

Dr. Aram J.K. Calhoun Surrebuttal Testimony

April 19, 2019

(Supplemental Evidence)

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

and

STATE OF MAINE
LAND USE PLANNING COMMISSION

IN THE MATTER OF

CENTRAL MAINE POWER COMPANY
Application for Site Location of Development
Act permit and Natural Resources Protection
Act permit for the New England Clean Energy
Connect (“NECEC”)

L-27625-26- A-N
L-27625-TB-B-N
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SITE LAW CERTIFICATION SLC-9

SURREBUTTAL TESTIMONY OF GROUP
4 WITNESS Dr. ARAM J.K. CALHOUN

April 19, 2019

Introduction

This surrebuttal testimony is in response to rebuttal testimony of Gary Emond. Throughout Mr. Emond’s rebuttal, he provides speculation in place of fact. He bases his statements on the survey work completed more than 10 years ago described in the TRC consultant position paper for the Maine Power Reliability Project (MPRP) he attached to his rebuttal testimony (Position Paper on the Presence of Significant Vernal Pools in or Adjacent to Transmission Line Corridors, TRC Engineers, LLC, March 2009). I will provide some of the most glaring examples of his overreaching statements and my responses to them below.

Responses to Mr. Emond's unsupported claims about vernal pools

On page 5 of his testimony Mr. Emond asserts that: "Constructing and maintaining transmission line corridors does not negatively affect vernal pool hydroperiod¹." Mr. Emond cites no evidence or reference for this statement. TRC did not study hydroperiod in the pools they surveyed. In fact, vernal pool hydrology is very sensitive to disturbances in vegetation cover. We have documented responses through peer-reviewed studies showing complex interactions with both surface and groundwater and amount of light exposure resulting from canopy removal (Cohen et al.2016; Calhoun et al. 2017).

Also on page 5 of his testimony, Mr. Emond asserts that: "The early successional habitat associated with transmission line corridors is permeable to amphibian migration." The TRC position paper Mr. Emond cites has no data on the movement patterns of adult and juvenile amphibians to and from breeding pools to terrestrial activity areas. Research at the University of Maine, through my lab and collaborations with Dr. Malcolm Hunter's lab, has rigorously shown the negative effect clear cuts and scrubby vegetation have on emigration at all life stages for amphibians. On Page 13 of the TRC position paper Mr. Emond cites in his testimony, TRC cites a publication on salamander crossings on Rhode Island golf courses conducted by a colleague of mine as proof that utility rights of way (ROW) will not pose an issue for wood frog and spotted salamander emigration. TRC missed the point of the paper by Montieth and Paton, 2006. The question was: Will salamanders cross golf course if they have to. Yes, some of them, some of the time. However, the take-home message of the paper is this:

Spotted Salamanders exhibited distinct preferences for terrestrial habitats by avoiding fairways and selecting forested uplands and forested wetlands... We documented adult Spotted Salamanders crossing fairways to adjacent forest patches; thus, fairways were not a dispersal barrier. Compared to random points, adult Spotted Salamanders selected cool microhabitats with greater leaf litter depth, more coarse woody debris, more canopy cover, less herbaceous cover,

¹ Hydroperiod refers to the period of time in which a vernal pool is filled with water

and high densities of vertical and horizontal small mammal burrows. These results suggest that maintaining extensive upland and wetland forested habitats near breeding ponds, with significant amounts of deep leaf litter, coarse woody debris, and high small mammal densities will help sustain Spotted Salamanders (Montieth and Paton 2006).

A cleared ROW, such as the Central Maine Power (CMP) transmission corridor, will not do these things.

Furthermore, other peer-reviewed research contradicts Mr. Emond's assertion that transmission corridors are permeable to amphibian movement. The seminal power line study and edge effect study on wood frogs in Maine was published in highly respected peer-reviewed journals (deMaynadier and Hunter 1998 and 1999; Dr. deMaynadier currently works at the Maine Department of Inland Fisheries and Wildlife (IFW)). Since Mr. Emond did not address the findings of this research, I provide an excerpt from one abstract with the key relevant findings:

For amphibians that breed in temporary pools, juvenile emigration is an important life-history movement linking the aquatic habitat of larvae to the surrounding upland habitats occupied by maturing animals and adults. Among natural populations, the abundance of juveniles and adults of both species [wood frogs and spotted salamanders] declined sharply across a gradient running from relatively mature forest-interior habitat (70-90 yr old) to recently clear cut habitat (2-11 yr old). Similarly, in the **power line experiment**, juvenile wood frogs showed an emigration preference for closed-canopy habitat immediately upon metamorphosis, with the highest capture rates occurring in microhabitats characterized by dense foliage in both the understory and canopy layers (deMaynadier and Hunter 1998).

The key conclusion of the research of deMaynadier and Hunter's work is that edges such as transmission lines and clear cuts are stressors for pool amphibians at all life stages (deMaynadier and Hunter 1999). Multiple stressors lead to lower fitness and more vulnerable populations. Fragmentation through hard or soft edges is unfavorable to these amphibians. Mr. Emond completely ignores this pivotal research.

Also on page 5 of his testimony, Mr. Emond asserts: “The MPRP data strongly indicate that several generations of spotted salamanders have successfully reproduced in these vernal pools. It is therefore logical to conclude that their offspring continue to breed in these pools.”

The TRC position paper has no data on mark-recapture studies over three years that would be needed to document that the offspring continue to breed in these pools (they do not breed every year and most wood frogs breed after their second year). Because spotted salamanders may live beyond a decade, and because they have high natal fidelity, they may continue to breed in suboptimal pools (called ecological traps as they slowly reduce populations) for the rest of their lives. Because there are salamanders (or frogs for that matter) each year is not proof that there is (a) recruitment (referring to the return of juveniles to successfully breed in future years) and (b) enough recruitment to balance ecological traps. Adults are likely to continue to breed in less than ideal pools even if they dry early every year or are now permanent. Low-quality pools, such as those found in ROWs, also intercept animals heading to breed in more suitable habitats. In order to conclude that “Several generations” of spotted salamanders have bred in the pools along the MPRP corridor, it would be necessary to have 30-60 years of data on the pools in question. The TRC study had two years of data and no mark/recapture studies. Mr. Emond’s conclusion that several generations of spotted salamanders are breeding in these pools is completely unsupported by any data.

On page 6 of his testimony Mr. Emond asserts that: “The above findings and proposals demonstrate that maintained transmission line ROWs are compatible with, coexist with, and support healthy and productive vernal pools and do not result in fragmentation.”

This statement is pure conjecture. Demonstration requires research and peer review. The only findings TRC has are survey data and analysis of vegetative cover at the time of the study. What we do know is that wood frogs and ambystomatid salamanders are mature forest specialists; this has been documented in the peer-reviewed literature for decades. Vernal pools are recognized as specialized breeding habitat for

species highly sensitive to open canopies, predation by other amphibians, and by predators associated with edges and within-pool invertebrate predators (e.g. leeches, predaceous diving beetles) in higher densities in more open, longer hydroperiod pools. There are no genetic studies, studies of disease ecology or fitness (as we have done) in the TRC paper. This statement by Mr. Emond should be disregarded. We know that wood frogs and salamanders breed in substandard habitats including roadside ditches, skidder ruts, and ROWs. This does not speak to where their ideal habitat is. *Surviving* is NOT to be confused with *thriving*. The two-year TRC survey is not sufficient to support any conclusions about the health and long-term viability of vernal pool amphibian populations.

On page 8 of his testimony Mr. Emond asserts that: “There is no uncertainty in actual pool numbers and no uncalculated impacts to vernal pools in the project area.”

As a scientist, I am hesitant to speak in absolutes. To state that there is no uncertainty in actual pool numbers is a stretch, but, ultimately, unimportant as the greater issue regarding pool numbers and mitigation is one Mr. Emond has not addressed. The more we study vernal pools, the more questions we have about the animals and all the other functions they provide, particularly with regard to interactions with other ecosystems. To state that there are **no uncalculated impacts** to vernal pools is ignorant of the scientific process and of the complexity of ecological systems. There are almost certainly uncalculated impacts. Here are some of the key ones to consider relevant to this project:

1. Significant vernal pools (SVP) are defined by a political compromise. Using the simple metric of egg mass numbers undervalues the role of all the pools with lesser egg mass numbers that function as landscape elements in a complex system. We know pools contribute broadly to biogeochemical cycles beyond the pool footprint and that other taxa use pools for parts of their life history (e.g., more than 500 species of invertebrates alone and at least half of our amphibian and reptile species)...without counting the egg masses. Unforeseen ripple effects may occur.

2. The role of pool complexes in population dynamics and hydrological functions is not accounted for in assessment of potential ROW impacts.
3. The effects of fragmentation on pool-breeding amphibians has been heavily documented, but CMP has offered no compensation for this effect (Patrick et al, 2008 a,b).
4. The role of sub-standard habitat elements (the pool and the immediate habitat surrounding the pool where traditionally metamorphs may spend their first winter) on overall population health is unknown. We know there is a forest carrying capacity for the terrestrial activity area of pool breeders. As animals exposed to compromised post-breeding habitat (from the working forest and from the ROW) are forced into the remaining optimal habitat, there may be density dependent population effects we cannot predict at this point.
5. Edge effects in our region may influence the microclimate in the forest interior 25 - 35 meters from cleared areas (deMaynadier and Hunter 1999). This is another effect of fragmentation directly impacting prime post-breeding habitat that is not accounted for as an impact in CMP's compensation package.

Also on page 8 of his testimony, Mr. Emond asserts: "The Project ROW will provide valuable vernal pool habitat, as evidenced by the MPRP vernal pool study and will not have an unreasonable impact on significant vernal pools or adverse effects to vernal pool species."

This statement is completely undocumented. The TRC position paper showed no indication that ROWs or any open canopy situations provide valuable vernal pool habitat. They did not study the health and fitness of the animals in the pools.

The TRC study is not a peer-reviewed study. Peer-reviewed studies are subject to scrutiny by one's scientific peers. Only a subset of these studies is published and often after revision or even an addition of further data. That is the highest tier of scientific rigor. Next, there is grey literature that is reviewed by insiders and open to a broader audience as well but can't be rejected per se (e.g. species management

plans, annual reports, etc.). There is a final category that should be considered dark literature that does not receive any level of peer review or public input. The MRPR is dark literature; it is a snapshot survey of vernal pools in existing ROWs. It is *not* a scientific study.

The TRC position paper does not provide a before and after study of what the density or quality of natural pools was before the MPRP ROWs were constructed. There is no baseline of comparison to state that the current pools support a completely recovered and solid population of pool-breeding amphibians and that the pool habitat is “valuable vernal pool habitat.” It lends no insight into amphibian movement patterns, amphibian genetics, amphibian health, amphibian stress levels, amphibian recruitment, amphibian reproductive success rate, or effects on terrestrial activity areas. It provides no data on the microhabitat before and after in terms of density and condition of small mammal burrows, depth and nature of leaf litter, or quality of coarse woody debris. For example, stating that the ROW has burrows, has coarse woody debris, and has leaf litter gives no insight into the quality of these compared to mature forest habitat. It provides no insight on edge effects or other results of fragmentation. The fact that they found more than 600 created pools in the TRC study is alarming to me given what we know about created pools effects on natural pools and breeding amphibians. For example, created pools attract more “weedy” species (as they are often associated with changed hydrology and more open conditions) such as bull and green frogs and invertebrate predators (all prey on larvae and eggs of the pool-breeders and may transfer disease to wood frogs), they often serve as ecological traps intersecting breeders on their way to natal pools, and often suffer high rates of disease mortality owing to higher temperatures (Gahl and Calhoun 2010, Greenspan et al. 2012, Calhoun et al. 2014.)

On page 8 of his testimony, Mr. Emond asserts: “The NECEC will not result in fragmentation or adverse impacts to jurisdictional vernal pools and vernal pool species within or adjacent to the proposed ROW.”

This assertion is unfounded for reasons already provided in response to Mr. Emond's other unsubstantiated inferences. A 53-mile clear cut 150 feet in width going through vernal pools is nothing but fragmentation, and it presents all the unsavory ecological outcomes that come with fragmentation.

Responses to Mr. Emond's specific objections to statements in my initial testimony

In addition, Mr. Emond took issue with a number of statements I made in my initial testimony that I will address. On page seven, Mr. Emond objected to my statement that: "It is risky assessing pool quality based on egg mass abundances over short time periods." Mr. Emond appears to have assumed that I was questioning CMP's pool survey methods. However, I was making the larger point that when we developed the metrics for assessing SVPs, we knew that "snapshot" counts would likely underestimate pool usage as breeding populations fluctuate widely based on overwintering conditions and springtime temperature and precipitation patterns. Hence, mitigation only for SVP impacts is likely to underestimate the ecological impacts on the ecological complexes of vernal pool resources.

Also on page seven, Mr. Emond objected to my statement that: "From an ecological perspective, the losses should be well-compensated, not undercompensated, given the level of uncertainty in actual pool numbers and given the level of uncalculated impacts to all vernal pools in the study area." Mr. Emond spends a fair bit of text explaining that the mitigation provided meets the IFW requirements based on the assessed pools. He also states that no pools could possibly have been missed in their survey.

Even if the proposed mitigation meets IFW's minimum requirements for mitigation pool impacts, it is certainly possible a one-year survey, which CMP did for its Site Law application, would miss SVPs. Egg mass numbers in any given pool vary from year to year depending on winter and spring weather conditions. A number of pools in the area of the new corridor are close to the regulatory thresholds of significance, and the significance of some was not able to be determined at the time of the survey. Simply put, it is reasonable to think CMP may have underestimated the number of SVPs in the proposed 53-mile stretch of new corridor. Moreover, the proposed mitigation does not address the role of pool clusters

(groups of three or more pools that share a breeding population and hence often have egg mass numbers below the SVP thresholds; Calhoun et al. 2003) or habitat fragmentation (Patrick et al. 2008 a,b). As I have stated in my initial testimony and in this surrebuttal testimony, the literature is clear that clear cuts and transmission corridors will have a fragmenting effect on pool webs. DEP should require CMP to compensate for these effects, whether or not staff at IFW felt they had the ability to ask for this compensation.

Finally, I take great exception to Mr. Emond's statement on page 9 of his testimony that: "Dr. Calhoun's assertions on potential adverse effects on the NECEC Project on vernal pools are not supported by Maine-specific data or experiences..."

I was clear in my testimony that I have been researching vernal pools for more than two decades in Maine and published more than 60 peer-reviewed articles/books on vernal pools. During this time, I have been active in vernal pool education and outreach in our state, and in organizing national and international workshops on temporary wetlands. My practical experience includes working on wetland policy at all governmental levels and training the next generation of wetland ecologists. On page 15 of the TRC paper that Mr. Emond cites, TRC further states that they likely have the largest vernal pool dataset in Maine. It is clear he did not even scan the literature I provided from my lab, which would make this statement not only ludicrous, but insulting.

In summary, based on my extensive study of and experience with vernal pool ecosystems, I believe that a significant impact on vernal pool communities will result from the proposed project and that we can barely scratch the surface of accounting for the nature and extent of damages that will be incurred. What we can do is avoid or mitigate these damages as fully and responsibly as possible.

Citations

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Notarization

I, Aram Calhoun, being first duly sworn, affirm that the above testimony is true and accurate to the best of my knowledge.

Date: April 19, 2019



Aram Calhoun

The above-named Aram Calhoun made affirmation that the above testimony is true and accurate to the best of her knowledge.

Date: April 19, 2019



Susan Ely, Attorney-at-law