	0	0	0	56	2	0	0	6	25	52					19	4	2.29	105
West Kennebago Mountain	Oxford	Uppr Cupsuptic Twp	2.8	0	100	100	100	E	2.8	1.6	0	0	0	0	0	0	0	0	85	27	69			A	1		2	2.22	108
Twin Mountains	Oxford	Uppr Cupsuptic Twp	2.2	0	100	100	100	E	2.2	0.0	0	0	0	0	0	0	0	0	73	28	52						1	1.53	154
Snow Mtn (Upper Cupsuptic Twp)	Oxford	Uppr Cupsuptic Twp	1.5	0	100	100	100	E	1.5	0.6	0	0	0	0	0	0	0	0	81	48	62						1	1.84	130
Bull Mountain	Oxford	Uppr Cupsuptic Twp	1.5	0	100	100	100	E	1.5	0.0	0	0	0	0	0	0	0	0	53	18	39						0	1.03	182
Spruce Mountain (Woodstock)	Oxford	Woodstock	3.6	100	0	0	13	Mx	0.0	0.0	0	0	0	2	0	0	0	0	0	26	59						3	0.80	207
Mollyockett Mountain	Oxford	Woodstock	1.9	100	0	0	0	Pr	0.0	0.0	0	0	0	2	0	0	0	0	0	2	56						2	0.49	239
Blackcap	Penobscot	Eddington	1.1	100	0	0	0	Pr	0.0	0.0	1	0	1	0	0	0	76	0	0	8	46						1	1.43	163
Passadumkeag Mountain	Penobscot	Grand Falls Twp	1.9	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	10	48			A	1		1	0.55	229
Mount Chase	Penobscot	Mount Chase	2.7	100	100	0	0	Pr	0.0	0.0	2	0	0	0	0	0	0	0	8	35	58			A	1		4	1.46	159
Deasey Mountain	Penobscot	T3 R7 WELS	1.0	0	100	0	100	R	0.0	0.0	0	0	0	0	100	0	0	100	0	20	58						3	2.69	84

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Unnamed (T4 R8 WELS)	Penobscot	T4 R8 WELS	1.4	0	83	0	17	Mx	0.0	0.0	0	0	0	0	57	0	0	29	0	4	13					0	2	1.12	176
Roberts Mountain	Penobscot	T6 R6 WELS	2.2	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	14	47						2	0.50	237
Prong Pond Mountain	Piscataquis	Beaver Cove	1.8	0	100	0	0	Pr*	0.0	0.0	0	0	0	0	0	0	0	0	0	39	53					2	4	0.94	192
Baker Mountain	Piscataquis	Beaver Cove	3.9	0	100	92	19	Mx*	3.6	0.1	1	0	0	0	0	0	0	93	86	32	62					33	2	3.41	58
Big Moose Mountain	Piscataquis	Big Moose Twp	4.8	100	100	22	20	Mx*	1.1	0.0	4	0	1	0	100	0	26	96	28	37	55			A	1		1	4.16	39
Russell Mtn (Blanchard Twp)	Piscataquis	Blanchard Twp	2.2	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	2	33					15	2	0.48	242
White Cap Mtn 2 (Bwdn Coll Gr E)	Piscataquis	Bowdoin Coll Grant E	1.1	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	3	9	52					89	6	1.73	141
White Cap Mtn (Bwdn Coll Gr E)	Piscataquis	Bowdoin Coll Grant E	2.2	0	100	100	56	R	2.2	0.7	2	0	0	0	0	0	84	100	91	33	74		T	A	3	86	6	6.22	9
West Peak	Piscataquis	Bowdoin Coll Grant E	3.2	0	100	23	100	R	0.7	0.0	0	0	0	0	0	0	0	93	48	29	61		T		2	100	7	4.10	43
Hay Mountain	Piscataquis	Bowdoin Coll Grant E	1.4	0	100	100	100	R	1.4	0.0	0	0	0	0	0	0	0	100	92	10	77		T		2	78	5	4.20	36
Big Spruce Mountain	Piscataquis	Bowdoin Coll Grant E	1.8	0	100	58	0	Pr	1.0	0.0	0	0	0	0	0	0	0	100	72	37	69					66	6	3.63	53
Elephant Mtn (Bwdn Coll Gr W)	Piscataquis	Bowdoin Coll Grant W	2.2	0	100	0	27	Mx	0.0	0.0	0	0	0	0	0	0	0	0	17	38	72			A	1	16	3	1.41	164
Blue Ridge (Bwdn Coll Gr W)	Piscataquis	Bowdoin Coll Grant W	4.1	0	100	0	0	Pr*	0.0	0.0	0	0	0	0	0	0	0	0	0	23	36	RP				20	5	1.98	118
Little Spencer Mountain	Piscataquis	E Middlesex Canal Gr	2.0	0	100	53	0	Pr	1.1	0.0	0	0	0	0	0	0	0	0	37	47	83						2	1.45	162
Barren Mountain (Elliotsville Twp)	Piscataquis	Elliottsville Twp	6.1	0	100	0	100	R	0.0	0.0	2	0	0	0	100	1	0	100	5	26	56		T	A	3	58	12	5.51	15
Lily Bay Mountain	Piscataquis	Frenchtown Twp	6.0	0	100	59	0	Pr*	3.5	0.0	1	0	0	0	0	0	0	90	41	26	56			A	1	5	3	2.80	77
Bluff Mountain	Piscataquis	Frenchtown Twp	2.3	0	100	0	0	Pr*	0.0	0.0	0	0	0	0	0	0	0	0	5	24	43	RP				10	2	1.72	142
Blair Hill	Piscataquis	Greenville	4.2	100	0	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	8	19					6	4	0.55	230
Lobster Mountain	Piscataquis	Lobster Twp	4.7	0	100	0	43	Mx	0.0	0.0	1	0	1	0	0	0	0	0	0	31	71						3	1.06	179
Unnamed (Moosehead Jct Twp)	Piscataquis	Moosehead Jct Twp	2.0	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	19	56					3	1	0.53	233
Little Moose Mountain	Piscataquis	Moosehead Jct Twp	1.7	100	100	0	100	OC	0.0	0.0	2	0	0	0	54	0	89	0	0	28	68					0	2	2.58	88
Big Moose Mountain 2	Piscataquis	Moosehead Jct Twp	1.1	100	100	0	100	OC	0.0	0.0	0	0	0	0	46	0	0	0	0	3	16						0	0.56	227
South Turner Mountain	Piscataquis	Mount Katahdin Twp	1.3	0	0	0	100	R	0.6	0.0	0	0	0	4	100	0	31	100	4	45	45			A	1	0	3	3.60	54
Rum Mountain	Piscataquis	Mount Katahdin Twp	2.6	0	0	0	100	R	0.8	0.0	0	1	0	3	100	0	0	100	52	23	43					44	8	4.30	31
Mount Katahdin	Piscataquis	Mount Katahdin Twp	4.8	0	0	0	100	R	3.4	3.0	2	1	0	6	100	1	26	100	14	56	62		X	T/A	5	15	7	6.57	4
Lord Mountain	Piscataquis	Nesourdnahunk Twp	1.2	0	0	0	100	R	0.0	0.0	0	0	0	0	100	0	0	100	0	30	34					0	1	2.50	93
Shaw Mountain	Piscataquis	Shawtown Twp	3.0	0	100	0	100	R	0.0	0.0	0	0	0	0	0	0	0	0	5	21	52					7	6	1.04	181
Hedgehog Mtn (Shawtown Twp)	Piscataquis	Shawtown Twp	2.0	0	100	0	100	R	0.0	0.0	0	0	0	0	0	0	0	0	0	15	12					15	4	0.67	218
Black Pinnacle	Piscataquis	Shawtown Twp	2.1	0	100	0	100	R	0.0	0.0	0	0	0	0	0	0	0	0	0	14	28					13	6	0.88	197
Wadleigh Mountain	Piscataquis	T1 R12 WELS	1.3	0	100	0	100	OC	0.0	0.0	0	0	0	0	0	0	0	100	0	4	31					19	5	1.78	137
Farrar Mountain	Piscataquis	T1 R12 WELS	1.8	0	100	0	100	OC	0.0	0.0	0	0	0	0	0	1	0	100	13	32	71					13	2	2.37	97
Peaked Mtn (T10 R10 WELS)	Piscataquis	T10 R10 WELS	1.2	0	100	0	0	Pr	0.0	0.0	1	0	0	0	0	0	0	0	0	36	65						5	1.18	174
South Brother	Piscataquis	T3 R10 WELS	1.2	0	0	0	100	R	1.2	0.6	0	1	0	0	100	0	49	100	11	29	43			T/A	3	8	4	4.40	30
Mount O-J-I	Piscataquis	T3 R10 WELS	2.2	0	0	0	100	R	0.7	0.0	0	1	0	0	100	0	0	100	35	62	71			T	2	17	8	4.56	27
Doubletop Mountain	Piscataquis	T3 R10 WELS	1.7	0	0	0	100	R	0.8	0.0	0	0	0	1	100	0	0	100	66	60	82			T	2	16	6	4.67	26
Barren Mtn (T3 R10 WELS)	Piscataquis	T3 R10 WELS	2.1	0	0	0	100	R	1.8	0.3	0	1	0	0	100	0	0	100	57	33	61					43	7	4.47	28
Squaws Bosom	Piscataquis	T3 R11 WELS	3.1	0	69	55	100	R	1.7	0.0	0	0	0	0	85	0	0	100	64	34	75					6	9	4.13	42
Wassataquoik Mountain	Piscataquis	T4 R10 WELS	2.6	0	0	0	100	R	0.2	0.0	0	0	0	0	100	2	0	100	48	30	58					0	3	3.95	45
North Brother	Piscataquis	T4 R10 WELS	2.5	0	0	0	100	R	2.1	1.4	0	2	0	0	100	0	59	100	40	53	61			T	2	0	4	5.05	20

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Mullen Mountain	Piscataquis	T4 R10 WELS	1.7	0	0	0	100	R	0.9	0.0	0	1	0	0	100	0	0	100	55	43	58					0	3	3.64	51
Center Mountain	Piscataquis	T4 R10 WELS	2.1	0	0	0	100	R	0.2	0.0	0	1	0	0	100	0	0	100	7	56	74					0	4	3.35	59
North Turner Mountain	Piscataquis	T4 R9 WELS	2.7	0	0	0	100	R	0.2	0.0	0	0	0	0	100	0	0	100	5	29	48					0	4	2.88	73
Howe Peaks	Piscataquis	T4 R9 WELS	5.2	0	0	0	100	R	4.4	2.8	1	1	0	6	100	3	40	100	18	28	45			T/A	3	4	6	6.43	7
East Turner Mountain	Piscataquis	T4 R9 WELS	2.2	0	31	0	69	R	0.1	0.0	1	0	0	0	100	0	0	100	3	20	47					0	4	2.92	71
Traveler Mountain	Piscataquis	T5 R9 WELS	4.8	0	0	0	100	R	2.1	0.0	0	1	0	0	100	0	34	100	2	37	72						3	3.63	52
South Branch Mountain	Piscataquis	T5 R9 WELS	1.9	0	0	0	100	R	0.0	0.0	0	0	0	0	100	0	0	100	0	51	76			T	2		1	3.21	63
Sable Mountain	Piscataquis	T5 R9 WELS	2.1	0	0	0	100	R	0.0	0.0	0	0	0	0	100	0	0	100	0	14	35						1	2.36	98
Pogy Mountain	Piscataquis	T5 R9 WELS	3.4	0	0	0	100	R	0.3	0.0	0	0	0	0	100	0	0	100	0	21	27					0	3	2.59	87
North Traveler Mountain	Piscataquis	T5 R9 WELS	2.1	0	0	0	100	R	0.9	0.0	1	1	0	0	100	0	33	100	26	56	64			A	3		2	4.26	34
Barrell Ridge	Piscataquis	T5 R9 WELS	1.2	0	0	0	100	R	0.0	0.0	0	0	0	0	100	0	0	100	0	14	73			A	1		2	2.79	80
Hurd Mountain	Piscataquis	T6 R15 WELS	1.6	0	100	0	0	Pr	0.0	0.0	1	0	1	0	0	0	0	0	0	7	35						5	0.85	200
Caucomgomoc Mountain	Piscataquis	T7 R15 WELS	2.6	0	100	0	7	Mx	0.0	0.0	0	0	0	0	0	0	0	100	0	10	41						1	1.36	167
Columbus Mountain	Piscataquis	T7 R9 NWP	1.6	0	100	0	100	R	0.0	0.0	1	0	1	0	100	0	41	100	0	29	49		T		2	29	10	4.79	25
Benson Mountain	Piscataquis	T7 R9 NWP	2.4	0	100	0	100	E	0.0	0.0	0	0	0	0	100	0	0	0	0	25	47					22	5	2.07	115
Norway Bluff	Piscataquis	T9 R9 WELS	4.4	0	100	0	100	E	0.0	0.0	0	0	0	0	0	0	10	0	3	28	65						2	0.85	199
Jo-Mary Mountain	Piscataquis	TA R10 WELS	1.9	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	52	55	74					73	3	2.32	100
Cooper Mountain	Piscataquis	TA R11 WELS	1.2	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	0	11					38	2	0.60	223
Big Boardman Mountain	Piscataquis	TA R11 WELS	1.4	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	5	32					24	4	0.76	211
Saddleback Mtn (TB R11 WELS)	Piscataquis	TB R11 WELS	6.5	0	100	15	0	Pr	1.0	0.0	0	0	0	0	0	0	0	0	29	33	68	O				6	5	1.81	133
Little Spruce Mountain	Piscataquis	TB R11 WELS	1.6	0	100	97	0	Pr	1.6	0.0	0	0	0	0	0	0	8	100	100	23	53					55	3	3.50	55
Big Shanty Mountain	Piscataquis	TB R11 WELS	2.4	0	100	28	0	Pr	0.7	0.0	0	0	0	0	0	0	0	100	47	40	65					18	3	2.62	86
Big Spencer Mountain	Piscataquis	TX R14 WELS	2.9	0	100	72	92	R	2.1	0.0	1	0	0	0	0	0	0	0	55	47	80			A	1		0	1.88	125
Trickey Bluffs	Somerset	Alder Brook Twp	1.0	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	64	72						1	0.98	188
Ironbound Mountain	Somerset	Alder Brook Twp	2.5	0	100	0	36	Mx	0.0	0.0	0	0	0	0	0	1	0	0	0	33	50						2	1.02	183
Number Six Mountain	Somerset	Appleton Twp	1.3	0	100	76	0	Pr	1.0	0.0	1	0	0	1	100	0	0	100	98	39	65						4	4.25	35
Greenlaw Mountain	Somerset	Appleton Twp	1.8	0	100	23	0	Pr	0.4	0.0	1	0	0	1	44	0	0	99	64	45	54						1	3.02	69
Sally Mountain	Somerset	Attean Twp	1.9	0	100	0	0	E	0.0	0.0	0	0	0	0	100	0	0	0	0	37	71			A	1		6	2.32	102
Bald Mountain	Somerset	Bald Mtn Twp T2 R3	4.1	100	100	0	54	Mx	0.0	0.0	2	0	2	0	100	0	24	92	0	18	35		X		2	31	3	3.84	48
Number Two Mountain	Somerset	Bald Mtn Twp T4 R3	2.6	100	100	6	0	Pr	0.2	0.0	0	0	0	0	0	0	0	0	20	21	33	O					0	0.89	195
Boundary Bald Mountain	Somerset	Bald Mtn Twp T4 R3	6.3	6	100	90	0	Pr	5.7	0.4	0	0	0	0	0	0	32	81	74	35	59						1	3.24	62
Unnamed (Bradstreet Twp)	Somerset	Bradstreet Twp	1.7	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	0	5						1	0.11	265
Moxie Mountain	Somerset	Caratunk	5.0	100	0	0	0	Pr	0.3	0.0	2	0	2	2	0	0	0	99	12	23	50	O				25	2	2.82	76
Roundtop Mountain	Somerset	Carrying Pl Twn Twp	2.5	6	100	0	8	Mx	0.0	0.0	0	0	0	0	0	0	0	0	0	8	16		X		2	45	2	1.09	177
Little Bigelow Mountain	Somerset	Dead River Twp	3.0	0	100	59	100	R	1.8	0.0	1	0	0	1	100	0	73	100	40	37	74		T		2	59	3	5.61	13
Bigelow Mountain	Somerset	Dead River Twp	2.6	0	100	94	100	R	2.4	1.8	2	0	5	2	100	1	64	100	56	66	91		T	A	4	72	4	7.65	2
Green Mountain	Somerset	Dole Brook Twp	1.3	0	100	0	100	E	0.0	0.0	1	0	0	0	99	0	0	0	0	11	23			A	1		1	1.59	147
Witham Mountain	Somerset	Highland Plt	2.4	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	19	55					6	0	0.47	244
Stewart Mountain	Somerset	Highland Plt	3.8	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	7	12	35					22	2	0.72	213

TABLE 1

Site name	County	Town	Length (miles)	% Expedited	% LURC	% P-MA	% Conserved	Conservation status	Length above 2700' (mi)	Length above 3500' (mi)	Current Community EOs	Historic Community EOs	Current Species EOs	Historic Species EOs	% BwH Focus Area	# RTE species	% TNC summit	% Roadless	% Bicknell's habitat	% Steep (ridgeline)	% Steep (upper slope)	Ridgeline pond	Appalachian Trail	Other hiking trails	Trail access points	AT viewshed score	# Scenic features	Composite score	Composite score rank
Burnt Hill (Highland Plt)	Somerset	Highland Plt	2.1	100	100	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	11	25					6	0	0.30	257
Hedgehog Mtn (Hobbstown Twp)	Somerset	Hobbstown Twp	2.1	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	24	15	40						3	0.80	208
Unnamed 2 (Jackman)	Somerset	Jackman	1.6	89	11	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	4	33						0	0.18	264
Unnamed 1 (Jackman)	Somerset	Jackman	1.0	100	0	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	0	15	70						1	0.56	226
Johnson Mountain	Somerset	Johnson Mtn Twp	2.2	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	18	19	33						0	0.50	236
Cold Stream Mountain	Somerset	Johnson Mtn Twp	6.5	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	1	12						2	0.22	260
Unnamed (Long Pond Twp)	Somerset	Long Pond Twp	2.1	100	100	0	0	Pr	0.0	0.0	0	0	0	1	0	0	0	0	15	18	37						4	0.84	201
Granny Cap	Somerset	Lwr Enchanted Twp	1.6	0	100	2	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	21	50	89						2	1.22	173
Williams Mountain	Somerset	Misery Twp	2.7	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	14	31						4	0.59	224
Parlin Mountain	Somerset	Parlin Pond Twp	2.9	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	7	8						3	0.34	253
Bean Brook Mountain	Somerset	Parlin Pond Twp	1.8	70	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	46	8	65						2	0.99	186
Pierce Pond Mountain	Somerset	Pierce Pond Twp	2.0	0	100	0	48	Mx	0.0	0.0	1	0	0	0	0	0	0	67	0	32	65					39	2	1.96	122
Unnamed (Prentiss Twp)	Somerset	Prentiss Twp	2.2	17	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	0	1						0	0.00	267
Russell Mtn (Russell Pond Twp)	Somerset	Russell Pond Twp	1.1	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	15	10	25						1	0.44	247
Little Russell Mountain	Somerset	Russell Pond Twp	1.4	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	13	21			A	1		1	0.46	246
Telephone Hill	Somerset	Saint John Twp	1.5	0	100	0	31	Mx	0.0	0.0	0	0	0	1	0	0	0	65	0	12	30						1	1.01	184
Unnamed (Sandwich Acad Gr)	Somerset	Sandwich Acad Gr	2.5	100	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	2	17						2	0.26	258
Long Pond Mountain	Somerset	Sandwich Acad Gr	1.1	100	100	0	0	Pr*	0.0	0.0	0	0	0	0	0	0	0	0	0	9	23						0	0.19	263
Unnamed (Sandy Bay Twp)	Somerset	Sandy Bay Twp	3.3	35	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	7	20	39						0	0.42	249
Sandy Stream Mountain	Somerset	Sandy Bay Twp	2.7	100	100	20	0	Pr	0.5	0.0	0	0	0	0	0	0	0	0	32	19	29						0	0.67	217
Sandy Bay Mountain	Somerset	Sandy Bay Twp	3.6	64	100	21	0	Pr	0.8	0.0	0	0	0	0	0	1	0	0	23	18	43						0	1.01	185
Unnamed (Soldiertown Twp)	Somerset	Soldiertown Twp	1.1	0	100	0	100	E	0.0	0.0	0	0	0	0	0	0	0	0	0	0	8						0	0.04	266
Blanchard Mountain	Somerset	T3 R4 BKP WKR	1.1	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	11	53					16	2	0.66	219
Seboomook Mountain	Somerset	T4 R17 WELS	2.2	0	100	0	100	E	0.0	0.0	1	0	0	0	0	0	0	0	0	6	13						2	0.43	248
Tumbledown Mtn (T5 R6 BKP WKR)	Somerset	T5 R6 BKP WKR	5.3	0	100	74	0	Pr	3.9	0.2	0	0	0	2	0	0	0	97	87	44	61	O(2)					2	3.86	47
Three Slide Mountain	Somerset	T5 R6 BKP WKR	2.1	0	100	93	0	Pr	2.0	0.0	0	0	0	0	0	0	0	100	83	40	71						2	2.89	72
Number Five Mountain	Somerset	T5 R7 BKP WKR	1.6	0	100	76	88	R	1.2	0.0	1	0	0	1	100	0	0	100	72	42	67						5	4.13	41
Pleasant Pond Mountain	Somerset	The Forks Plt	2.0	100	66	0	56	R	0.0	0.0	0	0	0	2	0	0	0	0	0	26	63		T		2	42	3	1.74	139
Blue Ridge (Tntn & Rayn Acad Gr)	Somerset	Tntn & Rayn Acad Gr	1.4	100	100	0	0	Pr*	0.0	0.0	0	0	0	0	0	0	0	0	0	15	61						1	0.49	241
Unnamed (Upper Enchanted Twp)	Somerset	Uppr Enchanted Twp	2.8	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	7	23						3	0.41	250
Shutdown Mountain	Somerset	Uppr Enchanted Twp	1.4	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	3	0	0	0	32	45						2	1.65	146
Coburn Mountain	Somerset	Uppr Enchanted Twp	7.4	44	100	53	8	Mx	3.9	0.6	0	0	0	0	0	2	0	0	69	17	61	O					3	2.85	74
Pleasant Mountain	Washington	Devereaux Twp	1.4	0	100	0	0	Pr	0.0	0.0	0	0	0	0	0	0	0	0	0	10	30						1	0.31	256

Attachment 3: “Flaws in the Expedited Permitting Process”, Weingarten

Flaws in the Expedited Wind Permitting Process

INTRODUCTION

The following are my concerns about the major flaws of the LURC permitting process, both conceptually and procedurally, for industrial wind energy development. My knowledge and experience with the LURC permitting process is informed by the past six years of participation as an intervenor in two major wind energy permitting proceedings in front of LURC (Kibby I and the Sisk-Kibby expansion), and as an activist in following and engaging in other wind power cases at LURC and DEP, as well as attempting to impact state wind energy policies through legislative and regulatory advocacy and generating public awareness of the issues at stake.

During the past six years I have attended a significant number of LURC meetings and hearings, and have studied and analyzed LURC's land use standards, permitting criteria, the current and prior Comprehensive Land Use Plans (CLUPs), and LURC's legislative and regulatory framework. I have worked closely with several attorneys during this period as well as been Friends of the Boundary Mountains' pro se attorney during the Sisk proceedings.

1. LURC Commissioners are confused and unsure of their role under the Expedited Wind Energy Act

The LURC Commissioners in general are very confused about their role under the Expedited Wind Energy Act (Chapter 661) and have repeatedly expressed their confusion in public (see transcripts of LURC meetings on Sisk and Bangor Daily News Jan. 05, 2011). Some Commissioners aren't even sure that they are "allowed" to vote to deny a wind power permit in the expedited area, which certainly calls into question the objectivity of the entire process and the rationality of having any proceedings whatsoever. This misperception that the Legislature has decided that LURC ***must*** approve all wind projects in an expedited area has severely tainted the process.

A major cause of this confusion and insecurity in doing their jobs is their misconstruing of the Act and their inability to integrate the existing body of LURC land use standards and criteria with the language of the Act. Over the years LURC has adopted and codified a body of environmental principles, standards, and criteria that bring balance to decisions the Commissioners need to make on proposals for developments in the UT. Some of the Commissioners have been under the mistaken belief that the Wind Energy Act negates all these existing environmental standards and land use criteria when it comes to siting wind power projects in an expedited area.

The Legislature has clearly provided in the statute that the Commission should only approve those wind projects that conform to ***all*** of the applicable LURC regulatory requirements on the books and that meet the goals of Maine's Comprehensive Land Use Plan (CLUP). *The only "new" environmental test is for scenic impacts*. It specifically states in the Act that: "Nothing in this section is meant to diminish the importance of

addressing as appropriate site-specific impacts on natural values including, but not limited to, wildlife, wildlife habitats and other environmental values, including "harmonious fit".

It should be noted that the broad goals and policies of the CLUP are: (1) to "support and promote the management of all resources, based on principles of sound planning and multiple uses," the "separation of incompatible uses" and the preservation of "outstanding … natural resource values of the jurisdiction" (2) to "[c]onserve, protect and enhance the natural resources of the jurisdiction" and (3) to "[m]aintain the natural character" of areas "having significant natural values and primitive recreational opportunities."

The way the Commission is supposed to determine which wind proposals should be granted a permit and which should be denied is by applying the applicable standards to the proposed project so the Commission can adjudicate whether or not the proposed project is conforming. This is generally called applying the "standard of review" to the evidence submitted to the Commission during the hearings.

This standard of review was completely abandoned by the majority of the Commissioners in the Sisk proceedings because it got in their way of making a decision favorable to TransCanada Corporation. Abandoning the standard of review compromised the mission of LURC in the Unorganized Territories, as prescribed by its own enabling Statute, its own rules and body of standards, and Maine's Comprehensive Land Use Plan (CLUP).

In particular, the Commission compromised the special values inherent in the Mountain Protection subdistrict designation, bestowed by LURC on mountains above 2700 feet in elevation. The 2010 CLUP, in its "Mountain and Soil Resources", confirms that one of the greatest threats to the fragile environment above 2700 feet is the impact of erosion from road construction and a reduction in the capacity of the land to absorb and hold water. These concerns have been consistently ignored by LURC under pressure to fast-track and approve wind energy projects.

The unmistakable conclusion is that LURC bowed to political pressure by granting a permit for the Kibby expansion project despite its unsuitability under LURC's existing environmental standards and the CLUP, which had been previously acknowledged by LURC in their first vote on the proposal. This view was strongly expressed by Commissioner Kurtz in her stated objections to the project at the second vote and in her disagreement with the other Commissioners over their forsaking of their obligation to apply the very standards that LURC is charged with enforcing.

2. LURC staff have been manipulative and biased in performing their duties in wind energy applications before the Commission

Another source of the Commission's misconstruing of the Wind Energy statute and their confusion in going through the permitting process is the dishonorable role that the LURC staff have played in the permitting process. To say that LURC staff have been extremely biased and unbalanced in managing wind power permitting cases would be the understatement of this young century.

As an example, at the Sept. 2010 LURC meeting, Asst. AG Jerry Reid presented a consultation to the Commissioners and staff on issues that had arisen in the processing of wind power applications. One major piece of advice to LURC from Reid was that LURC staff ***should not be offering their own set of recommendations to the Commissioners in the lead-up to deliberations on a wind power decision***. Rather, Mr. Reid opined that it would be a cleaner, more transparent, and a more objective process if the staff compiled background information and summaries of the relevant evidence for the Commissioners in a "Deliberative Notebook," but refrained from including their own recommendations, as had been done in both the Redington-Black Nubble and Kibby applications. The actions of the LURC staff pushing their own recommendations in those cases had led to much public consternation and questioning.

Yet, within 3 months of Reid's consultation, at the 11th hour in the Sisk/Kibby expansion proceedings, Marcia Spencer Famous, LURC senior planner, unveiled her own recommendations as part of the "Deliberative Notebook." What made this action particularly egregious is that the 3rd Procedural Order in this proceeding had explicitly stated that the staff would ***not*** issue its own recommendation. So not only did LURC violate its own Procedural Order but did so within only 3 business days of the Commissioners' deliberations and vote on the project, thereby handicapping FBM's grassroots, all-volunteer group with an absolutely impossible short time-frame to respond. This violation of our due process by LURC is among many others that are now before the Maine Supreme Court in the case of Friends of the Boundary Mountains v. LURC.

3. The playing field is far from level in wind energy cases before the Commission

The above example of bias on the part of the LURC is just one of many instances that demonstrate how far from level the playing field is for citizen intervenors during wind power application proceedings. Rulings on objections to submitting evidence, requests for more time, or permission to introduce new evidence or witnesses, etc. are consistently approved for corporate applicants and denied to grassroots groups like Friends of the Boundary Mountains.

After voting 5-2 on July 7, 2010 to deny a permit to TransCanada for expanding the Kibby project onto Sisk Mt., the Commissioners, at their August meeting, over the strenuous objections of FBM, voted to table that vote and allow TransCanada to re-open the record to introduce a revised proposal, which ultimately was approved. At the same time, the Commissioners denied FBM's request to continue the public hearing so that it could cross-examine TransCanada's witnesses on this revised proposal and present

FBM's case on why the revised proposal was as environmentally destructive as the original proposal.

During LURC or DEP proceedings under the Act, the time element has been placed under the complete control of the applicant. The Act specifies that if a hearing is held, LURC or DEP must come to a decision within 270 days of when the application is deemed complete. This provision has been used by the applicant/LURC to fast-track without allowing grassroots intervenors sufficient time to prepare/present their case. Then, on the other hand, after the vote went against the applicant, they (TransCanada) "generously" waived the 270-day limit so as to enable LURC to re-open the record so TransCanada could submit its sham amendment. LURC accepted this ploy despite the fact that the 270-day limit should be treated as equally applicable for the benefit of the intervenors as well as the developer. But that is not how LURC plays its role… fairness never enters the picture under LURC. This same scenario is now playing out in the current Bowers Mountain proceedings.

What makes the LURC permitting process even more corrupt is that grassroots intervenors, such as Friends of the Boundary Mountains, do not have anywhere near the resources to counter the massive spending by applicants like TransCanada in employing expert witnesses or a team of high powered attorneys and public relations flacks. By TransCanada's own admissions, it spent $5 million in pre-approval activities for the Kibby proceedings whereas FBM raised and spent $25,000 for the entire case! With such a disparity in resources LURC and other state agencies should be leaning over backwards to create as level a playing field as possible to assure that full scrutiny from all sides of the issues will be presented to the Commissioners for their deliberation. Instead, the entire process is weighed so heavily in favor of the corporate applicant that it becomes a very one-sided farce. While in some states funds are made available to intervenors so the proceedings can be more balanced, Maine apparently hasn't reached that level of common sense.

4. State review agencies are either incapable or unwilling to provide objective and forthright analysis to LURC in wind energy permitting applications

The pro-wind bias of the permitting process extends to the reviews of windpower applications submitted by staffs of the state agencies that LURC draws upon in making permitting decisions. LURC is very dependent on the technical "expertise" of various state agencies in evaluating windpower applications because it seldom hires its own expert consultants.

It is common knowledge that state agencies were instructed by the Baldacci Administration to accommodate windpower applicants as much as possible. Any technical experts presented by windpower opponents (usually pro-bono volunteers) have been consistently ignored by LURC in preference to the state agency shills for the wind industry.

When any state agency reviewer is critical of any portion of a wind energy proposal, even mildly so, it becomes big news because it happens so rarely. And in every one of those rare cases, when the agency reviewer presents their final testimony at a hearing they invariably have backed away from their initial criticism, presumably because of political pressure.

The records of windpower cases are replete with examples of state reviewers' biased and dishonest testimonies. In the case of Kibby, the State Soil Scientist (Dept. of Agriculture) strongly opposed the building of new roads in the fragile and thin soils above 2700 feet elevation and said it couldn't be done without unacceptable risk of erosion. However, he eventually caved into pressure from TransCanada and began downplaying his concerns. The massive erosion "event" in Oct. 2008 on Kibby Mountain clearly proved the accuracy of his initial opposition.

In the Sisk Mt. case the Deputy Director of the Bureau of Parks and Lands initially was irate over TransCanada's visual assessment, which misconstrued the adverse impacts of the proposed Kibby expansion on the public lands running along the shoreline of Chain of Ponds, lakes of high statewide significance. Once again, by the time of the public hearing he backed down from his initial irate opposition.

Probably the most egregious examples of bias and dishonesty (or perhaps incompetence) can be found in the reviews of the Department of Inland Fisheries and Wildlife. This goes back to even the mid-1990s when IF&W presented incredulous testimony during the hearings on the Kenetech windpower proposal that none of the proposed 600 wind turbines on 25 miles of ridgelines in the Boundary Mountains would harm any avian species! IF&W's favoritism towards the wind industry continued in the Kibby case where they dismissed the dangers to various threaten animal species found on Kibby Mountain although these same species found on Redington and Black Nubble Mts. led to a denial of Endless Energy's windpower application for Redington – Black Nubble.

During the Sisk proceedings IF&W consistently overlooked or covered-up the severe adverse impacts that will result from TransCanada's proposal. They defended and exonerated TransCanada's overt violation of scientific protocols, and IF&W's own rules, in supporting the mapping of significant vernal pools during the dry season when vernal pools had already dried up. IF&W completely ignored impacts of TransCanada's proposal on Golden Eagles, although an historic Golden Eagle nest sits on Sisk Mt. and two others can be found within two miles of the project site.

This cover-up of the risks to the future of the Golden Eagle population in Maine by IF&W is especially significant because the latest scientific tracking data from the Golden Eagle population that migrates between the Gaspe in Canada and Virginia demonstrates that breeding-age eagles are seeking to expand their nesting territory. Since Golden Eagles are drawn to historic nesting sites for breeding, the Boundary Mountains, and Sisk in particular, are prime potential habitat. It is also scientific knowledge that Golden Eagles require a 10-mile area from their nests for foraging (unlike Bald Eagles that

require much less). Building an industrial cluster of wind turbines on Sisk would deter any return of Goldens, a threatened native Maine species that has been nearly wiped out.

Assuming that wind energy is good-to-go everywhere

The Expedited Wind Energy Act makes an overall assumption that grid-scale wind energy is a viable and feasible form of energy, both technically and economically, which will produce a positive impact on reducing global warming and address Maine's oil dependency. This assumption was made in crafting the Act without any scientific documented proof and thus has created a process that presumes without evidence or independent evaluation that one form of energy is superior in all cases regardless of different site-by-site circumstances and environment.

This assumption is so taken for granted in the permitting process that LURC has disallowed the submission of any evidence to the contrary, even with regard to particular windpower sites that have been proposed. Due to this assumption, LURC and DEP are accepting at face value the energy production estimates submitted by applicants, without any critical due diligence examination.

Even if the overall technical and economic feasibility of wind energy in Maine was scientifically valid, it does not necessarily follow that it would be valid for all proposed *specific windpower sites*. Just as adverse impacts and benefits need to be weighted in the permitting process on a site-specific basis, so does the *production capability and economics* of any individual site need to be weighed in making a valid determination for rendering a permit decision. If *all* expedited sites are economically viable based on their own circumstances, they shouldn't have to hide under the skirts of this assumption.

The Sisk application was a perfect example of this conceptual flaw as it constituted an expansion of an existing and fully operational wind project site (Kibby). Thus, it presented the opportunity for the LURC commissioners to judge the efficacy of expanding the existing project site through an in-depth analysis of actual production data. Yet the Commissioners rejected FBM's attempt to introduce such evidence and ignored the deficient production at Kibby, relying on the unchallenged energy assumption contained in the Expedited Act and the estimates of the developer.

Data from Kibby demonstrates that LURC's decision on Sisk was flawed in large part due to acceptance of this mistaken assumption. Phase 1 of the facility has now been in operation for a full two years and Phase 2 for one full year. Comparing Kibby's actual production with its rated capacity of 132 MW for the first 3 quarters of 2011 produces a capacity factor of only ***22.5%***. When the facility produced abysmal results in year 1, TransCanada claimed "typical start-up difficulties" but now after 2 years of operation TransCanada's atrocious results continue unabated. In other words, TransCanada is producing a pittance of electricity after having destroyed one of the most spectacular mountains and wildlife and plant communities in Maine.

Moreover, it should be noted that in its application to LURC, TransCanada repeatedly

claims that Kibby constitutes a ***"premier"*** site for the production of wind energy! Yet data on Kibby's actual production of electricity data was deliberately withheld from the Sisk record by LURC. The agency blindly accepted TransCanada's claims about Sisk without any interest in the truth about Kibby's deficiencies.

5. Designation of the expedited zone was done neither scientifically nor democratically

The process of designating the geographic areas of the State that were to be an "expedited zone" by the Governor's Wind Energy Task Force was a backroom, politically and commercially driven process, devoid of objective scientific data and without any public input. It was, and is, one of the most disgraceful anti-democratic and anti-scientific legacies of the Baldacci administration.

In contrast, when the State was faced with a similar situation regarding hydropower on rivers, Governor Brennan released his Energy Policy for the State of Maine, which directed that the State base its determination on where to site hydroelectric dams by using scientific objective criteria. Consequently, the Dept. of Conservation was charged with conducting a Rivers Study.

The purpose of the study was two-fold. The first was to define a list of unique natural and recreation rivers identifying and documenting important river related resource values as well as ranking the State's rivers into categories of significance based on composite river resource value. The second purpose of the study was to identify a variety of actions that the State could initiate to manage, conserve, and, where necessary, enhance the State's river resources in order to protect those qualities that had been identified as important.

The Department of Conservation, working with environmental, economic, energy and other appropriate interests, identified river stretches in the State that provided unique recreational opportunities or natural values and developed strategy for the protection of these areas for submission to the Governor.

At a public meeting of the Task Force in 2007 I suggested the Rivers Study would be a good model to apply to wind power. The Task Force, to its immense shame and disgrace, comprised solely of pro-wind advocates, was only inclined to scurry to a smoke-filled backroom with the wind industry's chief attorney and lobbyist (who, unbelievably, were Task Force members) to carve up the State as the Pope did with the New World.

6. Cumulative impacts have not been defined nor evaluated

A grave failing of the permitting process has been the lack of consideration of *cumulative impacts* as monstrous turbines and their accompanying infrastructure desecrate more and more mountains. Although LURC has expressed at least lip service to the problems caused by the cumulative impacts of incremental development (see, e.g., goal 2 in the 2010 CLUP, which vows to " (p)revent the degradation of natural and cultural values

resulting from cumulative impacts of incremental development."), it has not been able to apply this standard to wind power projects in general nor to any project in particular. It will be too late when the balance is tipped too far and we begin to see our precious mountains, which constitute only 1% of Maine's landform, converted into industrial clusters whose cumulative adverse impacts cannot possibly meet the applicable standards. Yet LURC only perceives these impacts when viewed in isolation, as if the particular project were the sole development or potential development in an area.

When presented with applications for new or expanded projects, LURC and DEP should be questioning whether the proposed outcome as a whole could fit harmoniously into the natural environment of any given region, such as the Boundary Mountains or the Oxford Hills. This should be a critical component of the review process since, as we have seen, developers like to site projects near one another for maximizing their profits, regardless of habitat or other long-term considerations. But LURC and DEP, while putting on a pretense of examining adverse impacts of individual projects, have no criteria or process to address cumulative adverse impacts. Yet, creeping incremental expansion will become the "straw that breaks the camel's back" of an already tenuous balance and tips the scales forever so as to preclude any hope of preserving the natural environment.

The Expedited Wind Act is missing this holistic approach to the permitting process because the aggregation of impacts would call into question the entire goal of converting rural Maine into becoming the "Saudi Arabia of wind." Much better for the developers and their government lackeys to stick to the individual silo approach to the permitting process so as to not reveal to the public where we are headed. Without addressing cumulative impacts in the Statute or in the permitting process there is "death by a thousand cuts," as stated by the only contrarian LURC Commissioner.

7. The tangible benefits test has been misconstrued and misapplied

The Expedited Wind Act requires that the applicant demonstrate that its proposed project will provide significant tangible benefits, as defined in the Act, i.e., "tangible benefits" means environmental or economic improvements ***attributable to the construction, operation and maintenance of an expedited wind energy development.*** These tangible benefits are to be in addition to the generation of electricity.

There has been a great deal of misunderstanding and misapplying of the statutory definition of "tangible benefits" on the part of LURC and DEP. These authorities have allowed applicants to use cash gifts (in his questioning during oral arguments Justice Alexander referred to them as "payoffs") to satisfy the tangible benefits test. The statute's plain language, however, requires that the tangible benefits be "attributable to the construction, operation and maintenance" of the expedited wind project. ***The benefits must come from the wind project itself, not from the wealth of the applicant.***

Misconstruing the definition has led to various unethical behaviors on the part of wind power applicants (with the full knowledge and support of LURC). Applicants like TransCanada run around local communities or near proposed projects with open checkbooks begging local groups to take their money. These payoffs have influenced groups to adopt a position more favorable to the applicant, even after having initially opposed the project. This occurred during the Sisk application proceedings with the Arnold Historical Expedition Society. Moreover, the race to line up "tangible benefits" through the financial largesse of the applicant has led to winners and losers in local communities, the consequence of which is disruption in the social fabric of small towns. Because of these underhanded practices, the tangible benefits test only demonstrates the susceptibility of local people to legalized bribery, not the efficacy of wind energy.

Moreover, any rational determination of tangible benefits should require that the permitting authority calculate whether the project provides a *net* benefit to the community. In other words, the Commission should take into account the public *costs* of the project as well as its supposed benefits. Wind energy projects enable applicants to receive public subsidies from taxpayers at the federal, state and the county level. Wind power projects have been documented to lower real estate values. Wind power projects can adversely impact the local tourism industry, etc. These and similar costs can be quantified and should be included in the permitting decision. If these public costs exceed the public benefits provided by the project, the public receives a net loss, *not* a net benefit from the project. To date LURC has refused to seriously consider this side of the equation.

8. The Expedited Act grants LURC unconstitutional authority to add areas to the expedited zone created by the Legislature and provides no specific criteria for doing so

Despite the fact that nearly 2/3 of the State has been declared as an expedited zone for processing of wind power applications, Chapter 661 gives LURC and DEP additional authority to expand the statutorily-defined expedited zone, while not providing specific criteria for such expansion.

The first concern is serious doubt as to whether the Legislature can make such a delegation of what is essentially a raw legislative power to a state agency consistent with the separation of powers provisions of the Maine Constitution.

In addition, if this overly broad legislative delegation is constitutional, it must be accompanied by specific criteria on how this delegation of power is to be applied, which was not done in the case of the Expedited Wind Act. The Act has only vague and general references to guide the permitting agencies.

The first instance of an attempt to expand an expedited area occurred in the Sisk proceedings. For unknown reasons, not conforming to any boundaries or geographic logic, Sisk Mountain encompasses both expedited and non-expedited areas.

TransCanada filed a petition to expand the expedited area to cover the entire mountain. Because of a lack of specific criteria in the Act, LURC was forced into an extensive rule-making process to define criteria for this expansion. The process was lengthy and unwieldy and very unsatisfactory to all involved parties. Ultimately TransCanada withdrew its petition after much opposition and subsequently attempted to squeeze its project's footprint into the remaining expedited area.

9. The Expedited Act makes no provision for removing areas from the expedited zone

The Expedited Wind statute lacks any authority for *removing* areas from the expedited zone if they are found to be inappropriate by LURC or DEP. Had the Expedited Wind Act been drafted properly and thoughtfully, Sisk would never have been even partially expedited. This situation exists in several other mountain areas as well. It is extremely unfortunate that inappropriate areas are included in the expedited zone and that the controlling authorities (LURC and DEP) have not been given the means to withdraw these areas once they have been studied and found to have been inappropriately included.

10. The inadequacy of decommissioning planning

There has been considerable debate as to the adequacy of what LURC and DEP have been requiring of applicants for their decommissioning proposals. While Friends of the Boundary Mountains did not contest LURC's requirements for decommissioning in either the Kibby or Sisk proceedings, it was not due to the adequacy of the proposals but rather lack of time and resources for it to raise the issue among the many other negative features and impacts that needed to be addressed.

We can, however, offer some facts on LURC's inattention to concerns about decommissioning. In both the Kenetech and Redington cases LURC did not provide any financial security or planning for decommissioning with regard to the meteorological test towers that were constructed and then abandoned in Mountain Protection Subdistricts by each of the developers. This has been typical LURC practice.

In the case of Kenetech, lead-acid batteries, propane tanks, and other highly toxic materials were left in the fragile mountain environment after Kenetech's bankruptcy. It took over a year of pressure from FBM to initiate action by LURC to hire a salvage firm that needed to use helicopters to clean up the top of Kibby Mountain from Kenetech's junk. Because LURC hadn't required any bond or other security, the State taxpayers had to pay for this cleanup. Similarly, the abandonment of a met tower (that had collapsed) occurred on Redington Mt. after Endless Energy's application for a wind power facility was denied. This history calls into question LURC's and DEP's assumptions for decommissioning of entire wind power facilities built in fragile environments.

The final development permit for the Kibby expansion project only requires a "Parental Guarantee" from TransCanada Corporation to fund the necessary decommissioning activities. If TransCanada Corporation's credit rating falls below investment grade, the applicant would then be required to provide a Letter of Credit (LOC) from a financial institution of investment grade standing. The amount of the Parental Guarantee or LOC would be 50% of the estimated decommissioning costs, submitted by December 31st of the first year of commercial operation. No later than year 15 of operation, the applicant would be required to reassess the decommissioning costs and put in place a financial assurance for 100% of the then estimated decommissioning costs, less salvage value.

However, TransCanada submitted estimated cost of only $2,458,281 (based on 2009 US dollars) for removal of the collector system and substation; the turbines and foundations, minus the salvage credits per turbine; and the cost of transportation and disposal. To our knowledge this estimate has not been validated by any third party and therefore should be questioned in light of the $120 million cost of the project.

Furthermore, a detailed decommissioning plan including a description of the work to be performed to remove the turbines and foundations down to a depth of 24 inches below final grade; to remove all buildings, cables, electrical components, and associated facilities (unless they are to be otherwise placed into productive use); and how the site will be restored, including any landowner requests, will ***not*** be submitted until 60 days after the date the project ceases to generate electricity as set forth in a written notice from the applicant to LURC. Thus, it becomes impossible for intervenors or LURC to judge the merits of the decommissioning protocol until after the fact.

An issue that FBM did raise about decommissioning, which LURC dismissed-out-of hand, was our concern about TransCanada's ability to re-vegetate native plant communities above 2700'. This concern has been validated by LURC's post-construction inspection reports on the re-vegetation attempts made in the Kibby I project. These reports, which FBM obtained from LURC, document a total failure to re-vegetate.

The Expedited Wind Act needs to be made much more stringent regarding what is an acceptable plan for decommissioning since LURC and DEP have not done so.

11. Visual standards and tourism-related issues

Complaints and concerns about visual impacts in Maine from wind power projects generally go beyond the typical NIMBY syndrome. Maine's tourism industry, outdoor recreational activities, and second home economy all are intertwined with the importance of scenery and view sheds. In making their permitting determinations, LURC and DEP have consistently ignored public testimony on visual impacts and have instead relied on the so-called "visual expert," i.e., a paid-for corporate parasite who claims to be able to speak definitively on behalf of thousands of individuals on how they would react to viewing a string of turbines and "associated facilities" placed on a heretofore pristine mountain ridgeline. These parasites have shown that they will represent either side for the right price, which in reality can only be afforded by the developers.

So the developers hire these "experts" who proceed to Photoshop pictures purporting to represent "visual simulations" of what the "average" viewer will see at various vantage points. They then do their dishonest best to doctor these simulations so that the permanent scars inflicted on the earth are all greened over in lush lawns (@ 2700 and above feet, no less). Then they contort a fantasy methodology to evaluate how the "average" viewer will react to such desecration. Meanwhile, LURC and DEP ignore testimony upon testimony from real people who live in, or frequent, the proposed area and who know what their response will be to such desecration without paid-for "expert" methodology. What an absurd and rigged process.

To make matters worse, the Expedited Wind Energy Act limits the measuring of visual impact to an arbitrary 8 miles. But real life circumstances demonstrate the absurdity of this geographic limitation. For example, the turbines on Kibby can be seen day and night from multiple points in the Bigelow Preserve. The Preserve, saved from industrial exploitation by a referendum vote in 1976, is considered a "gem" among public lands in Maine and is now subjected to this pollution by TransCanada's monstrosity on Kibby. Even the parasitic visual expert who testified on behalf of TransCanada now expresses surprise concerning the impact on the Bigelow Range.

The entire weighing of visual impact in permitting decisions is rife with conjecture and corruption and needs to be thrown out completely.

Conclusions

Regardless of one's view of wind power as a source of clean energy, converting Maine into the "Saudi Arabia of wind," as intended by former Governor Baldacci, has to be viewed in the context of a major paradigm change for the State. Installing 2700 MWs of on-land wind power, as envisioned by the Expedited Wind Energy Act, entailing the permanent adverse impacting of 350 miles of mountain ridgelines, clear-cutting of 50,000 acres of forestland, building of hundreds of miles of new roads and high-power transmission lines and substations, and permanently impacting rural livelihoods and lifestyles, constitutes a major environmental, social, and economic dislocation that forever will change the character of Maine.

The Expedited Wind Act was the product of the infamous Governor's Task Force on Wind Power Development. In proclaiming the Task Force's mission, Baldacci stated its purpose was to: "review the regulations that affect the development of wind power projects in the state and recommend any changes that would assure that Maine has a balanced, efficient and appropriate regulatory framework for evaluating proposed projects. The Task Force will also monitor advances in wind power technology, identify benefits and incentives that might be available to communities considering wind power projects, help developers find the most appropriate locations for their projects and propose goals for wind power in Maine for 2010 and 2020."

Lofty goals indeed but how have they worked out in practice? Has there been public acceptance and support? Framers of the Act had expected to eliminate or reduce the

controversial nature of the permitting process while providing developers with predictability and assurance for the timeliness of the permitting process. There was the expectation that the Act would provide clear guidance to developers about the type of sites that would face lower risk through the permitting process and would clarify siting criteria and the standards of review.

To successfully meet these challenges, policy makers and politicians needed the Act and its implementation to be exemplary and the resulting consequences to be fully embraced and found acceptable by the public. It is, however, undeniable that Maine's Expedited Wind Energy Act has not lived up to the expectations of its framers and proponents and this misguided Statute brings public scorn on a daily basis.

Grassroots opposition has grown to include local groups in every corner of the State, a statewide coalition and a state level opposition group. Each month more and more towns are enacting ordinances to deter windpower projects in their jurisdictions. Perhaps this recent (Dec. 15, 2011) news item from the town of Paris, ME best expresses the widespread frustration towards windpower and determination of local citizens to stop it:

> "After much debate, we unanimously agreed that the intense controversy which always seems to be generated by wind farming was not something we felt was good for the town," said Creaser (of Paris' land use planning committee). "Since we didn't have the authority to ban them altogether, we designated the [Route 26] corridor as the wind farming zone, hoping that the technology will have to improve dramatically for anyone to build one there."
>
> "Proposed wind farms have been the subjects of fierce debate in neighboring communities, including Sumner and Buckfield."

Certainly this is not the kind of reaction proponents expected when the Wind Energy Act was rammed through the Legislature in 2008. This short-sighted legislation was based on political gamesmanship, not science or a thorough understanding of the havoc about to be wrought on rural Maine. Did these scheming politicians and their knee-jerk followers once consider how foolish and counter-productive it was to try to save the environment by wrecking that same environment, while simultaneously wasting vast amounts of taxpayer dollars? The only beneficiaries of this scheme have been the greedy and destructive corporate developers who will stop at nothing in their drive for profits.

Maine people will not rest until this terrible subterfuge is removed from our midst.

Bob Weingarten
President, Friends of the Boundary Mountains
Vienna, Maine

Attachment 4: Maine Audubon Letter, Gallo/Stockwell/Gray

MAINE AUDUBON
20 Gilsland Farm Rd., Falmouth, ME 04105
(207)781-2330, www.maineaudubon.org

Stephen A. Cole
Coastal Enterprises, Inc.
PO Box 268
Wiscasset, ME 04578

January 15, 2012

Dear Steve,

Thank you for the opportunity to provide comments on the work CEI is doing for the Office of Energy Independence and Security to review the state's wind power planning process and regulatory standards. Maine Audubon has been engaged in wind power siting since the very early days of wind power in the state. We support renewable energy, and recognize the seriousness of threats to wildlife and wildlife habitat from global climate change. At the same time, our mission is to conserve wildlife and wildlife habitat within our state boundaries, and we regularly speak up on behalf of wildlife.

Although we have supported most wind power projects in Maine, we have also opposed a few projects that have threatened unique habitat and imperiled species. To reduce the conflict between conserving valuable wildlife habitat and promoting renewable energy development, we brought diverse stakeholders together to create the first Wildlife Siting Guidelines and participated in the Governor's Task Force on Wind Power Development, which adopted those guidelines and the expedited permitting map, which you are now charged with evaluating.

We continue to review many wind development permits, and whenever possible offer suggestions and recommendations for how to improve projects to minimize impacts to valuable wildlife and habitat.

Today, we are wrapping up a GIS-based evaluation of the extent to which high-value natural resources overlap with potential viable wind resources. We hope this analysis can be used to help steer new wind power projects to areas with fewer impacts to wildlife and wildlife habitat, and to assess whether and how we might reach the state's goal of building 3,000 MW capacity by 2030.

We plan to release a complete report at the end of January, but for the purposes of your work and timeline, I will share some of the highlights of our evaluation below. In addition, we will provide comments in several of the subject areas in your Wind Assessment review for which we have staff expertise and experience.

OVERVIEW OF MAINE AUDUBON WIND SITING ANALYSIS

Maine Audubon is currently undertaking a GIS analysis of the wind resource in Maine and how it overlaps with mapped natural resource values. This issue is compelling to us based on our mission to conserve wildlife and wildlife habitat, and our interest in supporting long-term renewable energy sources in our state. Our analysis focused on identifying those areas with potential viable wind power, identifying areas of high natural resource value based on readily available information, and determining where and to what extent these areas overlap. We hope to use this analysis to assess how much overlap there is between wind potential and high-value natural resources, if areas of no overlap can accommodate enough future wind development to meet state goals, and how these two types of areas are distributed within the Expedited and Unexpedited Areas.

Briefly, we started with a base GIS layer of wind power class at 80 m, provided by the Natural Resources Council of Maine and originally created by a team lead by Bob Grace of Sustainable Energy Advantage for the Governor's Task Force on Wind Power Development in 2008.[1] We used this GIS data layer to determine the acreage of "wind base", the area where wind projects might be sited on the landscape given current technologies. This initial wind base excluded conservation land, already developed land, and areas with steep slopes. We also eliminated small, isolated polygons (<10 acres) from the base, as well as larger isolated polygons that had only the lowest wind power class.

Over that we added 19 layers of mapped natural resource values, including Significant Wildlife Habitats; buffers around wetlands and waterbodies; locations of rare, threatened and endangered species; and rare and exemplary natural communities (see Attachment I for a complete list of resource layers we used).

We deleted from the original wind base those areas that overlapped with any of these mapped natural resource values, and then determined the remaining available acreage available for potential wind development. A summary of the information from this analysis is presented briefly below. A full report of results will be available by the end of January. Please keep in mind that the wind base layer is a coarse model of wind power class, and does not reflect actual, on-the-ground measurements of wind speeds at any type of fine scale.

The base map we started with in our analysis identified 1,111,770 acres of land where the model identified a wind resource >300 m/sec^2. Most of those acres (about 800,000) were in the lowest Power Class (Class 1, 300-400 m/sec^2), and acreage in the two lowest Power Classes (1 and 2, 400-500m/sec^2) made up 92% of the wind base in Maine (Table 1). The analysis for the wind power task force in 2007 did not include the lowest power class (designated as Power Class 1 in this analysis and as Power Class Zero in the task force report) in their build-out estimates. However, since that report, we have seen development at these "low wind" sites in Maine become more common, as a result of a combination of two things: 1) taller turbines and longer blades that reach slightly higher wind speeds even at lower elevations, and 2) in-depth and **Table**

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[1] See *Report of the Governor's Task Force on Wind Power Development*, Attachment E, availat 124 n-line at www.maine.gov/doc/mfs/windpower/pubs/report/wind_power_task_force_rpt_final_021408.pdf. Accessed January 5, 2012.

Table 1. Acres of potential wind power development sites, acres of high-value natural resource areas, and remaining acres available for wind development by Wind Power Class and Expedited and Unexpedited Areas.

	TOTAL ACRES	By Wind Power Class[1]					
		1	2	3	4	5	6
Initial Wind Base[2]	**1,111,776**	798,050	224,180	51,450	20,510	8,410	9,170
% of total		72%	20%	5%	2%	1%	1%
Expedited	**531,700**	370,920	121,890	24,430	8,380	3,040	3,030
Unexpedited	**580,100**	427,130	102,290	27,020	12,130	5,360	6,150
Natural Resources Overlap	**177,000**	101,400	44,400	12,100	7,500	4,600	7,000
Expedited Area	**112,800**	66,500	33,400	6,200	2,800	1,600	2,300
Unexpedited Area	**64,100**	34,900	11,000	5,900	4,700	3,000	4,700
Wind Base Remaining[3]	**933,487**	695,558	179,733	39,300	12,960	3,812	2,123
Expedited Area	**418,159**	303,770	88,440	18,210	5,590	1,470	690
Unexpedited Area	**515,330**	391,790	91,300	21,090	7,370	2,350	1,440

[1]1=300-400 W/m², 2=400-500 W/m², 3=500-600 W/m², 4=600-700 W/m², 5=700-800 W/m², and 6=>800 W/m². Note that these same categories are identified as Power Class 0-5 in Appendix E of the Task Force Report).
[2]Excludes conservation land, developed land, steep slopes, polygons that were composed solely of Class 1 wind, and small ,isolated polygons (<10 acres) of any wind power class.
[3]Does not add with the Natural Resources Overlap to the acreage in the Initial Wind Base because after the overlay, an additional 1,289 acres in small isolated polygons (<10 acres in size)of wind base that had minimal potential for wind development were eliminated.

detailed meteorological and geographical studies that map wind resources on these sites at a fine scale and find higher wind values than otherwise indicated by coarse wind modeling. We believe much of the potential for future wind power development in Maine lies at these lower elevation sites.

The natural resource values we mapped have a total acreage of about 177,000 acres, or 16% of the initial wind base, with about 10% of that in the Expedited Area and 6% in the Unexpedited Area. If we remove this acreage from the total wind base, there are approximately 933,487 acres, or 84% of the initial wind base, still available for wind development in the state. Approximately 45% of that is located in the Expedited Area, away from the more remote parts of the state. The acreage is spread across all six wind speed categories.

After removing the acreage having conflicts with natural resources, we developed several build-out scenarios illustrating how much capacity we might be able to capture in wind development on the landscape in both the Expedited and Unexpedited Areas (Table 2). We estimated this by multiplying the acreage remaining in the wind base in the two different zones by three different factors of potential wind power generation. The analysis for the Task Force used an estimate of 7.5 MW/km² to estimate capacity. We did an analysis of the wind potential around turbines at nine existing or planned wind developments in Maine, and found a range of values from around six to more than ten MW/km². We therefore multiplied the acreage (converted to km²) by 6, 7.5

Table 2. Potential build-out scenarios in both the Expedited and Unexpedited Wind Permitting Areas, after mapped natural resource values have been deleted. MW capacities are based on three different estimates of power generated per square kilometer, and four different levels of development.

Estimate of Power Generation*	Total MW Capacity % of Wind Base Developed			
	100%	50%	25%	15%
Expedited				
6 MW/km^2	10,179	5,090	2,545	1,527
7.5 MW/km^2	12,714	6,357	3,179	1,907
9 MW/km^2	15,257	7,629	3,814	2,289
Unexpedited				
6 MW/km^2	12,539	6,269	3,135	1,881
7.5 MW/km^2	15,661	7,831	3,915	2,349
9 MW/km^2	18,794	9,397	4,698	2,819

**The analysis for the Task Force used an estimate of 7.5 MW/km^2 Based on an analysis of the wind base around existing wind projects (see Maine Audubon's full report), we felt an estimate higher and lower than that captures the range of power existing on Maine's landscape today.*

and 9 in order to include both a more liberal and a more conservative scenario than in the Task Force report. Given approximately 1,300 MW of wind power are already permitted or developed, we need to find another 1,700 MW somewhere to meet the state's goals.

If we concentrate all future wind development in the Expedited Areas away from known high-value natural resources, it appears we will have to develop approximately 15-20%, or 77,000 – 103,000 acres, of the wind base in the Expedited Permitting Area to meet the 3,000 MW goal the state has set.

Obviously the exact location of those acres and the feasibility of meeting the 3,000 MW goal by 2030 will depend on many other factors besides natural resource constraints, including location and capacity of transmission lines, ability to purchase/lease appropriate parcels, local support or opposition to wind projects, and scenic and visual impacts. We hope to build off the information CEI is currently collecting on lead lines, transmission lines, and capacity needs to further refine our projections.

ADDITIONAL COMMENTS FOR CEI WIND ASSESSMENT

Now we will provide comments in several of the subject areas in your Wind Assessm[illegible]eview for which we have staff expertise and experience. These comments will follow the same order as your proposed review.

5.1 Statewide Permitting Standards

There are multiple areas where the permitting standards could be clarified. Better guidance on standards would provide more predictability for stakeholders, would help move the wind review process along in a faster time frame, and would better protect important natural resources if built on sound science and accepted conservation practices. Specifically, we propose the following:

1. Northern Bog Lemming. No development of any kind within 250' of a documented occurrence (or evidence of a likely occurrence) of northern bog lemming should be allowed, unless the Department of Inland Fisheries and Wildlife grants an exception based on microsite factors.

The endangered Northern Bog Lemming is extremely rare, difficult to find, and hard to identify. Evidence of this animal has shown up at several wind development projects in recent years. Because the Northern Bog Lemming is so rare and generally inhabits remote areas, there is very little direct information to draw upon concerning impacts of development on their population and habitat. Some developers have argued because there is no clear evidence that development near or in a portion of bog lemming wetland habitat will adversely affect bog lemmings, it should be allowed. Maine Audubon takes a conservative approach, and advocates for any development projects to stay more than 250' away from the sphagnum wetlands where there is evidence that bog lemmings are likely to occur.

The Maine Department of Inland Fisheries and Wildlife uses 250' as a minimum setback for disturbance, though it will allow closer encroachment based on bog hydrology and other microsite factors. We know from the general scientific literature that larger buffers between wetlands and development are better for wildlife, that larger buffers are better at maintaining water quality, that isolated, small populations of animals (and bog lemmings in particular) are vulnerable to extirpation, and that disturbance can reduce habitat quality and therefore productivity, which is critical for a small population.

2. Bicknell's Thrush. There should be no development of any kind in occupied Bicknell's thrush habitat, with a 250' buffer around occupied Bicknell's thrush habitat to limit indirect impacts.

Bicknell's thrush is one of the most rare, range-restricted breeding birds in the Northeast. It does not breed anywhere else in the world outside of this northeastern region. Suitable Bicknell's thrush habitat is severely limited throughout its range. Its rarity and the importance of conserving its habitat are widely recognized:

- *The International Union of Concerned Scientists* classifies Bicknell's thrush as globally "vulnerable", a category for species facing a high risk of extinction in the wild.[2]

- *The U.S. Fish and Wildlife Service's* 2008 "Birds of Conservation Concern" includes the Bicknell's thrush at multiple geographic scales (local, regional and national) as a species

[2] BirdLife International (2009) Species factsheet: *Catharus bicknelli*. Downloaded from http://www.birdlife.org on 4/12/2010.

that, without additional conservation actions, is likely to become a candidate for listing under the Endangered Species Act.[3]

- *National Audubon's* 2007 Watchlist placed Bicknell's thrush in their red category, for species that are declining rapidly and/or have very small populations or limited ranges, and face major conservation threats. These typically are species of global conservation concern.[4]

- *The Maine Department of Inland Fisheries and Wildlife*[5] classifies Bicknell's thrush as one of only 12 bird species of very high priority on their list of Species of Greatest Conservation Needs, indicating a high potential for state extirpation without management intervention and/or protection. The plan lists wind power turbines as a threat for the species, and identifies the following three relevant population and habitat objectives for Bicknell's thrush:
    1. Increase the population within the Atlantic Northern Forest Bird Conservation Region by 10%;
    2. Maintain existing range of breeding habitat; and
    3. Identify and secure habitat protection for core breeding areas in Maine.

- *The Partners in Flight* North American Landbird Conservation Plan lists the Bicknell's thrush as a species with multiple causes for concern across their entire range, with a combination of small populations, narrow distributions, high threats, and declining population trends, and a species of highest continental concern and priority for conservation action at national and international scales.[6]

- *The Partners in Flight* Bird Conservation Plan for the Eastern Spruce-Hardwood Forest states that Bicknell's thrush is the species of greatest concern, and by association the conifer habitats of mountaintops…ranks first in regional priority (p. 16). It also lists the loss of boreal-mountaintop habitats that are critical for Bicknell's thrush as "perhaps the most immediate threat to important bird populations in the planning unit". The plan supports the conservation goal of protecting all sites that support Bicknell's thrush "large enough to be considered source populations for other sites" and as many additional high-elevation habitat patches with smaller populations as possible.[7]

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[3] U.S. Fish and Wildlife Service, 2008. Birds of Conservation Concern 2008. U.S. Dept. of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA.

[4] Butcher, G.S., D.K. Niven, A.O. Panjabi, D.N. Pashley, and K.V. Rosenberg. WatchList: The 2007 WatchList for United States Birds. American Birds 61:18-25.

[5] Maine Department of Inland Fisheries and Wildlife. 2005. Maine's comprehensive wildlife conservation strategy. Maine Department of Inland Fisheries and Wildlife, Augusta, Maine.

[6] Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Iñigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, T. C. Will. 2005. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY. Partners in Flight website. http://www.partnersinflight.or128it_plan/.

[7] K.V. Rosenberg and T.P. Hodgman. 2000. Partners in Flight Landbird Conservation Plan: Physiographic Area 28: Eastern Spruce-Hardwood Forest

- *The U.S. Fish and Wildlife Service* lists Bicknell's thrush as one of only 17 species in the highest priority conservation category in Bird Conservation Region 14 (Atlantic Northern Forest) because of concern for its population within the region, the high responsibility of the region for the population, and either high or moderate continental concern for the species. The plan also lists wind power as a threat to Bicknell's thrush in the region.[8]

Despite the lack of state or federal listing as an endangered or threatened species, there is widespread agreement among major bird conservation organizations and state and federal agencies across the northeast and the nation that Bicknell's thrush is a high conservation priority at multiple spatial scales. Yet some wind developers review the same information and still propose to build roads and turbines in or immediately adjacent to this rare habitat.

3. Fir-Heart-leaved Birch Subalpine Forest. We concur with AMC's comments submitted on December 30, 2011 that there should be no development of any kind in any occurrence of Fir-Heart-leaved Birch Subalpine Forest.

AMC has provided ample information about this habitat type, and we concur that the rarity and uniqueness of this habitat type, along with its close connection to Bicknell's thrush mentioned above, warrant singling it out as a natural resource value of particular concern for wind development, as well as any development likely to occur above 2700'.

5.3 Decommissioning Plans: We believe that standardized decommissioning plans should be required by law for commercial wind developments in the state. We believe that consistency in standards for those plans is more fair to developers, and ensures the people of Maine will not bear the cost of dismantling or disposing of wind developments that fail or are no longer operating. We believe that wind developments warrant special consideration in decommissioning, given their high visibility, their wide distribution across the landscape, their relatively short life expectancies, and safety concerns. In addition to requiring decommissioning funds be secured before a project can be approved, we suggest adopting the U.S. Fish and Wildlife Service's 10-point best management practices for retiring sites. (The USFWS guidelines are listed in Attachment II).

5.6 Expedited Permitting Area:

The Expedited Permitting Area created by the Wind Energy Act was designed to steer wind development away from the interior of large blocks of forest land and some of the important mountain resources within the state. Within the Expedited Permitting Area, a rezoning petition is not required in LURC jurisdiction, wind is an allowed use, and scenic standards are relaxed. There was no change to any other standards for development, and the Expedited Permitting Area was never intended to eliminate the need for site-specific review of project impacts, including to wildlife and habitat.

[8] Dettmers, R. 2006. A blueprint for the design and delivery of bird conservation in the Atlantic Northern forest. US. Fish and Wildlife Service/Atlantic Coast Joint Venture.

However, many members of the public, some wind developers and even some state officials view the Expedited Area as an area where wind projects should be encouraged and moved quickly through the permitting process in order to meet the state's goals for wind power.

Our analysis shows there are still many important natural resources that occur within both the Unexpedited and Expedited Areas that overlap with wind resources, and either should be avoided up front or will require careful review during the permitting process. Of particular concern are impacts (both direct and indirect, and over time and space) to rare, endangered, and threatened species; rare and exemplary natural communities; significant wildlife habitats; and large unfragmented and undeveloped landscapes.

Fortunately, even after removing the acreage with overlapping natural resources and wind resources, there may still be enough acreage within the Expedited Area to support enough wind development to meet the State's goals of 3,000 MW by 2030. As wind development moves forward in Maine at lower elevations and at lower wind speeds, there is more acreage available for development (compared to higher elevation, high wind sites). With more options on the landscape, developers should have more flexibility to steer away from valuable natural resources.

However, as mentioned earlier, the actual potential for wind development will depend on many other factors that must also be evaluated, including scenic impacts, impacts to tourism, economics, community support or opposition, the location and capacity of transmission lines and transfer stations, the geography of the remaining acres, and new wind technology.

Because of the misunderstanding around the terms and conditions of the Expedited and Unexpedited Areas, we encourage you to consider updating either the terms and or the areas so developers, regulators, and the public have a clearer expectation of what is both possible and desirable to promote for wind power development in Maine over the next two decades.

5.8 Additional – Cumulative Impacts

Maine Audubon is very concerned about cumulative impacts from wind power projects, especially to certain very rare species, habitats, and landscapes. Unfortunately, there is no guidance for regulators at the moment on whether or how to address cumulative impacts. We support giving permitting agencies clear statutory authority to consider cumulative impacts, which could be developed through the rule-making process.

We appreciate the opportunity to make these comments, and look forward to seeing the final product of your efforts to pull together this information.

Sincerely,

Susan Gallo

Susan Gallo
Wildlife Biologist

Sally Stockwell

Sally Stockwell
Director of Conservation

Jenn Burns Gray

Jennifer Burns Gray
Staff Attorney and Advocate

Attachment I. GIS layers used in Maine Audubon wind analysis.

Riparian Buffers: Buffers were placed around riparian areas, similar to those in place for municipal Shoreland Zoning. They included an upland buffer of 250 feet from the edge of lakes, ponds, rivers, coastline, and wetlands greater than 10 acres, as well as 75 feet around perennial streams. The acreage of actual wetlands was also included in this buffer.

The Nature Conservancy's Critical Summit Ecosystems: Summits are one of six special landform/ecosystem types identified as being of particular importance to the conservation of regional biodiversity in The Nature Conservancy's Northern Appalachian-Acadian Eco-regional Assessment.[9] Critical occurrences are considered "crucial to the conservation of biodiversity in the eco-region" and have passed a screening process that considers size, landscape quality, and verification. The GIS layer includes the ridgeline and a 100-meter buffer.

Deer Wintering Areas: Polygons for these Significant Wildlife Habitats were included for both organized towns as well as the P-FW zones within LURC. There is no buffer around DWAs.

Inland Waterfowl and Wading Bird Habitat: Polygons for these Significant Wildlife Habitats include moderate and high-value wetlands and a 250-foot upland buffer.

Significant Vernal Pools: Polygons for pools that qualify as Significant Wildlife Habitats include the vernal pool depression as well as a 250-foot upland buffer. Note that this dataset is limited in geographic coverage, and there have not been state-wide efforts to map this resource.

Endangered, Threatened, Special Concern Species: Locations for 96 rare and special concern species. Buffers around observed locations or polygons are based on habitat use and vary by species.

Tidal Waterfowl and Wading Bird Habitat: Polygons for these Significant Wildlife Habitats include a 250-foot around all designated roosting areas and a 100-foot buffer around all designated feeding areas.

Rare And Exemplary Natural Communities: Polygons provided by the Maine Natural Areas Program include the highest quality examples of natural plant communities – both common and uncommon - in the state.

Wading Bird Colony Buffers: Buffers of ¼ mile were added to points of Great Blue Heron rookery locations. Herons travel well beyond this distance to feed, but buffers beyond ¼ mile would need to be directional based on observed behavior.

Beginning with Habitat Focus Areas: These are natural areas of *statewide* ecological significance that contain unusually rich concentrations of at-risk species and habitats. These areas support rare plants, animals, and natural communities, high quality common natural communities; significant wildlife habitats; and their intersections with large blocks of undeveloped habitat. BwH Focus Area boundaries are drawn based on the species and natural communities that occur

[9] Anderson, M. et al., 2006. Northern Appalachian – Acadian Ecoregional Assessment Resource CD. The nature Conservancy, Easter Conservation Science, Boston, MA.

within them and the supporting landscape conditions that contribute to the long-term viability of the species, habitats, and community types.

Modeled Bicknell's Thrush Habitat: Bicknell's Thrush is the rarest migratory songbird in the east and is endemic to subalpine spruce-fir forest in the northeastern U.S. and maritime Canada. The layer includes potential Bicknell's thrush habitat as indentified in a model developed by the Vermont Institute of Natural Sciences in 2005.[10]

Beginning with Habitat Connectors: Two types of BwH connectors were identified by predictive computer modeling that highlights locations where high-value habitat is likely to occur on both sides of a road. The *Riparian Habitat Connectors* included 35-foot buffers. These are likely crossing locations for wetland- and riparian-dependent species moving between waterways and wetlands divided by roads. The *Large Block Habitat Connectors* included 500-foot buffers, and are likely habitat areas linking undeveloped habitat blocks greater than 100 acres

[10] Lambert, D. et al., 2005. A practical model of Bicknell's Thrush in the United Northeastern United States. The Wilson Bulletin 117(1):1-11.

Attachment II. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines September 13, 2011 DRAFT, pp. 100-101, www.fws.gov/windenergy/docs/ WEG_September_13_2011.pdf

Decommissioning

Decommissioning is the cessation of wind energy operations and removal of all associated equipment, roads, and other infrastructure. The land is then used for another activity. During decommissioning, contractors and facility operators should apply BMPs for road grading and native plant re-establishment to ensure that erosion and overland flows are managed to restore pre-construction landscape conditions. The facility operator, in conjunction with the landowner and state and federal wildlife agencies, should restore the natural hydrology and plant community to the greatest extent practical.

1. Decommissioning methods should minimize new site disturbance and removal of native vegetation, to the greatest extent practicable.

2. Foundations should be removed and covered with soil to allow adequate root penetration for native plants, and so that subsurface structures do not substantially disrupt ground water movements.

3. If topsoils are removed during decommissioning, they should be stockpiled and used as topsoil when restoring plant communities. Once decommissioning activity is complete, topsoils should be restored to assist in establishing and maintaining pre-construction native plant communities to the extent possible, consistent with landowner objectives.

4. Soil should be stabilized and re-vegetated with native plants appropriate for the soil conditions and adjacent habitat, and of local seed sources where feasible, consistent with landowner objectives.

5. Surface water flows should be restored to pre-disturbance conditions, including removal of stream crossings, roads, and pads, consistent with storm water management objectives and requirements.

6. Surveys should be conducted by qualified experts to detect invasive plants, and comprehensive approaches to controlling any detected plants should be implemented and maintained as long as necessary.

7. Overhead pole lines that are no longer needed should be removed.

8. After decommissioning, erosion control measures should be installed in all disturbance areas where potential for erosion exists, consistent with storm water management objectives and requirements.

9. Fencing should be removed unless the landowner will be utilizing the fence.

10. Petroleum product leaks and chemical releases should be remediated prior to completion of decommissioning.

Attachment 5: Natural Resources Council Letter, Voorhees

Natural Resources Council of Maine

3 Wade Street • Augusta, Maine 04330 • (207) 622-3101 • Fax: (207) 622-4343 • www.nrcm.org

January 13, 2011

Stephen Cole
Coastal Enterprises Inc
PO Box 268
Wiscassett, ME 04578

Dear Steve,

As a follow-up to our meeting earlier this winter, here are some additional comments that may assist you in assembling your report for the Office of Energy Independence & Security on wind power. That you for meeting with us and for working on this important matter. We covered a lot of ground in that meetingð more than can or need be written out here. We are aware of the extensive comments of the Appalachian Mountain Club and thought it might be most helpful for us to provide some comments in regard to those, identifying areas in particular where we agree with their recommendation or have any additional information or perspective. For the most part, these comments parallel the structure used by AMC (and by your Task List.)

As you know, the Natural Resources Council of Maine is greatly concerned about both the significant threat from air pollution and climate change that comes from our current use of fossil fuels, and about the threat of unplanned and inappropriate development that negatively impacts Maineôs unique North Woods. Wind power, with its potential to significantly reduce greenhouse gas emissions, is one important part of Maineôs energy and climate strategy. However individual projects must be well-sited to achieve a good balance between these objectives. This is less likely to occur without clear, effective planning and permitting frameworks which themselves find the right balance between prohibiting poor projects while allowing good ones to move forward without undue encumbrance.

5.1 Statewide Permitting Standards

- **Sporting camps**. We would support the inclusion of a specific list of sporting camps as scenic resources listed in statute. We agree that these camps, although private property, have a quasi-public identity that is already recognized distinctly in LURC rules and plans. We appreciate AMCôs analysis and comments about the relationship between these camps and potential projects, and thatð as in other casesð proximity alone does not mean adverse impacts.

- **Subalpine forest**. There are a wide variety of important environmental resources across the state that must be evaluated with regard to any proposed development, from subalpine forests to wetlands and from deer yards to rare species habitat. Our core environmental regulations and the agencies that enforce them are designed to make case-by-case determinations of undue adverse impacts on those resources. We agree that elevations

above 2700 ft are areas of concern for any development, with high potential for environmental conflict. As AMC points out, there have been few wind proposals above 2700 ft. (And most development above 2700 ft is already protected in part by conservation status or not being in the expedited area.)

- **Best available technology**. NRCM would strongly support providing review agencies with the clear authority to require best available technologies for mitigating impacts. This is particularly important with regard to use of radar-activated warning systems to replace extensive night lighting by turbines. Use of higher cut-in speed can be an appropriate tool in some cases (but should not be mandated categorically). The agencies should have clear authority but also flexibility to apply best-available technology where there will be real benefits (given that these forms of mitigation typically do have some cost.)

5.2 Visual Impact Criteria

A great deal can be and has been said about the challenges of evaluating the visual impacts of wind power on scenic and recreational resources of statewide significance. It is not an easy task and forces Maine people and permitting authorities to wrestle directly with the balance between the benefits of wind power and one of its most obvious impacts. In general, we believe the work of the Wind Power Task Force remains an important step in the right direction in trying to make this determination as clear and predictable as possible. We have two suggestions, which relate closely to but are not identical to those proposed by AMC.

Evaluating impacts beyond 8 miles is a significant deviation from the balance struck at the Wind Power Task Force and subsequent legislation. It *could* be appropriate in some cases, but any change should be done cautiously. Since the law was modified, NRCM has identified two circumstances when looking beyond 8 miles may be appropriate. First, when a proposed project lies near the boundary of the expedited area. In general, the non-expedited area contains many places and attributes that make it less likely to be appropriate for wind development, including in many cases an increased remoteness and natural character. It is possible that visual impacts on resources in the non-expedited area should be considered beyond 8 miles from a proposed project. Secondly, we believe that visual impacts over very great distances are more likely to be relevant from scenic hiking trails than from most other types of scenic resources. We support the current framework in that the determination of actual impacts is made in the permitting process. We would support a proposal to increase the distance for review to 15 miles in these two circumstances. (We are not persuaded that visual impacts should be evaluated under worse case conditionsð evaluating under typical conditions is more likely to be appropriate. We would support a rulemaking by DEP and/or LURC to give further guidance to *how* visual impact assessments should be conducted, which could address this and other issues that have been raised in several recent permitting proceedings.)

5.3 Decommissioning Plans

We support the required use of decommissioning plans and generally support the approach that has been taken by permitting agencies to-date. We would be more likely to support more stringent or costly decommissioning requirements if they were applied to a wider array of development, including *all* power plants, transmission lines, and indeed large scale resort or commercial development in prominent/scenic places. Otherwise it is potentially counter to Maineôs energy and climate goals to put a significant and costly condition on one of the forms of energy generation we seek to increase. We agree that standards should be consistent between projects, which could be achieved through further agency guidance.

5.5 Greenhouse Gas Emissions

We believe use of ISO-NEôs most recent marginal emission rate calculations is an appropriate way to consistently measure expected emission reductions from new wind power generation. There is significant technical evidence that wind displaces generation ñon the marginò, which is almost always oil and gas generation. ISO-NE has increasingly sophisticated metrics to measure this, which are typically updated annually. Given the functioning of our electricity grid, we do not believe it is necessary or feasible to demonstrate which specific fossil fuel source will be displaced or reduced. (AMCôs term ñtaken off-lineò is unclear from a technical standpoint.) Attached is a comprehensive bibliography of studies and reports regarding integration of wind power onto the utility grid, including resulting changes in fossil fuel power plants and their emissions.

5.6 Number of Turbines

NRCM has additional information and perspectives about the origins and meaning of the wind power goals developed by the Wind Power Task Force and subsequent legislation. As mentioned by AMC, the analysis by Sustainable Energy Analysis et al included a detailed wind power potential study for Maine (as well as the rest of New England.) This analysis was conducted by AWS Truewind, one of the premier wind mapping companies in the U.S. However, as AMC points out, analyses like these are greatly dependent on assumptions, which change over time. There were two primary scenarios considered, one of which identified 5,320 MW of potential (as reported by AMC) and one of which identified over 14,000 MW of potential in Maine, which included lower wind resource areas, many of which we increasingly believe are feasible for development in Maine. This very large potential comes *after* significant discounting of the actual wind resource, as described by AMC.

Perhaps more importantly, there was another significant aspect to the SEA analysis not described by AMCð an analysis of how much renewable energy might be *needed* in Maine and New England to meet the greenhouse gas emission targets identified in statute in Maine and the other states, namely reducing emissions 10% below 1990 levels by the year 2020. There were also several scenarios considered and various assumptions here, but the most central result showed

that the most cost-effective renewable energy strategy would call for approximately 4,000 MW of wind power in Maine by 2020 (as part of 10,000 ï 15,000 MW of new renewables needed across New England). Given the concerns that this was simply too large amount to reasonably expect (informed by the potential study), the Task Force adopted a lesser but still aggressive target of 3,000 MW. We do not believe there was a more specific rationale for choosing 3,000 MW, as opposed to 4,000 MW. A summary of the entire SEA analysis and results is attached.

Potentially changing these goals is therefore not merely about updated assumptions about how much wind power is reasonably achievable from a landscape perspective. (Which is a complicated task in itself, and AMC has begun to tackle it.) Changes must also include consideration of our energy and climate goals, as it did originally. We strongly appreciate the AMCôs analysis of ridgeline windy areas in the stateð in particular the identification of sites with greater and lesser likelihood of environmental conflictð and share the general concern that we do not have a clear picture of the likely build-out of wind power in Maine that enables us to guide it in a more sophisticated manner. We also agree with their finding and projection that a significant amount of wind development has and will be developed off of the higher elevation wind sites they identify.

5.7 Expedited Permitting Area

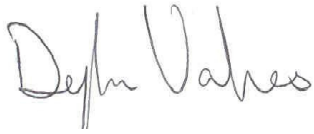
We agree with AMC and many other observers of the process that the Expedited Permitting Area was set using a very high landscape level and was imperfectly coordinated with both the assessment of windy areas and of particular environmental resources. That zoning exercise, therefore, would be highly insufficient without a robust permitting process to make determinations at a finer scale.

We do not have a position at this time on the specific areas suggested for removal from the Expedited Permitting Area because of their proximity to ñiconic places and their viewshedsò. We understand the purpose of the current visual impact permitting criteria for wind power to forbid development that would have undue adverse impacts on scenic resources of ñstatewide and national significanceò, which are identified in law and already include those places listed by AMC. LURC has tentatively rejected at least one proposed wind development based solely on this finding, and required a scaling-down of another project based in part on this criteria. An alternative to re-applying a zoning map to the entire state would be to identify ways in which that permitting criteria or process is not functioning to suitably protect those resources (for example, adding a category of scenic resources, changing the scope of visual impact assessments, or adding additional clarity to the criteria for finding an impact ñundueò.) But this should be based on a determination that there is a significant problem with the current approach and a solution tailored to it. It is generally up to permitting agencies to make determinations in each case about many specific resourcesð this is not always easy, but identifying and agreeing upon all areas and resources for which *any* visual impact by wind power should be categorically prohibited seems like an unreasonably difficult task. Having said that, NRCM strongly supports planning approaches to land use issues.

5.8 Additional ï Cumulative Impacts

NRCM shares AMCôs concerns about cumulative impacts and agrees that although some issues have been well framed, there is not a clear framework for addressing them. We would support increased or more clear statutory authority for permitting agencies to consider cumulative impacts, and suggest that a rulemaking would probably be needed to determine specific provisions for doing that.

Thank you,



Dylan Voorhees
Clean Energy Director

Attachment 6: LURC Memorandum on Permitting Process

STATE OF MAINE
DEPARTMENT OF CONSERVATION
MAINE LAND USE REGULATION COMMISSION
22 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0022

PAUL RICHARD LEPAGE
GOVERNOR

WILLIAM H. BEARDSLEY
COMMISSIONER

PUBLIC COMMENT PERIOD
PROPOSED CHANGES TO LURC WIND POWER APPLICATION PROCESSING

To: Interested Persons

From: Samantha Horn Olsen, Planning Division Manager

Date: December 20, 2011

Public Comment Period: Tuesday December 20, 2011 to Friday, January 20, 2012
Comments may be submitted to Samantha Horn Olsen at Samantha.horn-olsen@maine.gov, or at the mailing address above.

During recent Commission discussions about wind energy development the Land Use Regulation Commissioners expressed the need to find efficiencies in the processing of expedited wind energy development applications, while retaining the quality of information available for decision making. To that end, the Commissioners directed staff to suggest process changes to accomplish this goal. A staff proposal was presented to the Commission at the November 2nd Commission meeting, at which time the Commission directed staff to solicit public comment. The staff memorandum that describes the suggested changes is attached to this notice and is available on the LURC website as a link from the home page at www.maine.gov/doc/lurc. The public comment period is now open, and members of the public may submit comments on the proposal to the addresses listed above.

CATHERINE M. CARROLL, DIRECTOR

www.maine.gov/doc/lurc
PHONE: (207) 287-2631
FAX: (207) 287-7439
TTY: (888) 577-6690

STATE OF MAINE
DEPARTMENT OF CONSERVATION
MAINE LAND USE REGULATION COMMISSION
22 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0022
www.maine.gov/doc/lurc

PAUL RICHARD LEPAGE
GOVERNOR

WILLIAM H. BEARDSLEY
COMMISSIONER

Memorandum

To: Commission Members

From: Samantha Horn Olsen, Planning Division Manager

Date: 30 November 2011

Re: Revisions to the application review process for Expedited Wind Energy Developments

---

Introduction

At the September 7th Commission meeting you directed staff to develop a proposal for a revised application process for Expedited Wind Energy Developments. The charge to staff was to look for a way to find efficiencies in the process while maintaining as much of the opportunity for comment and information exchange as possible. That charge grew out of a concern for the amount of the Commission's limited resources these cases were consuming and the limited time the Commission had to attend to other, equally important, matters. To that end, staff consulted with the Maine Department of Environmental Protection (DEP), obtained a newly released protocol (attached) for how reviews of these projects will be handled within that agency, and LURC staff discussed the possible approaches.

In the past DEP typically conducted one public information meeting relatively early in the application process. They now have added a second public information meeting with the Commissioner (or Deputy) closer to the time of decision. Similarly, the staff proposal that appears below contemplates a Commission move to a public meeting model in some cases. With DEP moving toward two public meetings, a Commission move in that direction as well would appear to be a move to the middle of the process continuum for both agencies. However, there are ramifications to such a change, as outlined below.

Current Practice and Statutory Authority

First, I wish to draw your attention to an attached flow chart titled *"Land Use Regulation Commission / Wind Energy Decision Flow Chart Within Expedited Area / Current"*. This represents the current options available to the Commission when processing Expedited Wind Energy Development applications - either a written comment period, or a public hearing with all of the processing steps that are entailed.

However, 12 M.R.S.A. §685-B (the LURC statute) gives the Commission the flexibility to incorporate public meetings into a public comment period for Expedited Wind Energy Developments.

Catherine M. Carroll, Director

PHONE: (207) 287-2631
FAX: (207) 287-7439
TTY: 888-577-6690

12 MRSA §685-B DEVELOPMENT REVIEW AND APPROVAL
*2-C. **Wind energy development; community-based offshore wind energy projects; determination deadline.** The following provisions govern wind energy development.*

*A. The commission shall consider any wind energy development in the expedited permitting area under Title 35-A, chapter 34-A with a generating capacity of 100 kilowatts or greater or a community-based offshore wind energy project a use requiring a permit, but not a special exception, within the affected districts or subdistricts. For an offshore wind energy project that is proposed within one nautical mile of an island within the unorganized or deorganized areas, the commission shall review the proposed project to determine whether the project qualifies as a community-based offshore wind energy project and therefore is within the jurisdiction of the commission. **The commission may require an applicant to provide a timely notice of filing prior to filing an application for, and may require the applicant to attend a public meeting during the review of, a wind energy development or a community-based offshore wind energy project.** The commission shall render its determination on an application for such a development or project within 185 days after the commission determines that the application is complete, except that the commission shall render such a decision within 270 days if it holds a hearing on the application. The chair of the Public Utilities Commission or the chair's designee shall serve as a nonvoting member of the commission and may participate fully but is not required to attend hearings when the commission considers an application for an expedited wind energy development or a community-based offshore wind energy project. The chair's participation on the commission pursuant to this subsection does not affect the ability of the Public Utilities Commission to submit information into the record of the commission's proceedings. For purposes of this subsection, "expedited permitting area," "expedited wind energy development" and "wind energy development" have the same meanings as in Title 35-A, section 3451.* (emphasis added)

B. At the request of an applicant, the commission may stop the processing time for a period of time agreeable to the commission and the applicant. The expedited review period specified in paragraph A does not apply to the associated facilities, as defined in Title 35-A, section 3451, subsection 1, of the wind energy development or community-based offshore wind energy project if the commission determines that an expedited review time is unreasonable due to the size, location, potential impacts, multiple agency jurisdiction or complexity of that portion of the development or project.

In addition, staff received a suggestion that, in general, the Commission may wish to hold pre-application workshops in some larger or complex cases. Wind projects seem to be an instance in which this may be helpful. Workshops would be designed to acquaint the Commission with the project and give the Commission the opportunity to ask questions and point out issues that need to be addressed in the application process. Such workshops are neither expressly authorized nor prohibited in statute, and may be held if certain legal precautions are taken, such as compliance with the Freedom of Access Act, a clear statement about the role of such meetings, and the responsibility of the Commission to decide each case on the facts as they emerge during the full adjudicatory process. In the end, the burden of proof is on the Applicant, based on the record. Both of these tools – public meetings and pre-application workshops – are available to the Commission and are incorporated into the staff proposal below.

In making its decision about which process option should be followed in any one proceeding, the Commission should bear in mind the following standard for deciding about public hearing requests with regard to permit applications.

Commission rules: Chapter 4.04

(5) When to Hold a Public Hearing:

(a) As provided by these rules, interested persons may prepare and submit evidence and argument to the agency and request a hearing on an application.

(b) The Commission shall consider all requests for a hearing submitted in a timely manner. Hearings on an application are at the discretion of the Commission unless otherwise required by the Constitution of Maine or statute. In determining whether a hearing is advisable, the Commission shall consider the degree of public interest and the likelihood that information presented at the hearing will be of assistance to the Commission in reaching its decision.

(c) The Commission shall not amend or modify any permit unless it has afforded the permit holder an opportunity for hearing, nor shall it refuse to renew any permit unless it has afforded the permit holder an opportunity for a hearing.

The public notice provisions for applications of this nature that have a comment period but no hearing are contained in LURC's rules at 4.04(4)(c). Notice must be given to abuttors, municipal/plantation government, county government, local legislators, and people who have requested to be notified of such applications.

Finally, outside the rubric of the Commission's Chapter 5 Rules for the Conduct of Public Hearings, staff would be primarily responsible for administrative decisions that have typically been handled by the Chair in the wind permitting context. In particular, in order to meet the statutory deadlines, the decision about which standards are applied to associated facilities would have to be handled by staff, who would work in consultation with the Chair. Any extensions to the comment period would be handled by the staff as well.

Staff Proposal

After internal discussions and consultation with the A.G.'s office, the staff proposes that the following guidance for the application review process could be used as an alternative to the public hearing process option in cases where an evidentiary hearing with pre-filed testimony, cross-examination, and the like are not necessary in order to obtain essential information and evidence necessary to make the required findings and rulings. This alternative process is also represented in the flow chart titled *"Land Use Regulation Commission / Wind Energy Decision Flow Chart Within Expedited Area /Proposed".*

See chart below:

Staff Proposal

Timeframe	Action
Very early (1 to 2 years before application)	Applicant checks in with staff about preconstruction studies and coordination with other agencies
Several months before application filed	Applicant meets with staff to discuss process and application materials
	Pre-application meeting with applicant and review agencies
	Pre-application meeting with applicant and stakeholders if needed. Applicant community meetings can serve this function.
1-2 months before app. filed	Workshop with applicant, staff and Commission at a regular Commission meeting.
A few days before app. filed	Notice of intent to file
Application filed	Staff reviews filed application for completeness, requests any needed additional materials, applicant responds
185 day clock starts	Application declared complete, review starts[1]
Month 1	Staff give notice of opportunities to: request a hearing, petition for intervenor status, and comment on the associated facilities status
	Staff, in consultation with Chair, make associated facilities decision
Month 2	Public hearing and intervenor status requests brought to Commission for decision
	Staff notice and hold a local public meeting to provide information about the process and the proposal, and to learn about any issues. Staff draft a summary of the meeting. [2]
Month 3	Staff continues to gather and analyze comments and data, prepare issue summary
Month 4	Hold public meeting with the Commission to present staff analysis of the issues and hear public feedback.
	Short initial deliberation after public meeting
	Comment period and record close 10 days after public meeting. Staff can extend the comment period if necessary (LURC rules 4.04(9)).
Month 5 and 6	Staff prepares recommended decision
Late month 6 (185 days)	Commission decision

[1] Optional work session - If, during the course of the application review, the Commission feels it would be beneficial to have a work session between Commissioners and staff, the applicant may, at its discretion, extend the processing deadline to allow time for such a meeting. A work session may be used by the staff to raise issues with the Commission for which the staff needs some guidance or initial feedback.

[2] If the Commission decides that a public hearing is necessary, the process would shift back to the current process, with the exception that an initial public meeting will already have been scheduled and will be held regardless.

Advantages and disadvantages of the Staff Proposal

The move to a public meeting format creates significant time savings in pre-hearing and post-hearing process. For example, there would be no need for pre-hearing conferences, pre-filed testimony, cross-examination, and extended post-hearing comment periods. There would also be no need for procedural orders, and the overall process would be shorter – the mandatory 185 days.

The disadvantage associated with this time savings is that without the evidentiary hearing there may be less depth in the information gathered, particularly since there will be no formal Intervenors and no cross-examination to reveal details about the record materials. It will be incumbent upon the staff and Commission to pay close attention to the application materials and to public comment in order to discern any issues that need further work. In addition, since the close of the comment period is after the Commission deliberation, staff will have to exercise additional discretion regarding how the recommended decision is written to account for new information that is submitted after the meeting.

Next Steps

Staff recommends that if you wish to proceed with this alternative process you post the proposed guidance for public comment in order to ensure that any potential issues are identified and resolved prior to the first application that would be processed in this manner. If there are changes that you would like to make prior to posting the proposal, please let me know. Ultimately, if the Commission wishes to proceed with this process, it should be finalized in a guidance document for clarity and predictability.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
ACTING COMMISSIONER

MEMORANDUM

TO: Mike Mullen, Acting Director, BLWQ

FROM: Patricia Aho, Acting Commissioner

SUBJ: Grid-scale wind power permitting policy

DATE: August 29, 2011

In order to provide for additional opportunities for public comment and input related to an application for a grid-scale expedited wind power project, the Maine Department of Environmental Protection will undertake the following process:

- An application is filed and, once deemed complete, a public meeting in the vicinity of the project location will be held by staff. Interested parties and members of the public, will have an opportunity to comment, ask questions and undertake a general discussion of related points.

- Staff will work to view application materials and will issue a draft analysis.

- A second public meeting in the vicinity of the project will be held with the Commissioner or Deputy Commissioner presiding. Interested parties and members of the public will have an opportunity to comment on the draft analysis.

- The additional comments and information will be considered and a final decision will be issued by the Department.

In order to allow for potential applicants to factor-in the more robust public process as part of their application time line, the new public comment policy relating to the permitting process will apply to applications submitted to the department after September 5, 2011.

CC: Jerry Reid, Office of the Attorney General
DEP Senior Management Team
Kenneth Fletcher, Director, Office of Energy Independence & Security
Carlisle McLean, Senior Policy Advisor, Office of the Governor

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
RAY BLDG., HOSPITAL ST.

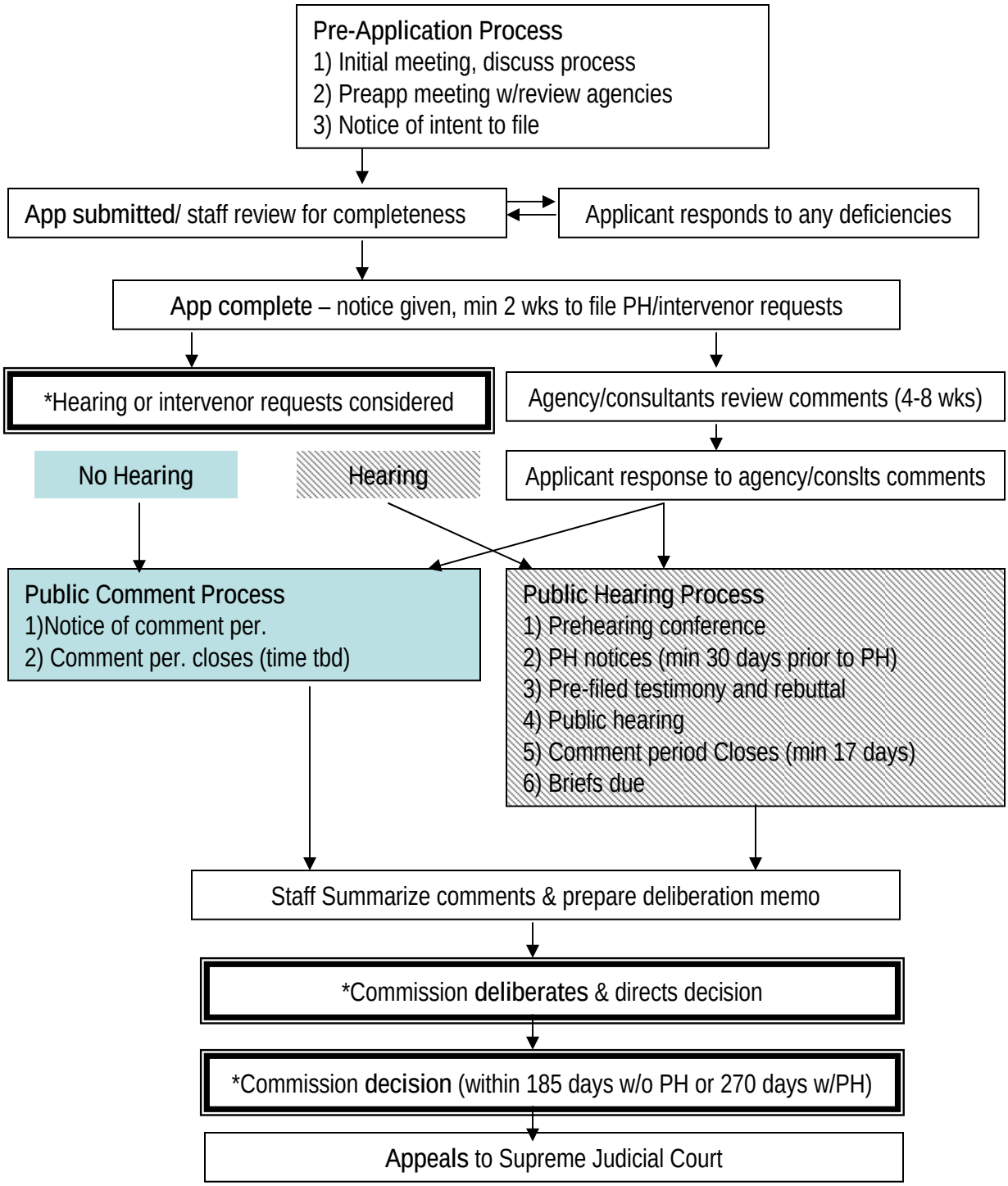
BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04679-2094
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

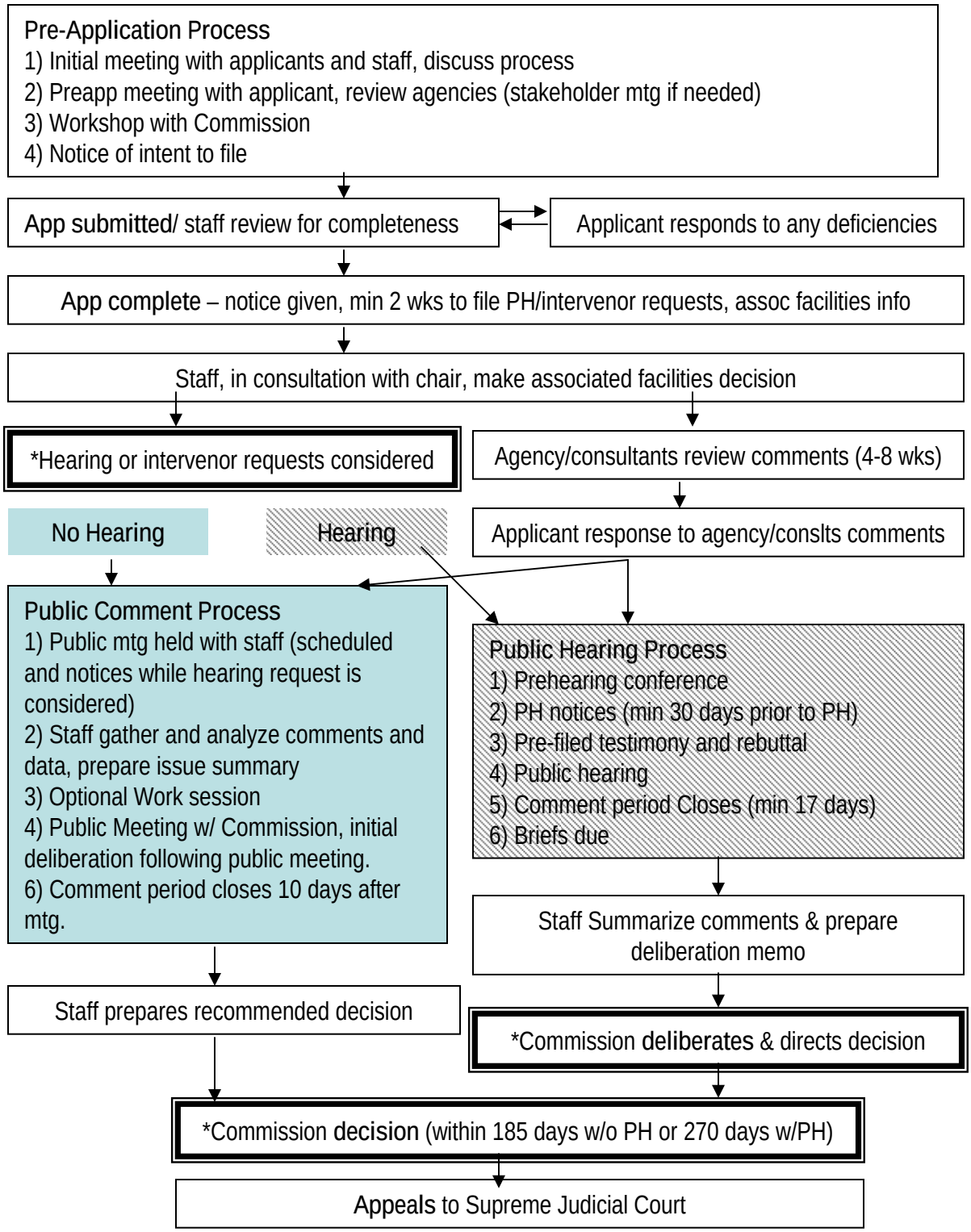
Land Use Regulation Commission
Wind Energy Decision Flow Chart Within Expedited Area
Current



**Denotes monthly Commission meeting*

Revised 8/26/11

Land Use Regulation Commission
Wind Energy Decision Flow Chart Within Expedited Area
Proposed



Draft Revised 11/3/11

**Denotes monthly Commission meeting*

Attachment 7: AMC Letter, Publicover

Appalachian Mountain Club

December 30, 2011

Stephen A. Cole
Coastal Enterprises, Inc.
PO Box 268
Wiscasset, ME 04578

Dear Stephen:

As a followup to your phone call with Ken Kimball and me on December 7, the Appalachian Mountain Club submits the following comments on the review of the state's wind power planning and regulation that you are conducting for the Office of Energy Independence and Security. We have arranged our comments according to the strategic plan outline that you provided to us.

5.1 Statewide Permitting Standards

There are three areas where permitting standards should be strengthened to provide greater protection to significant natural or cultural resources. In the first two areas wind power development is in clear conflict with other existing state policies.

- Sporting Camps. Under the current rules, sporting camps have no legal protection and are essentially invisible to state permitting of wind power projects. Because they are not specifically listed as a "scenic resource of state or national significance" in the law [35-A MRSA §3451(9)], permitting agencies (LURC and DEP) may not consider the impact of a wind power project on them. (Within organized towns, sporting camps may receive some consideration in municipal permitting, but no such consideration is available in LURC jurisdiction.) However, sporting camps are a unique and iconic part of Maine's recreational and cultural landscape. LURC's Comprehensive Land Use Plan highlights sporting camps as a resource worthy of special consideration, for example:

  - "Traditional sporting camps represent both a recreation asset and a valuable part of the heritage of the North Woods." (CLUP p. 131)
  - "Sporting camp owners benefit significantly from the natural resource and remoteness values in their immediate vicinity. Maintenance of relatively pristine surroundings and the feeling of remoteness is essential to most of the camps in attracting and maintaining clientele." (CLUP p. 266)
  - "Given the small number of sporting camps and large number of people for whom they provide recreation, the Commission also gives special consideration to sporting camps in its development standards." (CLUP p. 267)

Main office • Five Joy Street, Boston, MA 02108-1490 617-523-0655
Pinkham Notch Visitor Center • Route 16, Box 298, Gorham, NH 03581-0298 603-466-2721
Highland Center at Crawford Notch • General Delivery, Route 302, Bretton Woods, NH 03575-9999 603-278-4453
www.outdoors.org

One of the policies for Recreational Resources established in the CLUP is to "Consider traditional sporting camps as recreational and cultural resources, worthy of protection from incompatible development and land uses, and give special consideration to sporting camps in the Commission's development standards and in its review of rezoning petitions and development proposals within the immediate vicinity of a sporting camp" (CLUP p. 17). The exclusion of sporting camps from consideration in the wind siting law is clearly contradictory to the intent of the CLUP and represents a failure of public policy that should be rectified.

We recommend that sporting camps be included in the list of "scenic resources of state or national significance" that are entitled to consideration in state wind power permitting.

- Subalpine Forest. The second area concerns the potential impact of wind power development on high-elevation subalpine forests[1]. These forests (named "Fir-Heartleaved Birch Subalpine Forest" in the Maine Natural Areas Program's natural community classification system, and ranked as S3 [rare] on the scale of S1 [extremely rare] to S5 [common]) occupy a very small part of the state's landscape. Currently there are only 19 documented occurrences in the state that cumulatively encompass about 40,000 acres, or 0.2% of the state's land area[2]. MNAP is currently inventorying all remaining undocumented occurrences across the state. However, a complete inventory is unlikely to greatly increase the total documented area of this community, as the largest occurrences on the state's highest mountains are already well-documented.

  In addition to being an important component of the state's biodiversity in its own right, these forests provide the critical habitat for Bicknell's thrush, the northeast's rarest migratory songbird. This species is endemic to subalpine forests from the Catskills to maritime Canada. It is listed as a species of highest conservation concern in the Maine Comprehensive Wildlife Conservation Strategy. High-elevation subalpine forest (named "Mountaintop Forest") is listed as a distinct key habitat in the CWCS, and wind power development is specifically listed as a threat to this habitat. One of the conservation strategies for this task is to "Identify priority habitats for protection." One of the tasks listed under this strategy is to "Initiate efforts to 'officially' recognize Bicknell's Thrush and mountaintop habitat as a high conservation priority in public agency and private land-use planning efforts."

  Subalpine forests also have important adaptive value in the face of future climate change. A variety of sources indicate that Maine's coniferous forest is likely to decline significantly under the climatic warming projected by a variety of climate models, and will increasingly be limited to cool coastal areas and the higher elevations of the state's western mountains region. Paleoecological studies provide additional evidence that high elevations are likely to retain this habitat even as a warmer climate leads to its decline at lower elevations. Since the receding of the last glacier in New England some 13,000 years ago, there have been major warming and cooling periods that resulted in changes to forest composition at lower elevations in northern New England. During a major warmer period between 9,000 and 5,000 years ago, spruce-fir forests at lower elevations were displaced by a mixed forest with

[1] A more comprehensive discussion of this issue can be found in AMC's prefiled testimony on the Kibby Expansion wind power project; see http://www.outdoors.org/conservation/wind/upload/AMC-Kibby-Expansion-testimony.pdf.
[2] This community is a subset of land above 2700', which encompasses about 140,000 acres across the state.

species more closely resembling those of the mid-Atlantic region today. However, at higher elevations the available record suggests that coniferous forests were remarkably stable compared to lower elevations. Protecting habitats that historically have served as ecological refugia during periods of climatic variability is an extremely important aspect of any comprehensive public policy solution to climate change, which must include consideration of adapting to the inevitable changes in climate that will occur.

Development in subalpine forest has been the most controversial ecological issue in wind power permitting processes in the state. Two projects (Redington/Black Nubble and Kibby Expansion) have been proposed within documented occurrences of Fir-Heartleaved Birch Subalpine Forest containing populations of Bicknell's thrush. Both were rejected as proposed by LURC, though a smaller version of the Kibby Expansion project (that reduced but did not eliminate impact to this habitat) was approved but is now under legal appeal.

While the majority of this habitat lies either on conservation land or outside of the Expedited Permitting Area (EPA), there are 20 sites on private land within the EPA that contain at least 0.25 miles of ridgeline above 2700 feet in elevation, and which may contain rare subalpine forest or be actively occupied by Bicknell's thrush[3]. As can be seen from the table, many of these sites contain other serious potential conflicts (such as proximity to the Appalachian Trail or the presence of a major hiking trail).

Current rules put LURC and DEP in the untenable position of determining on a case-by-case basis how much impact to this rare critical habitat is acceptable. We believe that the law should clearly state that no development should take place in documented occurrences of Fir-Heartleaved Birch Subalpine Forest or occupied Bicknell's thrush habitat. This would bring wind power development policy in line with the intent of the Comprehensive Wildlife Conservation Strategy.

A more comprehensive approach would be to prohibit all wind power development above 2700 feet in elevation. We note that of the fourteen projects that have submitted development applications to LURC or DEP[4], only three (Redington/Black Nubble, Kibby Mountain and Kibby Expansion) extend above this elevation. Such a prohibition would provide the strongest protection to the state's important mountain resources, with only limited impact on future wind power development.

- Best Available Technology. The law should require that all projects utilize accepted best available technology to minimize impacts. We currently know of two technologies where this will be applicable:

  – The use of radar-activated aircraft warning systems to reduce visual impact. Systems such as the Obstacle Collision and Avoidance System (OCAS)[5] and the HARRIER

[3] See AMC report *Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts*, Table 8, page 28. Six other sites contain a smaller extent above 2700'.
[4] Redington/Black Nubble, Mars Hill, Kibby Mountain, Kibby Expansion, Stetson I and II, Oakfield, Rollins, Record Hill, Spruce Mountain, Bowers Mountain, Highland Plantation, Bull Hill and Saddleback Ridge.
[5] See http://www.ocasinc.com/turbine-avoidance-solutions.cfm.

Visual Warning System[6] use on-site radar to detect approaching aircraft and activate warning lights and audio warnings. These systems allow required day and nighttime lighting to remain off until needed (eliminating the constantly flashing lights currently in use, which may be visible for a great distance in an otherwise dark landscape). Concurrent with the application of this technology it should be required that the turbines be painted a more neutral and less reflective and obvious color than reflective bright white (the primary purpose of which is to make the turbines highly visible at long distances to approaching aircraft during the daytime). The OCAS and HARRIER type technologies daytime radio beacon warning to approaching planes, as well as temporarily turning the turbine warning lights on, eliminates the need for highly visible coloration of turbine towers.

– The use of higher cut-in wind speeds, which research has shown can significantly reduce bat mortality with fairly small reductions in overall project output[7].

Currently requirements for mitigation measures such as these are a matter for negotiation on a project-by-project basis. This approach provides less assurance to the public that impacts will be mitigated, and is also unfair to project developers (since the requirements are not known in advance of project development, and some projects may be required to utilize them while others are not). Requiring this type of mitigation for all projects will both help protect important public values while creating a more level playing field for developers.

5.2 Visual Impact Criteria

The scenic evaluation zones recommended by the Governor's Task Force on Wind Power Development in Maine[8] and incorporated into the 2008 wind siting law (PL 661) were based (without specific attribution) on a 2007 report from the National Academy of Sciences[9], in particular the following sentence: "*The most significant impacts are likely to occur within 3 miles of the project, with impacts possible from sensitive viewing areas up to 8 miles of the project*." (NAS 2007, Box 4.1, page 101.) However, the recommendation was based on a very selective and incomplete reading of the NAS study[10]. The full paragraph reads:

> "The size of the area for analysis may vary from location to location depending on the particular geography of the area and on the size of the project being proposed. Modern wind turbines of 1.5-3 MW can be seen in the landscape from 20 miles away or more (barring topographic or vegetative screening), but as one moves away from the project itself, the turbines appear smaller and smaller, and occupy an increasingly small part of the overall view. The most significant impacts are likely to occur within 3 miles of the project, with impacts possible from sensitive viewing areas up to 8 miles of the project. At 10 miles away the project is less likely to result in significant impacts unless it is located in or can be seen from a particularly sensitive site or the project is in an area that might be considered a regional focal point. Thus, a 10-mile radius provides a good basis for

[6] See http://www.detect-inc.com/Documents/Technical%20Data%20Sheet%20-%20HARRIER%20Visual%20Warning%20System%20-%20Wind%20Energy%201110.pdf
[7] See http://www.esajournals.org/doi/abs/10.1890/100103; http://www.sciencedaily.com/releases/2009/09/090928095347.htm.
[8] AMC Senior Staff Scientist David Publicover was an alternate member of the Task Force.
[9] National Academy of Sciences. 2007. *Environmental Impacts of Wind-Energy Projects.* Committee on Environmental Impacts of Wind Energy Projects, National Research Council.
[10] As a member of the Governor's Task Force we admit that we bear considerable responsibility for allowing this recommendation to be approved without challenge.

> analysis including viewshed mapping and field assessment for current turbines. In some landscapes a 15-mile radius may be preferred if highly sensitive viewpoints occur at these distances, the overall scale of the project warrants a broader assessment, or if more than one project is proposed in an area. In the western United States, landscape scale and visibility may require a larger area of assessment."

The undeveloped regions of Maine certainly qualify as a place with "highly sensitive viewpoints" and "particularly sensitive site[s]", with "area[s] that might be considered a regional focal point", or where more than one project may be proposed. Experience with existing projects is showing that they are clearly visible from distances much greater than eight miles.

The hard-and-fast eight mile limit for visual impact can lead to ridiculous situations, as illustrated by the proposed Highland Plantation project (whose application has been withdrawn). Avery Peak, one of the high points along the Bigelow Range, is considered one of the most spectacular viewpoints in the state – perhaps second only to the summit of Mount Katahdin. It is one of only four places along the Appalachian National Scenic Trail in Maine where extended stretches of above-treeline hiking are available[11]. If built, the Highlands project would become a dominant human feature in an overwhelmingly undeveloped landscape. Yet under the current law the project would be deemed to have no impact on this viewshed, since the nearest turbines are slightly over eight miles away. Despite the fact that on a clear day the Kibby project can be clearly seen from Avery Peak at a distance of twenty miles, the law provides no opportunity for regulators to consider the impact of turbines that would be much closer and much more visible. This situation must be changed.

In addition, visibility can be highly variable depending on such factors as atmospheric conditions, time of day, time of year, and the direction of the project from the viewpoint. A project to the north of a viewpoint (where the sun is directly lighting the highly reflective bright white surface of the turbine facing the viewer) will be more visible than a project at the same distance to the south of a viewpoint (when the turbines are more likely to be backlit, and the side facing the viewer is in shadow). The conditions under which visual simulation photographs are taken can have a significant but false effect on the impression that the simulation gives of project visibility, yet there are no requirements that the simulations reflect the "worst case" conditions.

At a minimum, we believe that the current law should be amended to 1) change the current three and eight mile limits for required and optional visual impact analysis to eight and fifteen miles, respectively, with provisions to consider impacts at greater distance if special circumstances warrant such consideration, and 2) require all visual impact analyses to be based on worst case conditions (that is, a very clear day at the time of day and year when the sun creates the brightest and most direct lighting of the project).

5.3 Decommissioning Plans

While all projects have included a decommissioning plan, we are not aware of any requirement in state law or regulation for such a plan. Currently decommissioning is addressed on a project-by-project basis and is a matter for negotiation between developers and permitting agencies. As

[11] The others are the Mahoosuc Range, Saddleback Mountain, and Mount Katahdin.

such, there is variation between the plans for different projects. In addition, the time staff spend reviewing these plans could be better spent on more significant project issues.

We believe that the law should require a decommissioning plan for all grid-scale wind energy projects, and that there should be consistent requirements so that all projects are held to the same standards. Such requirements would not only provide greater assurance to the public that projects will be decommissioned if necessary, but will provide fairness to developers by ensuring equitable treatment for all projects.

We believe that decommissioning requirements should reflect the following principles:

- Decommissioning funds should ensure that all necessary funds are in hand and available to the responsible state agency. There should be absolutely no chance that the public is left "on the hook" for decommissioning costs.
- Decommissioning plans should not in any way be based on assumptions about the future financial solvency of the parent company.
- Funds should be available for decommissioning at any time during the life of the project. Currently many decommissioning funds are not fully funded until a decade or more into the life of a project. While decommissioning prior to the anticipated useful life of the project is unlikely, it is not a totally unforeseeable event. (For example, a severe natural event could render the project inoperable, and changes in economic conditions may make the project uneconomical to rebuild.) An insurance policy should be required that will fund decommissioning if it is necessary prior to the decommissioning fund being fully established.
- The cost of decommissioning should be periodically updated and the decommissioning fund adjusted as necessary.
- Decommissioning funds should reflect the full cost of decommissioning, and should not be offset by the expected salvage value of project components, as this value could fluctuate over time frames shorter than the periodic reassessment. Any salvage value may be used by the project owner to offset their costs (or returned to project creditors if decommissioning is carried out by the responsible public agency), but should not be counted on to reduce the anticipated decommissioning costs.
- At a minimum, decommissioning rules should require the removal of all above- and belowground project components, stabilization of disturbed areas, re-establishment of natural contours of stream crossings, replacement of topsoil, and revegetation by native species (not just "grasses and forbs" as stated in many decommissioning plans). (We note that many decommissioning plans allow roads to remain if that is the desire of the landowner. This is acceptable, as the landowner then assumes the responsibility for maintaining roads to prevent erosion and water quality impacts.)

5.4 Permitting Process

We have no comments on this section.

5.5 Greenhouse Gas Emission Reductions

We recommend that any claims of greenhouse gas emission reductions be required to demonstrate i) what specific fossil fuel source will be directly taken off line as a result of the wind project, or ii) how the project will reduce the rate of increase of fossil fuel greenhouse gas emissions.

5.6 Number of Turbines Necessary

The calculation of the number of turbines required to meet Maine's legislatively-established wind power goals are simple and straightforward, but do not by themselves answer the larger questions – are these goals realistic, and what are the consequences of developing sufficient turbines to meet the goals? We address the first of these questions here, and the second in our comments on section 5.8 (Cumulative Impacts).

The goals for terrestrial wind power established by the legislature in 2008 of 2,000 MW by 2015 and 2,700 MW by 2020 were based on the recommendations of the Governor's Task Force[12]. The additional goal of 3,000 MW by 2030 was enacted by a subsequent legislature in 2010 and went beyond the Task Force's recommendations.

It is important to understand the genesis of these goals. They were based on an analysis developed by a consultant group led by Bob Grace of Sustainable Energy Analysis[13]. The analysis used available wind resource data and applied a range of filters to develop an estimate of how much wind power could potentially be developed in the state. Some of the filters led to the exclusion of areas such as conservation land, steep slopes and land within two miles of the Appalachian Trail. Others were based on broad assumptions, primarily the assumption that 50% of the wind resource on forested land was "reasonably" developable. (This was intended to reflect unknown factors such as the presence of site-specific ecological or scenic constraints, the willingness of municipalities or landowners to allow development, etc.). The result was an estimate of 5,320 MW of wind power that could potentially be developed in the state. The Task Force then applied its own filter and determined that developing about 50% of this potential (2,700 MW) by 2020 constituted a realistic and achievable goal.

There are three major problems with the approach that was taken[14]:

- There are two very subjective filters in the process that have a major impact on the final goal – Grace's estimate that 50% of the wind resource on available forest land is "reasonably" developable, and the Task Force's estimate that 50% of Grace's potential is a realistic goal. These filters are not based on any analysis and in reality constitute little more than "wild a-- guesses". In hindsight they are both very likely overly optimistic. On several occasions we have heard from developers that realistically developable sites in the state are quite limited.

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[12] *Report of the Governor's Task Force on Wind Power Development*, page 13.
[13] *Report of the Governor's Task Force on Wind Power Development*, Attachment E.
[14] As with the delineation of the scenic evaluation zones, as a member of the Task Force the AMC shares responsibility for these problems.

- There was no coordination in the Task Force between the development of the statewide megawatt goals and the delineation of the Expedited Permitting Area. We have access to Grace's data and estimate that nearly half of his potentially developable land lays outside the EPA. This was a major oversight on the part of the Task Force (for which we share responsibility).

Thus, the wind power goals recommended by the Task Force were based on a flawed analysis containing considerable subjectivity. Our conclusion is that the goals are overly optimistic and not realistically achievable within the currently-designated EPA. Promoting development outside of the currently designated EPA to meet these goals would threaten the character of the most remote and wild areas of the state, and would involve the construction of extensive new transmission line.

Our report *Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts*, utilizing an entirely separate analysis, reached a similar conclusion[15]. As stated in the report's Executive Summary:

> "Assessing the cumulative development potential relative to the legislatively-established goals for terrestrial wind power development presents a pessimistic picture. Developing every private land site within the expedited permitting area identified in this analysis, combined with operating and permitted projects, would provide about 2,000 MW of capacity – far short of the 2030 goal. Even under a very optimistic scenario (which assumes that a 500-MW project will be developed in Aroostook County, and 40% of other future development will occur at sites not included in this analysis), nearly 90% of the privately-owned ridgeline within the expedited permitting area without obvious resource conflicts would need to be developed to meet the 2030 goal. Clearly not all sites identified in this analysis will be available or suitable for development, and where the additional 40% of future capacity (the equivalent of nearly 20 Mars Hill-sized projects) would be located is unknown. This raises a significant question as to whether the 2030 development goal for terrestrial wind power can realistically be met."

Rather than having a realistic assessment of the capacity of the landscape determine the state's wind power development goals, we may be in danger of having a subjective and arbitrary goal drive development beyond the capacity of the landscape to absorb it without considerable impact to the state's "quality of place". We know of one instance where a LURC Commissioner felt compelled by the legislatively-established goals to vote for approval of a development application when he had serious questions as to whether the project met LURC's standards for approval.

5.7 Expedited Permitting Areas

As a member of the Governor's Task Force, we were actively involved in the delineation of the Expedited Permitting Area. The Task Force operated under very tight time constraints, and thus the EPA represents a very broad designation of areas that at the highest level were considered potentially suitable for wind power development[16]. (This is reflected in the fact that, with a few exceptions, the EPA was designated along township lines.) As we note in our report *Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts* (p. 26),

[15] See report section "Statewide development goals and cumulative impacts", pages 22-24.
[16] Because the state has no zoning authority over organized towns, all organized towns were automatically considered to be within the EPA, and the Task Force's discretion was limited to LURC jurisdiction.

we believe that the designation of the EPA is generally appropriate for ecological values at the broad landscape scale. The EPA generally excludes broader regions within LURC jurisdiction that are of high resource value, as well as the larger remote and undeveloped areas. However, there are two areas where the EPA falls short.

First, with one exception (Boundary Bald Mountain), the EPA does not exclude areas of high ecological value at scales smaller than a township, or designate high-value areas for exclusion using natural rather than political boundaries. It was generally felt by the Task Force that these site-specific values would receive proper consideration under existing permitting standards. However, there exist certain types of ecological resources or high-value areas that are not appropriate for wind power development under any circumstance. One example is subalpine forests (discussed in detail in Section 5.1 above). Another example is Habitat Focus Areas designated under the state's Comprehensive Wildlife Action Plan and Beginning With Habitat program[17]. The law designating the EPA should be amended to specify that these and other ecological resources or regions of high ecological value are by definition excluded from the EPA.

Second, and more significantly, the EPA does a poor job of identifying in sufficient detail those regions or viewsheds that are most critical to the state's recreational and tourism economy, and which would be unacceptably degraded by any significant level of wind power development. These are the iconic places that are most uniquely associated with Maine's scenic character and "sense of place." Examples include Acadia National Park, the Appalachian National Scenic Trail (in particular, the above-treeline stretches previously noted), Baxter State Park, the Allagash Wilderness Waterway, Moosehead Lake, the Rangeley and Downeast lakes regions, and portions of the coastal region. Any inventory of the most significant scenic resources in the state would surely include these places.

Under current law, impacts to these places are evaluated on a project-by-project basis, and regulators are left to judge whether visual impacts from project development in these viewsheds reaches the level of "undue adverse". This is appropriate for many of the scenic resources identified in the law as being of "state or national significance." However, as with ecological resources, both the public and developers would benefit from clearer proactive guidance as to what scenic resources are of such high significance that wind power development should simply not be allowed in their viewsheds.

We believe that the law should be amended to identify these iconic places and their viewsheds and to remove any area within fifteen miles of them from the EPA unless it can be demonstrated that the project would not be visible from them. In particular, there are several unorganized townships that we think should clearly be removed from the EPA, as they lie within these regions of extremely high visual sensitivity. These include Rangeley Plantation, Sandy River Plantation and Adamstown Township in the Rangeley Lakes region; Dallas Plantation, Lang Township, Coplin Plantation and the western half of Highland Plantation in the High Peaks

[17] See www.maine.gov/ifw/wildlife/groups_programs/comprehensive_strategy/pdfs/statewide_focus_area_map.pdf. We recognize that these areas are not intended to be used as a regulatory designation.

region[18]; Rockwood Strip, Taunton & Raymond Academy Grant. Sapling Township, Big Moose Township and Moosehead Junction Township along the western shore of Moosehead Lake[19]; and Carroll Plantation (south of Route 6) in the Downeast Lakes area[20]. In addition, the extension of the EPA in the northeast corner of Chain of Ponds Township (containing the summits of Sisk and Pisgah mountains) should be eliminated.

5.8 Additional Areas of Examination – Cumulative Impacts

We have watched closely as LURC and its staff have struggled with the issue of the potential cumulative impacts of wind power development. This issue is best addressed through landscape level planning, as it is difficult if not impossible to address in the context of a particular permitting decision. While LURC staff has done a good job of framing the questions, it is beyond their current capacity to conduct the type of detailed analysis that could guide better policy in this area. In addition, such an analysis cannot be conducted solely by LURC, but must be done at a statewide level since visual impacts extend across jurisdictional boundaries. (That is, projects in organized towns will impact areas under LURC jurisdiction and vice versa.)

While we do not claim to be experts in cumulative impacts analysis, our report *Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts* attempts to assess the consequences of developing sufficient terrestrial wind power to meet the legislatively-established goals[21]. Since you have this report available to you, we do not repeat the information contained therein in detail, but merely highlight the most relevant paragraph from the Discussion section (page 26):

> "This level of development [i.e., necessary to meet the state's 2030 goal] would likely lead to one or more projects being visible from most of the significant viewpoints in the Western Mountains region. The Androscoggin Valley of southern Oxford and Franklin counties could see a particularly high concentration of development; the area already has multiple projects that are in various stages of planning or permitting. It is clear that meeting the state's 2030 goal will require a very significant transformation of the state's landscape, one in which wind power projects become a common part of the landscape from even relatively remote and undeveloped viewpoints. Whether this was fully understood when the goal was adopted is not clear, and whether Maine's citizens will support it once the consequences of the goal are better known is an open question."

As recent controversies over wind power development in the state indicate, some portion of Maine's citizens clearly do not support this level of development.

Any information your report can provide on how to address this issue would be of great value.

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[18] The western half of Highland Plantation includes the most controversial portion of the Highlands Plantation project, including Stewart Mountain.

[19] Except for the small areas at the western end of Taunton & Raymond Academy Grant and Sapling Township that are delineated as "Wind Turbine Permitted Areas" under terms of the Plum Creek Concept Plan (Exhibit C to Appendix C).

[20] This is the site of the Bowers Mountain project, which by their preliminary denial vote LURC has indicated they consider inappropriate for development.

[21] See report section "Statewide development goals and cumulative impacts", pages 22-24 and Maps 4 and 5.

5.8 Additional Areas of Examination – Tourism Effects

We offer the following information on sporting camps to demonstrate the potential impact of extensive wind power development on this iconic component of Maine's tourism industry.

We identified likely sporting camps from a variety of sources, including the Maine Sporting Camp Association membership list, web searches of a variety of Maine tourism web sites, and LURC permitting records. We examined available information for each facility to determine as best we could whether it met the state's legal definition of a sporting camp. While there is some uncertainty in this determination we believe our list is reasonably accurate. We ended up with a list of 80 facilities. We then determined the locational coordinates of each facility from available information (primarily directions on the facilities' web sites) and statewide aerial photography.

Of these 80 facilities, 28 lie in organized towns, 13 lie in LURC jurisdiction within the EPA and 39 lie in LURC jurisdiction outside of the EPA. Of these 39, 25 lie within 8 miles of the EPA. Thus over half of the facilities (41 out of 80) lie within the EPA, and 66 (82%) could potentially fall within the legally-established viewshed zone of a wind power project[22].

We determined the relationship of these facilities to the 48 low-conflict potential development sites identified in our report *Ridgeline Windpower Development in Maine: An Analysis of Potential Natural Resource Conflicts*[23]. Four sporting camps lie within three miles of a potential development site, and 20 lie within eight miles. This underestimates the potential risk to sporting camps, since as our report indicates a significant number of additional sites would be necessary to meet the state's 2030 goal for wind power development.

Proximity to a project does not necessarily mean that a sporting camp will be adversely affected. Three of the camps are located within eight miles of an existing project[24], and we have not located any information that indicated that these camps were adversely affected or that the camp owners expressed concern about the project. However, Claybrook Mountain Lodge is located in close proximity to the proposed Highland Plantation project, and the owners have expressed serious concern about the project[25]. We strongly urge you to contact them to discuss their concerns.

While it is very difficult to make specific predictions of how many sporting camps will be adversely affected by future wind power development, we conclude that the risk is very real that multiple camps could be impacted. Though the economic impact might be small in relation to the state's total tourism economy, the closure of even a few camps due to wind power development would have an impact on Maine's character and "quality of place" that can't be measured in dollars. They are a unique resource and an important part of what makes the Maine woods a place of legend.

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[22] Some camps could receive a measure of "shadow protection" due to their location on a listed lake of state or national significance. However, only eight of the 41 camps within the EPA lie adjacent to such a lake.
[23] These are the sites shown on Map 5 of the report, excluding existing and permitted projects.
[24] King and Bartlett Camps is just under eight miles from the Kibby Project, Rideout's Lodge is just under eight miles from the Stetson II project, and Eagle Lodge and Camps is less than three miles from the Rollins project.
[25] See http://bangordailynews.com/2011/05/10/business/somerset-county-residents-lambaste-wind-farm-proposal/.

Section 5.8 Additional Areas of Examination – Transmission/Intermittency

We have no comments on these sections.

We thank you for taking the time to speak to us and to offer the opportunity for us to present these comments. We look forward to seeing your report. If you have any questions on these comments, please contact me (603-466-8140, dpublicover@outdoors.org) or Ken (603-466-8149, kkimball@outdoors.org).

Sincerely,

David Publicover
Senior Staff Scientist

Attachment 8: Letter from Alan Mishka to Dr. Pinette at the Maine Center for Disease Control regarding health effects

January 17, 2012

Dr. Sheila Pinette
Maine Center for Disease Control and Prevention
286 Water Street
State House Station 11
Augusta, ME 04333-0011

Dr. Pinette,

It is my understanding that your office, in furtherance of the Office of Energy Independence and Security (OEIS) 2012 Wind Assessment, will be conducting an analysis of literature that pertains to potential health impacts of wind turbines. I am also aware that you will be consulting the recent paper released for public review by the Oregon Office of Environmental Public Health (OOEPH).

I have reviewed the Oregon paper and hope that you will see the importance of this document's conclusions on turbine noise in the context of Maine's current experience with wind development. Also, of importance is the distinct contrast between Maine and Oregon's regulation of turbine noise. As briefly as possible, I would like to make several points on these items as well as the assessment of wind development's impact on public health through the projected reduction of emitted pollutants.

Noise and Health

On first glance, it seems notable that the OOEPH recommended no significant changes to Oregon's wind turbine noise regulations. However, Oregon's current noise standards give specific treatment to wind turbine noise and more or less already protect Oregonians from the noise levels cited in the study as being of concern. Therefore, it's only logical that no significant changes would be necessary in that state.

Maine, of course, has no unique or specific standards for the control of wind turbine noise at this time. Current wind turbine noise levels allowed by existing DEP rules are considerably weaker and less protective of citizens than those in Oregon. Indeed, LURC's forced adoption of DEP noise standards for wind developments resulted in a weakening of noise standards in the unorganized territories, where nighttime ambient noise levels have been measured below 20 dBA.

The OOEPH concluded that:

1. "Sound from wind energy facilities in Oregon could potentially impact people's health and well-being if it increases background sound levels by more than 10 dBA, or results in long-term outdoor community sound levels above 35-40 dBA. The potential impacts from wind turbine sound could range from moderate disturbance to serious annoyance, sleep disturbance and decreased quality of life.

> 2. Chronic stress and sleep disturbance could increase risks for cardiovascular disease, decreased immune function, endocrine disorders, mental illness, and other effects. Many of the possible long-term health effects may result from or be exacerbated by sleep disturbance from night-time wind turbine sound."

Maine's current noise standards allow up to 55 dBA and 45 dBA noise levels in the daytime and nighttime, respectively, and give no specific guidance on the post-development increase in noise above pre-construction levels.

It seems that in the absence of any MCDC resources for conducting its own analysis, the safest course of action in the interest of Maine citizens is to recommend changes to Maine's current noise standards to be more reflective of those currently used in Oregon for regulating wind turbine noise.

Pollution and Health

Dr. Dora Mills, during her time with the MCDC, made remarks implying that wind turbine development would improve the health of Mainers as a result of regional reductions in fossil fuel consumption. She apparently was not relying on any specific studies that had reached that conclusion, but rather on a hunch fashioned from conventional wisdom.

There can be no doubt that reductions in the volumes of fossil fuels burned can have positive impacts on air quality. However, with no actual attempt to quantify these air quality changes or those required to make predictable reductions in the incidence of specific diseases, I believe Dr. Mills was on weak footing to make such an assumption.

The OOEPH makes a similar generalized statement about the reduction of greenhouse gases and other fossil fuel pollutants and their relation to public health. They were more careful in their conclusions, however, writing on page 76:

> "3. The health benefits from reduced GHG emissions depend on the extent to which these reductions prevent or lessen the severity of future climate change impacts in Oregon."

Energy Information Administration data suggests that even in the most hopeful vision, Maine's contribution to global carbon reductions with wind turbines will be imperceptibly small. There is significant wisdom in the OOEPH's statement. If we make the assumption that climate change is a global scale issue, and Oregon's - or Maine's - efforts are not part of a successful aversion of deleterious climate change, no associated changes in its public health can be expected. Putting Mainers at risk for life and health disruptions for such minute GHG reductions potential is inexplicable.

The OOEPH is also careful to not attempt to quantify the the public health gains that might be expected from the reduction of criteria pollutants. They clearly understand the complexity of such estimates. Two other statements on page 76 are worth noting.

> "1. Wind energy facilities in Oregon can indirectly result in positive health impacts by reducing regional emissions of GHGs, criteria pollutants and hazardous air pollutants.
>
> 2. Communities near fossil-fuel based power plants that are displaced by wind energy could experience reduced risks for respiratory illness, cardiovascular diseases, cancer, and premature death."

The OOEPH makes no attempt to place a figure on what percentage of reduction in disease might be expected and, in fact, makes no assurances that significant reductions would occur. Would there be a 20 percent reduction in disease, a one percent reduction, or less? The OOEPH does not attempt to answer this. The OOEPH also makes no attempt to explain or incorporate into their presumptions the intricacies and vagaries of electricity production and the integration of wind into that mix.

Unfortunately, with such generic statements, we are left without any real idea of what level of public health improvement might be expected. This is not a criticism of the Oregon work by any means. Calculating such figures is the domain of much larger and more comprehensive studies.

What does this mean for Maine?

ISO New England stated in the New England Wind Integration Study that wind generated electricity would displace primarily natural gas generation. Natural gas is, of course, our cleanest burning fossil fuel, emitting relatively little SO_2, mercury or particulates, and a fraction of the CO_2 and NOx emitted by oil or coal.

Pounds of Air Pollutants Produced per Billion Btu of Energy

	CO_2	NOx	SO_2	Mercury	Particulates
Natural Gas	117,000	92	0.6	0.000	7
Coal	208,000	457	2591	0.016	2744
Oil	164,000	448	1122	0.007	84

Source: Energy Information Administration, Natural Gas 1998: Issues and Trends

In their 2011 Regional System Plan, ISO New England stated that the remaining coal generating facilities in New England would likely be replaced by natural gas fired generators, not wind turbines. In light of these considerations, is a more modest public

health response to wind development likely in Maine? It would seem that such considerations would be important.

As a Maine resident who has been watching wind development in our state closely, I have become keenly aware that the wind industry and its supporters have changed the focus of their campaign significantly in the last two years.

Their original campaign relied on a large component of environmental and public health benefits claims. Today, the campaign generally shows only remnants of those claims and relies heavily, instead, on claims of economic benefits. It seems even the advocates for wind power development now recognize the inherent weaknesses of those original claims.

Indeed, in last summer's BEP hearings on the need for reduced noise level limits for wind turbines, the industry's representatives did not dispute the claims of those who testified that the allowable noise limits should be lowered. Remarkably, the only argument they pursued was over the economic impacts such a move would have on their industry. Clearly, public health should take priority over a single industry's unsubstantiated claim of possible economic damage.

I hope that you will weigh these considerations carefully and strongly suggest, through the OEIS assessment, that Maine's residents living in proximity to wind developments are due a greater degree of protection than they are currently receiving through Maine statute and policy.

Thank you for your service and for your consideration of my submission.

Respectfully,

Alan Michka
Lexington Township, Maine
(207) 628-2014
armichka@207me.com

Electronic cc Kenneth Fletcher
Steve Ward

Attachment 9: Biographical Summaries – Wind Assessment 2012 Authors

Biographical Summaries

Stephen Cole has worked on energy projects for the past eight years at CEI. In 2005, he collaborated with Enterprise Resources Corporation and Ronald Kreisman, Esq. to produce a *Feasibility Study for Community Wind Projects in Maine,* funded by the American Lung Association of Maine, CEI, and the Jebediah Foundation. The study documented potential business models for community-scale wind projects as well as regulatory, environmental and economic considerations. During 2007-2008 Cole conducted the *MSAD #3 Wind Turbine Feasibility Project* with assistance from Dr. Mick Womersley, Unity College. This project produced anemometer surveys, preliminary permitting and economic analysis for a single 100 kW turbine proposed for a new school in Thorndike, ME. In 2009, Cole wrote the application to the U.S. Department of Energy which authorized CEI's participation in DOE's *Loan Guarantee Program*. Cole was CEI's lead in the *Grants Connector Project* during 2010-11, connecting public and private entities to financial resources and incentives under contract to the Maine Governor's Office of Independence and Security.

Robert Fagan, a senior associate at Synapse Energy Economics since 2005, is a mechanical engineer and energy economics analyst who has analyzed energy industry issues for more than 20 years. His activities focus on many aspects of the electric power industry, especially economic and technical analysis of transmission systems, wholesale and retail electricity markets, renewable resource alternatives including on-shore and off-shore wind and solar PV, and assessment and implementation of energy efficiency and demand response alternatives. Fagan is expert in the complexities of, and the interrelationships between, the technical and economic dimensions of the electric power industry in the United States and Canada, including the following areas: wholesale energy and capacity provision under market-based and regulated structures; transmission use pricing, encompassing congestion management, losses, LMP and alternatives, financial and physical transmission rights; and transmission asset pricing (e.g., embedded cost recovery tariffs). His experience includes knowledge of physical transmission network characteristics; related generation dispatch/system operation functions; technical and economic attributes of generation resources; RTO and ISO tariff and market rules structures and operation; and FERC regulatory policies and initiatives, including those pertaining to RTO and ISO development and evolution. Mr. Fagan has provided testimony on energy industry issues to the Maine Public Utilities Commission and appeared before the Maine Joint Legislative Committee on Utilities, Energy and Technology providing testimony on energy efficiency matters. Robert Fagan holds an MA from Boston University in energy and environmental studies and a BS from Clarkson University in mechanical engineering.

Stephen Ward served as Maine's Public Advocate from August 1987 to March 2007 under four Governors of Maine. Ward served on the Executive Committee of the National Association of Utility Consumer Advocates (NASUCA) from 1996 to 2007 and as NASUCA's President from 2000 to 2002.. Since 2007, he has engaged in consulting assignments with a diverse group of clients. Recent consulting projects have involved: 1) developing administrative rules for Maine's Energy and Carbon Savings Trust; 2) facilitating negotiation among parties affected by a proposed Aroostook County wind farm and associated transmission upgrades; 3) advising AARP on ratepayer impacts of Smart Meter installations in Florida; and 4) drafting proposals for Efficiency Maine funding for energy projects at Kennebec Valley CAP and with the Maine Community Action Association.