Prioritizing Non-regulatory Protection of Vernal Pools in the Queen's River Watershed, Rhode Island

RESPONSES TO COMMENTS

Appendix D
of
Final Research Report

by

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Appendix D. Responses to stakeholder questions and comments.

Early in July of 2007, the RIDEM Office of Water Resources notified personnel from a wide range of federal and state agencies, municipal boards, and nongovernmental conservation organizations working in the Queen's River watershed of the availability of a draft version of this report and invited them to participate in a meeting on the topic on July 17 at URI. These stakeholders were given the opportunity to ask questions and to provide comments on the project and draft report during the meeting and on a questionnaire distributed to attendees and those unable to attend. Below are our responses to those questions and comments.

Research Methodology and Application of Results

Question: *How accurate is the TNC vernal pool mapping in the Pawcatuck River watershed? Are we concerned about possible errors of omission in areas of the Queen's watershed that we did not visit?*

Response: The TNC vernal pools database was created through stereoscopic interpretation of 1:12,000-scale, conventional, black-and-white aerial photographs taken in the spring of 1995. Of the 253 vernal pools that we studied in the Queen's, 228 (90%) were identified by TNC. We identified 11 additional pools during our fieldwork and another 14 through interpretation of digital, color ortho-photography. We and TNC may have failed to detect other pools that were either very small or hidden under a coniferous forest canopy. However, we are confident that such omissions would not have altered the location or general extent of the pool-breeding amphibian hotspots that we identified in this study.

Question: *What was the rationale behind the establishment of the specific upland forest cover classes and pool size classes for ranking purposes?*

Response: Our research and that of other scientists has demonstrated a positive relationship between the extent of upland forest cover surrounding a vernal pool and the occurrence (Homan et al. 2004), species richness (Hermann et al. 2005), and population size (Skidds et al. 2007; Egan and Paton, in press) of pool-breeding amphibians. These studies have shown that wood frog presence and abundance increase markedly when forest cover exceeds 40-50%. In creating forest cover classes for pool ranking, we attempted to differentiate among pools with low (<30% cover), moderate (30-60% cover), and high (>60% cover) suitability for breeding wood frogs. A threshold forest cover value has not been identified for spotted salamanders, but our research (Skidds et al. 2007) has shown that forest cover is positively related to egg mass counts for this species as well and that wood frog and spotted salamander egg mass counts also are positively related; therefore, the cover classes that we chose seemed reasonable for both species.

We have found a positive relationship between pool size and egg mass counts for both species also (Skidds et al. 2007). Because there was no clear threshold value for size, we simply created three classes for ranking that spanned the range of sizes encountered in the Queen's River study, with the middle class centered on the mean value (0.10 ha).

Question: *What was the rationale for recognizing a hotspot based on a minimum cluster of at least three high-ranking pools?*

Response: The three-pool minimum was not established prior to hotspot identification and it is not based on data from the scientific literature or from our previous research. It is simply based on a visual inspection of the distribution of high-ranking pools throughout the watershed, the distances among those pools, and the relative abundance of other fishless pools in the vicinity of the high-ranking pools. The minimum number of high-ranking pools in those regions where such pools were less than 1.5 km apart turned out to be three and, in our view, three was a reasonable minimum for recognition of a cluster. So the hotspots may be viewed as regions of relatively high overall pool density that are "anchored" by at least three high-ranking pools.

Question: *Why were pools 859 and 860, which are located <0.5 km from the southern boundary of Hotspot F, not included in that hotspot?*

Response: Pools 859 and 860 (see Appendix B for identification numbers) are completely surrounded by developed land (Fig. 8). As noted on page 17 of this report, we maximized the area of forested land and minimized the area of developed land during delineation of each hotspot. In this particular case, we drew the southern boundary of the hotspot along the edge between forest and developed land, so pools 859 and 860 were excluded from the hotspot.

Comment: *I suggest extending hotspot boundaries to at least 370 m beyond the pools to protect at least 95% of adult females, based on the study by McDonough and Paton (2007).*

Response: McDonough and Paton's study dealt with dispersal of adult spotted salamanders from breeding pools on a golf course where forest cover was extensive (70%), but highly fragmented, and where dispersing salamanders had to cross fairways to locate suitable terrestrial habitat. The study determined that females dispersed farther than males, that 95% of the females ended their migration within 370 m of the breeding pool, and that, on average, females dispersed more than twice as far on the golf course as at the control area, where the forest was not fragmented. Our hotspots contain the least fragmented forest tracts in the Queen's River watershed. For that reason, we felt that 300 m was a sufficient terrestrial "life zone" for the pools located at the edge of the hotspots. Pools farther from the edge have life zones far in excess of 300 m. A 300-m life zone would have

captured 100% of the males and 84% of the females dispersing from pools on the golf course studied by McDonough and Paton (2007).

Question: *Are there plans to apply this methodology to other watersheds in the State?*

Response: To date, vernal pool mapping has been conducted only in the Pawcatuck River watershed, of which the Queen's is a sub-watershed. Given that our assessment methods are based on research conducted throughout the Pawcatuck, use of this methodology in other areas of the Pawcatuck would be appropriate. During the coming months, the RIDEM Office of Water Resources will be exploring the feasibility of hotspot identification in such areas using a landscape-scale approach (e.g., TNC vernal pool mapping and forest cover data from RIGIS), coupled with less intensive fieldwork. Hotspot identification outside the Pawcatuck watershed would require vernal pool mapping there and an evaluation of the appropriateness of our ranking schemes for those areas.

Question: *Are there plans to apply this methodology to vernal pools in more urbanized areas?*

Response: The pool-breeding amphibians targeted in our study are species that depend on forested habitat outside of the breeding season. For that reason, we employed the area of upland forest cover within 300 m of a pool as one of the key criteria for pool ranking. By definition, vernal pools located in urban areas have little or no forest cover around them and would represent poor habitat for species such as wood frogs, spotted salamanders, marbled salamanders, and gray treefrogs. Because our method was developed to support land conservation efforts involving both vernal pools and associated upland forests, use of the method to prioritize protection within urban landscapes would not be appropriate.

Question: *How might our findings be incorporated into local land use regulations?*

Response: Although our method was designed for non-regulatory use (i.e., to prioritize vernal pools and their surroundings for acquisition or conservation easements), the results could certainly be used to identify lands to be conserved during the planning of subdivisions or other development projects. Forested areas supporting one or more high-ranking vernal pools might be designated as one of several high-priority habitats for open space protection in a town's subdivision regulations. Other scientists (Calhoun and Klemens 2002) have identified "best development practices" that can be implemented to conserve pool-breeding amphibians during residential and commercial development throughout the northeastern United States.

Alternative Approaches to Vernal Pool Conservation

Question: *Are vernal pools protected by State wetland regulations?*

Response: Yes. Under Rhode Island's Freshwater Wetland Rules and Regulations, vernal pools may be protected as ponds (areas at least ¼-acre in size with surface water for at least 6 months); as swamps, bogs, marshes, or other types of vegetated wetlands; or as special aquatic sites (wetlands that do not satisfy the criteria for the above wetland types, but that are capable of supporting aquatic life forms of wetland-dependent wildlife such as pool-breeding amphibians). So Rhode Island's wetland regulations do regulate alteration of vernal pools, but those regulations do little to protect required upland habitats, where these amphibians live outside the breeding season, and that is a critical issue. State jurisdiction ends at the edge of special aquatic sites, and extends no more than 50 feet into the upland around ponds and vegetated wetlands. As a result, pool-breeding amphibians are highly vulnerable to human alteration of both wetland and upland habitats.

Comment: *Protection of vernal pools and pool-breeding amphibians is important, but there are many other reasons for land conservation, and we need to take a holistic approach.*

Response: We agree. Land may be conserved to protect surface water or groundwater quality and quantity, to control stream flooding, to provide public recreation areas, and to protect our natural heritage, among other reasons. We fully realize that few parcels may be preserved based on amphibian habitat value alone; however, we do think that agencies and organizations involved in land conservation should consider pool-breeding amphibians as an important group to target in their efforts to maintain the biodiversity of our landscape. Research has shown that forest preservation, in particular, is critical to the conservation of not only amphibians, but also forest-interior birds, native plant diversity, forest mammals, and other taxonomic groups. Moreover, biodiversity maintenance is clearly compatible with land conservation for the other reasons listed above.

Comment: *Recent development of decision-support model software for prioritizing land conservation is an exciting new direction that we should pursue.*

Response: We agree, and we see no reason why our scheme for prioritizing conservation of pool-breeding amphibian habitats cannot be incorporated into such models.

Comment: *Non-regulatory approaches are not the only effective means for maintaining biodiversity; local land use regulations also are important.*

Response: Again, we agree. Maintenance of our native flora, fauna, and ecosystems in the face of increasing urbanization is such a challenge that we need to employ all of the methods at our disposal—regulatory and non-regulatory—to achieve this goal. Conservation development, which has been promoted by RIDEM for some

time now, can be an especially important tool at the municipal level. State and federal wetlands regulations also play an important role. Conservation land acquisition and conservation easements often are particularly effective approaches for guaranteeing protection of large, contiguous blocks of habitat—hundreds of acres or more—which are required for maintenance of pool-breeding amphibians and other area-sensitive forest wildlife.

Question: *Did we attempt to identify those factors that are most destructive to vernal pools and pool-breeding amphibians so that methods can be devised to undo the damage?*

Response: Our research over the last 10 years has focused on identifying within-pool and landscape-level habitat characteristics that positively influence the presence and abundance of pool-breeding amphibians in specific regions of watersheds so that high-quality habitat can be protected before it is damaged or lost entirely. Pool hydroperiod and the extent of upland forest surrounding breeding pools are two examples. However, it is also clear that any human actions that adversely affect these features (e.g., draining vernal pools or clearing forests in the vicinity of high-quality pools) should be regulated and even reversed, where feasible, through habitat restoration. The first step, as we saw it, was to understand the habitat requirements of the animals so that we would know which features to protect or restore.

Question: *Has RIDEM given thought to strengthening the regulations that pertain to vernal pools? Would initiation of a vernal pool certification program, such as the one in Massachusetts, be more effective for protecting vernal pools on potentially developable land?*

Response: By creating the category "special aquatic site" during the 1994 revision of Rhode Island's Freshwater Wetland Rules and Regulations, RIDEM significantly increased protection of vernal pools. Alteration of any small, seasonal body of water that is capable of supporting aquatic life forms such as fairy shrimp or pool-breeding amphibians requires a permit from RIDEM (or CRMC near the coast). In Massachusetts, such protection is not afforded until a pool has been certified (i.e., until it has been shown to support such species). Some people have questioned the effectiveness of Massachusetts' certification program because, even after more than 20 years, only a small percentage of the State's pools have been certified; meanwhile, the rest have been unprotected. In Rhode Island, protection is already in place for all vernal pools; the question of capability to support aquatic life forms is addressed when a permit application is reviewed. It would be ideal if such capability could be assessed before permit applications are filed. Conceivably, with training, local Conservation Commissions could play a role in such an effort, by documenting the value of individual pools themselves and by training landowners and other town residents to do so.

Information Needs

Comment: *More detailed information on pool-breeding amphibian hotspots (e.g., plat and lot numbers for parcels contiguous with already protected lands) would be valuable.*

Response: Plat and lot information for the 253 vernal pools included in this study is presented in Appendix C of this report, along with the location of each pool by hotspot or connecting corridor, if appropriate. We have not provided plat and lot data for upland parcels that do not contain pools (as far as we know), but RIDEM plans to compile that information in the near future and to make it available to interested parties.

Question: *Where might one obtain information on the use of aerial photographs to identify vernal pools?*

Response: We recommend the following three publications; full citations appear in the Literature Cited section of this report.

- *Vernal pools in Massachusetts: Aerial photographic identification, biological and physiographic characteristics, and State certification criteria* (Stone 1992)
- *Massachusetts aerial photo survey of potential vernal pools* (Burne 2001)
- *Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States* (Calhoun and Klemens 2002)
- *Remote and field identification of vernal pools* (Burne and Lathrop 2008)

Question: *Can you provide a link to natural history information on vernal pool species?*

Response: Please go to www.uri.edu/cels/nrs/paton for information on pool-breeding amphibians of Rhode Island. Other excellent sources of information on New England vernal pools are:

- *A field guide to the animals of vernal pools* (Kenney and Burne 2001)
- *Vernal pools: natural history and conservation* (Colburn 2004)
- *Science and conservation of vernal pools in northeastern North America* (Calhoun and deMaynadier 2008)

Vernal Pool Management

Question: *How would a land trust, nongovernmental organization, or government agency manage a vernal pool, if acquired?*

Response: The key is to maintain the integrity of the pool and to maintain forested habitat up to a distance of several hundred meters around the pool, if possible. The pool should be protected from polluted surface runoff (including sedimentation) and polluted groundwater inflow, from hydrologic modification (e.g., impoundment or ditching), and from clearing of vegetation in the pool or in the surrounding upland. We highly recommend the excellent publication on "Best Development Practices" by Calhoun and Klemens (2002) for a detailed treatment of alterations to avoid and BMPs to employ. Restoration is recommended for pools that have been severely degraded as a result of human activity.

Question: *Would it be possible to raise the spillway of lower-ranking pools in order to lengthen the hydroperiod and make them more valuable?*

Response: Some vernal pools have surface outlets; others do not. If a pool has a surface outlet, it might be possible to lengthen the hydroperiod by raising the elevation of the outlet; however, we would not recommend manipulating the hydroperiod, or any other characteristic, of an undisturbed vernal pool to make it "more valuable." Our ranking of pools in the Queen's River watershed according to size, hydroperiod class, and extent of surrounding forest was done simply to identify those pools and watershed regions that are potentially capable of supporting unusually high numbers or diversity of pool-breeding amphibians for non-regulatory protection, realizing that funds are limited and prioritization is necessary. However, even pools with short hydroperiods may provide excellent habitat for certain aquatic invertebrates and certain amphibians and may support multiple species in wetter than average years. Our recommendation would be to maintain, in any geographic area, pools with diverse hydroperiods so that adequate breeding habitat would be available in at least some ponds regardless of annual precipitation levels (see Semlitsch [2000] for further discussion of this topic). We recommend pool manipulation only if the goal is to restore the wetland to a previous, undisturbed condition, and then only if the required permits have been obtained.

Question: *What procedures or permits would be required for creation or restoration of vernal pools?*

Response: If the goal is to create a vernal pool from upland, and the site does not lie within "riverbank wetland" (i.e., within 100 feet of a stream less than 10 feet wide or within 200 feet of a stream at least 10 feet wide) or "perimeter wetland" (i.e., within 50 feet of the edge of any bog, marsh, swamp, or pond as defined in the RI Freshwater Wetlands Act), then a wetland permit is not required. If one wishes to restore a degraded vernal pool or to create one within existing wetland, such as a swamp, a permit must be obtained from RIDEM (or CRMC in the

vicinity of the coast). RIDEM recommends that applicants for such permits contact the RIDEM Wetland Restoration Team for guidance prior to filing an application.

Question: *Has Rhode Island (presumably RIDEM) established a minimum percentage of vernal pools for restoration?*

Response: We are aware of no past or current efforts to restore degraded vernal pools in this state, nor do we know of any plans for future restoration of individual pools or pools on a landscape scale. Before a landscape-level vernal pool restoration plan could be developed, there must be a comprehensive inventory (including field-checks) of both disturbed and undisturbed pools. In Rhode Island, the TNC inventory of potential vernal pools in the Pawcatuck River watershed is the only comprehensive inventory available. That inventory was conducted through interpretation of aerial photographs; probably less than 20% of those potential vernal pools have been verified in the field. Clearly, vernal pool restoration goals cannot be set without more data on the location and condition of existing and former pools.

Related Topics

Comment: *The State's Land Use Plan for 2025 targets certain areas for development; vernal pool information is needed for those areas and for areas targeted for water supply.*

Response: To develop effective management plans for the conservation of vernal pools and their fauna, we need to identify and assess the habitat quality of vernal pools across the Rhode Island landscape—in areas targeted for development and in areas that are still rural and, ideally, contiguous with protected land. Our study sought to identify pool-breeding amphibian hotspots that could serve as focal points for a comprehensive management plan in the Queen's River watershed. We believe that this approach is applicable throughout the State.

Question: *How might landowners be brought into the vernal pool protection process?*

Response: Vernal pool owners are uniquely positioned to impact the health of these habitats and their fauna, both positively and negatively. Grassroots efforts by municipal Conservation Commissions, watershed associations, land trusts, and other nongovernmental conservation organizations might be the most effective in educating landowners about the values of vernal pools, ways to minimize adverse impacts, means for enhancing their value, and the benefits of various land protection methods. Agencies such as RIDEM, CRMC, and the Natural Resources Conservation Service (NRCS) might provide training for these local groups and serve as a continuing source of information and technical assistance. NRCS also may be able to provide funds to landowners for vernal pool creation, enhancement, or restoration.

Question: *Does RIDEM consider vernal pool protection when ranking applications for funding under the State's Open Space grants program?*

Response: Open Space grant applications are ranked out of a total of 100 points based on point values assigned to several different scoring criteria. Habitat protection criteria (up to 25 points total) are further divided into five sub-categories (up to 5 points each). The first of those sub-categories is critical and/or uncommon habitat and vernal pools are listed as one of the habitat/community types considered. A parcel containing vernal pools may have additional points awarded for other habitat protection criteria such as rare/endangered species. The specific characteristics of the parcel may result in points awarded for other criteria in addition to habitat protection. Information on the Local Grants Program can be found on the RIDEM Office of Planning and Development webpage: http://www.dem.ri.gov/programs/bpoladm/plandev/grants.htm