Legislative Task Force

Meeting #9

Thursday, May 29, 2014
8:00 – 10:00 AM

Rhode Island's Builders Association Conference room
450 Veterans Memorial Parkway, #301, East Providence, RI

Agenda

8:00 Welcome and Overview of Agenda– *Kevin Flynn, DOP*

8:05 Review/ Feedback on meeting notes: -- *Kevin Flynn & All*

- March 27, 2014
- April 17, 2014

8:10 Subject Topics and Technical Presentations:

A. Literature Review:
   a. Outline of Approach : *Nancy Hess, DOP*
   b. Summary of Wetland Buffer Reports & Manuals - *Carol Murphy, DEM*
      - ❖ Rhode Island Specific reports
      - ❖ New England Specific reports
      - ❖ Things in the Queue

B. Questions & Task Force Discussion – (*All) - moderated by Kevin Flynn, DOP*

9:45 Next Steps– *Nancy Hess, DOP*

A. June Meeting Date & Location
B. July Meeting Date & Guest Speakers

10:00 Adjourn

Legislative Task Force Meeting #7

Thursday, March 27, 2014

8:00 AM – 10:00 AM
Room 300, 3rd Floor
Department of Environmental Management
235 Promenade Street, Providence, RI

Task Force members in attendance were: James Boyd (Coastal Resources Management Council), Joseph Casali (Civil Engineer Representative), Russell Chateauneuf (Civil Engineering Representative), Alicia Good for Janet Coit (DEM Representative), Tim Stasiuanas (Builder's Trade Association), Gary Ezovski (Business Community Representative), Kevin Flynn (DOP-Associate Director), Lorraine Joubert (Environmental Entity), Thomas Kravitz (Municipal Representative – Burrillville), Tom Kutcher (Wetlands Biologist), Scott Moorehead (Business Community Representative), Eric Prive (Civil and Environmental Engineering Representative), Scott Rabideau (Business Community Representative), and Nancy Scarduzio (Office of Regulatory Reform).

The Division of Planning (DOP) and DEM also had several agency staff members present; from DEM; Brian Moore, Carol Murphy, Ernie Panciera, and Marty Wencek, Nancy Hess and Sean Henry were on hand from DOP.

Wetlands Regulation in Narragansett: Two Perspectives

Director Flynn began the meeting by introducing the meeting's presenters, Narragansett Community development Director, Mike DeLuca spoke first. Mr. DeLuca shared how Narragansett regulates their wetlands and several case studies to demonstrate the system in action. Narragansett had no local wetlands regulations until the 1980s. During the same time, the town hired consultants that recommended the use of 5 zoning overlays, 2 of which governed wetlands: The coastal and freshwater wetlands overlay district, and the coastal resources overlay district. The first overlay district includes wetlands themselves and a 150 foot buffer zone around them, or 100 feet in some areas, and has several prohibited uses. Special use permits can be obtained for projects within the buffers. Section 16 also permits certain smaller projects to be reviewed at the staff level.. Mr. DeLuca outlined the parameters by which a project would be required to appear before the Zoning Board of Appeals. He then answered questions asked by the task force before moving on to the case studies.

Mr. DeLuca brought 3 case studies of wetlands-related issues with properties to present to the task force some of the local issues of regulation. The first was a wetland bordering, irregularly shaped lot at the end of a road that owners wished to build a house onto. The main issue was the size of the house and its proximity to the wetland. After review, it was determined that the owners would be able to build by obtaining a variance, but they would have to make several adjustments to their plan,

including a small reduction in size, limiting the wetlands disturbance into the future, and extending the road.

The second case study is an 11,000 square foot lot that is 60% wetlands. The owners proposed to build a house with a deck on it and a gravel road leading to the property. The driveway would disturb the wetlands considerably. The construction of the house required variances to be given for dimensional setbacks, wetlands setbacks, relocation of the planned house, and elimination of the deck. Task force members then asked several questions and discussed some of the issues surrounding the properties and reviews.

The third case study involved an existing home on a wetland-bordering lot that the owners wished to demolish in order to rebuild a new house. This property was located in the coastal freshwater overlay district. This case provided an overview of the process of site plan approval that involves both the planning department and the Town's engineering department. He again fielded questions from the task force on the properties and review conducted.

The second half of the presentation was conducted by task force member, Scott Rabideau. He examined the same cases presented by Mr. DeLuca, but from the perspective of how much effort needs to be exerted on behalf of the property owner in order to comply with the Town's regulations and requirements. Most often, the property owner would need to consult with experts to submit an application or to present their case to a zoning board. This includes attorneys, environmental consultants, biologists, and others ($). For instance, in order to submit an application for alteration of a wetland, they must first map the wetland edge, which requires a land surveyor and a report submitted by a wetlands biologist. Mr. Rabideau estimated that this process would take about 18 hours of working time. In addition, presenting this application to the planning and zoning boards would also require hiring an attorney to present the application and ensure that all requirements are being met by the application. The biologist and other witnesses may have to testify before the boards would incur more costs for the property owner. In most cases, the greater the impact on the wetland, the more effort needs to be exerted by the property owner in order to seek approval from the Town. An application to significantly alter a wetland has a much higher standard than an insignificant alteration. It would require an evaluation of all the functions and values of the wetland, as well as any wetlands that are hydrologically connected to that wetland, wildlife values, and other more stringent measures. An engineer would be required to measure flood protection, water quality, soil and sedimentation controls, and other requirements. The task force members then asked questions and engaged in discussion.

Next Meeting

The next meeting is scheduled for April 17, 2014. The topics will include looking at the wetlands regulations of other New England states, as well as looking forward to the timeline for the rest of the year. Nancy Hess outlined the organization of a subgroup to do the Literature review and solicited the task force for any literature requests to be included in the literature review for the task force.

Adjourn
10:00 AM

Legislative Task Force Meeting #8

Thursday, April 17, 2014

8:00 AM – 10:00 AM
Room 300, 3rd Floor
Department of Environmental Management
235 Promenade Street, Providence, RI

Task Force members in attendance were: James Boyd (Coastal Resources Management Council), Joseph Casali (Civil Engineer Representative), Russell Chateauneuf (Civil Engineering Representative), Alicia Good for Janet Coit (DEM Representative), Tim Stasiuanas (Builder's Trade Association), Gary Ezovski (Business Community Representative), Kevin Flynn (DOP-Associate Director), Lorraine Joubert (Environmental Entity), Thomas Kravitz (Municipal Representative – Burrillville), Tom Kutcher (Wetlands Biologist), Scott Moorehead (Business Community Representative), Eric Prive (Civil and Environmental Engineering Representative), Scott Rabideau (Business Community Representative), and Nancy Scarduzio (Office of Regulatory Reform).

The Division of Planning (DOP) and DEM also had several agency staff members present. From DEM; Terry Grey, Brian Moore, Carol Murphy, Ernie Panciera, and Marty Wencek. Nancy Hess and Sean Henry were on hand from DOP.

Introduction

Kevin Flynn began the meeting at 8:00 with the announcement that the meeting notes from the previous meeting would be available as soon as possible. He then turned the meeting over to Carol Murphy, DEM, to continue outlining the regulatory landscape of neighboring New England states.

Other New England States Wetlands Protection

Connecticut

Carol Murphy has been continuing her research since first presenting about the other states at the February task force meeting. Her research has focused on Connecticut, Massachusetts, New Hampshire, and Vermont. She found out that the most common setback distance has been one hundred feet. Connecticut's wetlands protection is managed under two state laws: the Inland Wetlands and Watercourses Act and the Tidal Wetlands Protection Act. The Inland Wetlands and Watercourses Act is implemented by the municipalities, who are responsible for establishing an inlands wetlands agency. Some permits are administered by the Connecticut Department of Energy and Environmental Protection (CT DEEP) for projects at the state level and shoreline alterations. The CT DEEP provides guidance to the municipal inland wetlands agencies regarding upland review areas. The guidance

supports three different models that municipalities can use: a fixed distance from all resources, different distances depending on the resources and other criteria, or a case-by-case basis of site-specific data. The distances the municipalities use as a setback in Connecticut vary from 25-500 feet. Many communities also regulate vernal pools and intermittent wetlands as resources.

Massachusetts

Massachusetts defines both coastal and inland wetlands in one statute. The law is administered by each community's conservation commission, and is monitored by the MA DEP. The conservation commission is charged with protecting the public interest, and work to ensure that activities do not alter wetlands adversely. Buffer zones are defined in Massachusetts regulations, and extend one hundred feet from bordering wetlands, and require permits for any activities within the buffer zones. The MA DEP also retains authority over certain state-level projects, and also handles any appeals from the local level. Task force members then discussed the mechanics of the different zones around wetlands and some of their terminology. Massachusetts changed their wetlands regulations in the mid-1990s to add riverfront protection areas. This resource area has a 200 foot review area in most places, and a 25' setback within fourteen specific cities and towns. Mr. Ezovski asked about elevation and considering the vertical distance around wetlands resources.

New Hampshire

New Hampshire regulates wetlands in a similar fashion to Rhode Island. NH uses its fill and dredge act regulates freshwater and coastal wetlands. Municipalities participate in state review processes by identifying 'prime wetlands' that recognize the size, character, or other feature that provides that wetland with additional significance that affords such wetlands an additional one hundred foot buffer. The task force discussed the process the communities use to identify and vote on the prime wetlands, and the use of review areas and buffers.

Vermont

Wetlands are regulated in Vermont based on their functions and values as applied to a classification system. Those determined to be Class 1 (exceptional and irreplaceable) or Class 2 wetland, the state regulates. Class 1 and 2 wetlands are mapped at the state level. All other wetlands are regulated at the municipal level, or perhaps the federal government in certain few instances. Class 1 wetlands have a 100 foot buffer, while Class 2 wetlands have a 50 foot buffer. Vermont's land use program (Act 250) may affect wetlands regulation, as other state statutes might as well.

OWTS Regulations

There was a second presentation at this meeting on the subject of OWTS-related regulations, presented by Ernie Panciera and Brian Moore of DEM. The two men explained how Rhode Island uses setbacks to manage septic systems across the state. The state requires there to be a 50 foot setback between septic systems and any watercourse. The term *watercourse* includes any body of water, including some that are not included in the RI wetlands definition. There is also a larger 200 foot setback from sensitive water resources- salt ponds, drinking water wells, and others. The two presenters also discussed regulation in other New England states, and the changes that DEM made to their septic rules in 2008. Task force members also posed several questions on these topics.

Next Meeting

The next meeting is scheduled for May 29, 2014. The next steps to consider include the results of a literature review on the best available science on wetlands setbacks and OWTS. Nancy Hess solicited the task force for any scientific or professional resources on those subjects, and then outlined the timeline for the remaining meetings of the task force.

Adjourn
10:00 AM

Overview of Literature Reviews

What is a literature review?

A literature review discusses published information in a particular subject area, and sometimes information in a particular subject area within a certain time period.

A literature review can be just a simple summary of the sources, but it usually has an organizational pattern and combines both summary and synthesis. A summary is a recap of the important information of the source, but a synthesis is a re-organization, or a reshuffling, of that information. It might give a new interpretation of old material or combine new with old interpretations. Or it might trace the intellectual progression of the field, including major debates. And depending on the situation, the literature review may evaluate the sources and advise the reader on the most pertinent or relevant.

But how is a literature review different from an academic research paper?

The main focus of an academic research paper is to develop a new argument, and a research paper will contain a literature review as one of its parts. In a research paper, you use the literature as a foundation and as support for a new insight that you contribute. The focus of a literature review, however, is to summarize and synthesize the arguments and ideas of others without adding new contributions.

Why do we do literature reviews?

Literature reviews provide you with a handy guide to a particular topic. If you have limited time to conduct research, literature reviews can give you an overview or act as a stepping stone. For professionals, they are useful reports that keep them up to date with what is current in the field. For scholars, the depth and breadth of the literature review emphasizes the credibility of the writer in his or her field. Literature reviews also provide a solid background for a research paper's investigation. Comprehensive knowledge of the literature of the field is essential to most research papers.

Who writes these things, anyway?

Literature reviews are written occasionally in the humanities, but mostly in the sciences and social sciences; in experiment and lab reports, they constitute a section of the paper. Sometimes a literature review is written as a paper in itself.

Selections typically based on:

1. Relevance of published studies to topic
2. Organization
3. Current study, rationale and contribution to field of knowledge on topic
4. Clarity of writing and interpretation of literature
5. Bibliographic format w/ multiple documents reviewed.

DRAFT Notes for Legislative Task Force Meeting May 29, 2014
Selected Rhode Island and New England Buffer Reports and Manuals
Carolyn Murphy, DEM Freshwater Wetlands Program

SELECTED RHODE ISLAND REPORTS AND MANUALS

1. Groffman, P., A. Gold, T. Husband, R. Simmons, and W. Eddleman. 1991. An investigation into multiple uses of vegetated buffer strips. Narragansett Bay Project Report No. NBP-91-63.

- The study named and researched inherent values of buffer zones to wetland-dependent wildlife species, namely, they are: **Sites for foraging; Corridors for dispersal; Areas to escape from flooding; Sites for hibernation; Areas for breeding and nesting; Areas of low predation; Species richness; and Buffering of disturbances from outside the wetland.**
- The wildlife studies resulted in a buffer model for protection of wetland-dependent wildlife in red maple swamps based on 1) Habitat suitability; 2) Wildlife spatial requirements; 3) Access to upland habitats; and 4) Noise impacts.
- If the habitat suitability guidelines are not met, the buffer should be restored.
- The minimum buffer is 100 meters (328 feet) if there are threatened or endangered species, or neotropical migrant birds.
- The minimum wetland buffer required if amphibians or small mammals are present is undetermined.
- The minimum buffer is 15 meters (49 feet) for access to upland nesting sites for turtles.
- The minimum buffer requirements for noise attenuation range from 13 to 85 meters (43 to 279 feet).
- Suggested buffer distances range from 32 to 100 meters (105 to 328 feet).

2. Palstrom, N. 1991. Vegetated Buffer Strip Designation Method Guidance Manual. IEP, Inc., Northborough, MA

- Developed a multi-step buffer model including evaluation of "special conditions" for sensitive wetlands and high impact activities.
- A minimum 300 foot buffer is required between a wetland and a commercial / industrial facility with hazardous materials onsite.
- A buffer consistent with existing buffers, but not less than 25 feet, should be maintained at residential infill areas.
- Buffers with slopes greater than 15 % or with less than 80 % vegetative cover are not suitable for water quality protection, and other measures need to be incorporated.
- Where wetlands are habitat for endangered or threatened species, the buffer should not be less than that required for 85 % suspended sediment removal.
- *Sensitive wetlands* are those in water supply watersheds, vernal pools, cedar swamps, scenic rivers, conservation lands, and coastal ponds.

3. Desbonnet, A., P. Pogue, V. Lee, and N. Wolff. 1994. Vegetated buffers in the coastal zone - A summary review and bibliography. Coastal Resources Center Technical Report No. 2064. University of Rhode Island Graduate School of Oceanography. Narragansett, RI.

- Compiled minimum buffers to protect wetland wildlife habitat ranging from 15 to 200 meters (49 to 656 feet); the authors found it difficult to determine a best fit width for general wildlife habitat.
- Found that many studies determine buffer distances by determining species specific needs, especially of rare species.
- Table 7 provides a summary of the effectiveness of a range of buffer distances for wildlife habitat and pollutant removal (from 5 to 600 meters) (16 to 1968 feet).
- General wildlife habitat value is summarized as Fair to good at 75 meters (246 feet); Good at 100 meters (328 feet); and Excellent at 200 to 600 meters (656 to 1968 feet).
- Describes the "ideal buffer" for multiple uses.

4. Murphy, M.C. and F. C. Golet. 1998. Criteria for determining buffer zone and setback widths. In Development of revisions to the State of Rhode Island's freshwater wetland regulations. Final report for Department of Environmental Management. Univ. of Rhode Island, Kingston, RI

- Discussed a tiered buffer approach based on functions and values and within the extent of the *bordering lands* defined by the Governor's Commission (1995). The *buffer zone* is that portion of the *bordering land* maintained in a natural undisturbed condition.
- Tier 1 is a 150 foot buffer to perennial watercourses. The tier 1 setback is 175 feet.
- Tier 2 is a 100 foot buffer for permanent or semi-permanently flooded water bodies and vegetated wetlands, bogs and fens, natural heritage sites, and critical amphibian habitats (CAH). The tier 2 setback is 100 feet.
- Tier 3 is a 75 foot buffer for seasonal standing water bodies other than CAH, seasonally or temporarily flooded vegetated wetlands other than CAH, and intermittent watercourses. The tier 3 setback is 100 feet.
- Tier 4 is a 50 foot buffer to seasonally saturated wetlands. The tier 4 setback is 75 feet.

5. Rhode Island Rivers Council. 2005. Findings and recommendations: Establishment of riparian and shoreline buffers and the taxation of property included in buffers. A report to the Governor, Senate and House. By the Rhode Island Rivers Council. Providence, RI.

- Charged to make recommendations with respect to riparian buffers and taxation of property included as buffers. *Riparian buffers* are along rivers, streams, open waters, and coastal waters.
- Stated that preservation and restoration of natural riparian buffers is considered to be the single most important management practice to protect water resources.
- Recommended that DEM investigate the NJ 300 foot buffer for high quality river segments and consider adopting regulations.

6. Lichtin, N. 2008. Water quality function of wetland buffers: A brief annotated bibliography. URI Cooperative Extension, Nonpoint Education for Municipal Officials. Kingston, RI.

- Buffer width recommendations in the papers reviewed range from 50 feet to 200 feet depending on the function of the buffer and the study author. Emphasis on water quality with recognition of benefits of buffers for flood control, erosion control, and wildlife habitat. Riparian buffers have been reported to have a major effect on flood mitigation by increasing the opportunity for infiltration, reducing the velocity of runoff, and minimizing impervious cover.
- "Most studies have found that much larger buffers are required to provide wildlife habitat than are required for any of the other buffer benefits."

7. Horsley Witten Group, Inc. and S. Millar. 2011. Rhode Island Low Impact Development Site Planning and Design Guidance Manual. Department of Environmental Management and Coastal Resources Management Council.

- Table 3-1 summarizes a range of buffers researched by the Environmental Law Institute (2003) and US Army Corps of Engineers (Fischer and Fischneich 2000) and it provides recommended distances for five functions.
- The authors recommend the following buffer distances: Stream stabilization = 50 feet; Water quality protection = 100 feet; Flood attenuation is FEMA 100 year floodplain plus 25 feet; Riparian wildlife habitat = 300 feet; and Protection of cold water fisheries = 150 feet.

SELECTED NEW ENGLAND REPORTS AND MANUALS

1. Boyd, L. 2001. Buffer zones and beyond: wildlife use of wetland buffer zones and their protection under the Massachusetts Wetland Protection Act. University of Massachusetts.

- 65 freshwater wetland dependent wildlife species in MA also require the adjacent upland habitat for their life needs.
- 50 of these species use from the freshwater wetland edge to 100 feet; 38 species use from the edge to 200 feet; and 34 species use from the edge to beyond 200 feet.
- 90 % of MA freshwater wetland dependent reptiles, 95 % of amphibians, 100 % of mammals, and 55 % of wetland dependent birds have upland requirements.
- Concludes: "The direct and active protection of the 100 ft. regulated buffer zone would provide some protection to 77 % of those species that require upland habitat in addition to those elements provided by the wetland. ....There is an additional need to provide protection to areas beyond the 100 ft. because 52 % of the MA wetland dependent wildlife are dependent on areas beyond 200 ft."

2. Calhoun, A. J. K. and M. Klemens. 2002. Best development practices: conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Cons. Alliance, Wildlife Conservation Society, Bronx, New York. And Calhoun, A. J. K. and P. deMaynadier (editors). 2008. Science and conservation of vernal pools in Northeastern North America. CRC Press Taylor & Francis Group, Boca Raton, Florida.

- See table 3 (2002) for guidelines on vernal pool management areas including the vernal pool depression, the vernal pool envelope (to 100 ft) and the critical terrestrial habitat (to 750 ft).
- Figure 4 (2002) and Color plate 17 (2008) provide migration distances for vernal pool indicator species, adapted below:

Vernal pool indicator species	Marbled salamander	Spotted salamander	Wood frog
Mean distance (ft)	368	390	633
Maximum distance (ft)	1476	817	1549

3. Berkshire Regional Planning Comm. 2003. The Massachusetts buffer manual: using vegetated buffers to protect our lakes and rivers. Massachusetts Department of Environmental Protection. Appendix A

- How vegetated buffers improve water quality and benefit wildlife:
  a. Vegetation creates a physical barrier to stormwater movement;
  b. Buffers capture sediment and nutrients above ground;
  c. Buffers capture nutrients underground;
  d. Buffers capture sediments and nutrients from agricultural activities;
  e. Buffers protect aquatic ecosystems;
  f. Buffers provide wildlife habitat;
  g. Buffers help to dissipate floodwaters; and
  h. Buffers help to stabilize banks.

- Regarding width: "In general, the wider the buffer and the more complex the vegetation within it, the more effective it is in meeting those purposes."
- Table A-16 presents what a 100 foot buffer is likely to provide for wetland wildlife and what it does not provide.

DEM > 5.29.14

RI 1

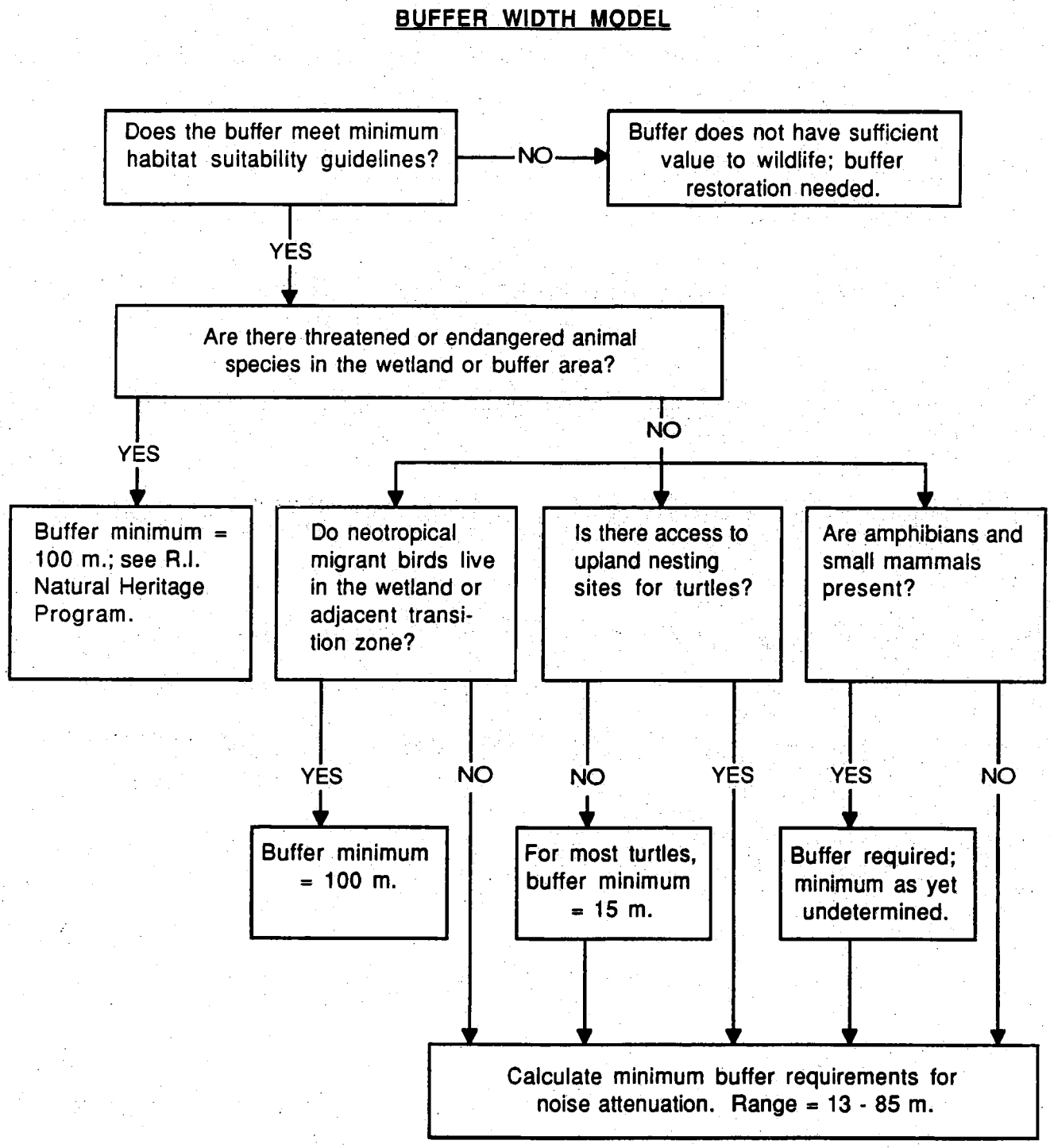
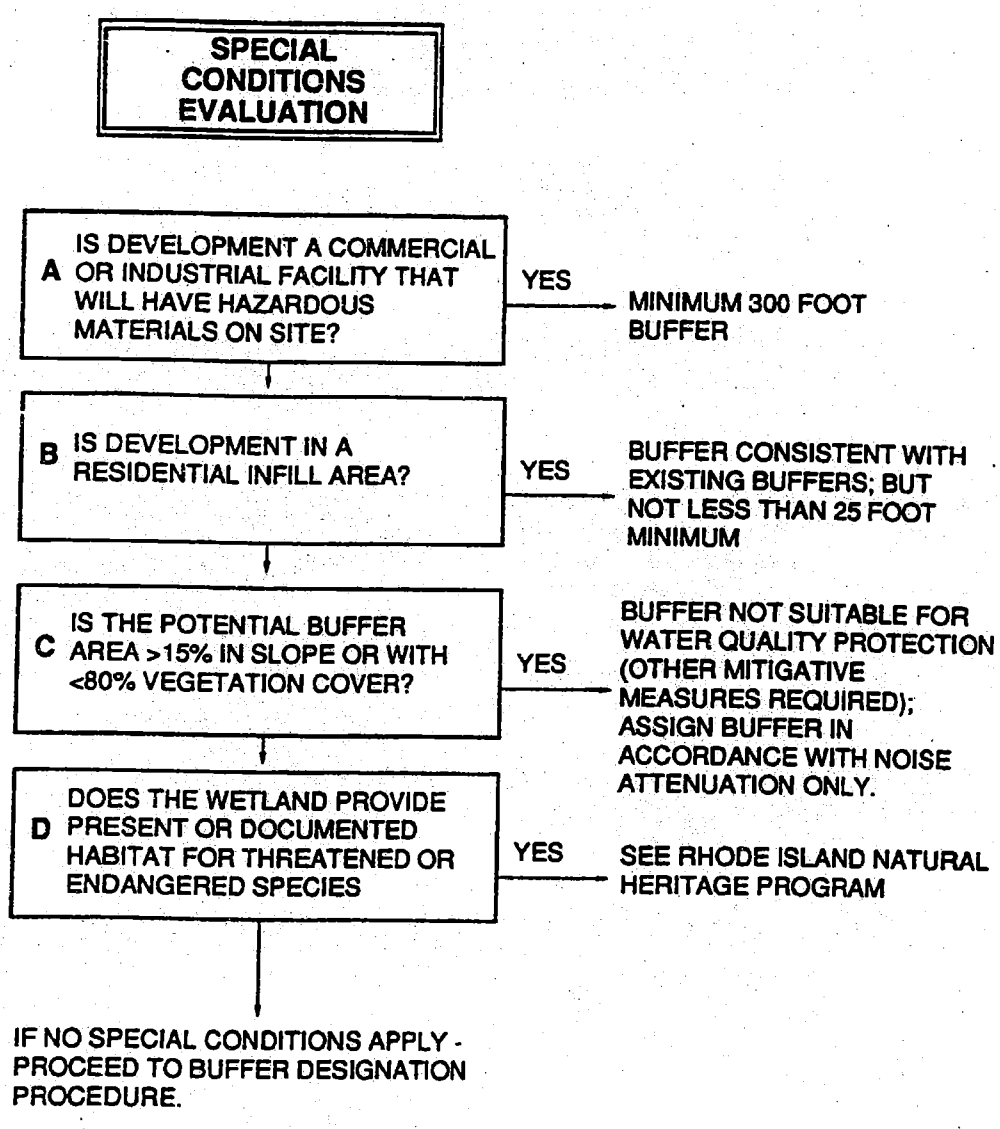


Figure 5-6. Flowchart of wetland buffer width model for red maple swamps in Rhode Island.

RI 2

FIGURE 2


SPECIAL CONDITIONS EVALUATION
A IS DEVELOPMENT A COMMERCIAL OR INDUSTRIAL FACILITY THAT WILL HAVE HAZARDOUS MATERIALS ON SITE?
YES
MINIMUM 300 FOOT BUFFER
B IS DEVELOPMENT IN A RESIDENTIAL INFILL AREA?
YES
BUFFER CONSISTENT WITH EXISTING BUFFERS; BUT NOT LESS THAN 25 FOOT MINIMUM
C IS THE POTENTIAL BUFFER AREA >15% IN SLOPE OR WITH <80% VEGETATION COVER?
YES
BUFFER NOT SUITABLE FOR WATER QUALITY PROTECTION (OTHER MITIGATIVE MEASURES REQUIRED); ASSIGN BUFFER IN ACCORDANCE WITH NOISE ATTENUATION ONLY.
D DOES THE WETLAND PROVIDE PRESENT OR DOCUMENTED HABITAT FOR THREATENED OR ENDANGERED SPECIES
YES
SEE RHODE ISLAND NATURAL HERITAGE PROGRAM
IF NO SPECIAL CONDITIONS APPLY - PROCEED TO BUFFER DESIGNATION PROCEDURE.
IEP inc

RI 3

Table 7. A summary of pollutant removal effectiveness and wildlife habitat value of vegetated buffers according to buffer width. The stepwise increments are adapted from Table 5 and Table 6, and reflect changes in pollutant removal effectiveness and wildlife habitat value according to width of the vegetated buffer. [1 meter = 3.28 feet]

Buffer Width (m)	Pollutant Removal Effectiveness	Wildlife Habitat Value
5	Approximately 50% or greater sediment and pollutant removal	Poor habitat value; useful for temporary activities of wildlife
10	Approximately 60% or greater sediment and pollutant removal	Minimally protects stream habitat;poor habitat value; useful for temporary activities of wildlife
15	Greater than 60% sediment and pollutant removal	Minimal general wildlife and avian habitat value
20	Approximately 70% or greater sediment and pollutant removal	Minimal wildlife habitat value; some value as avian habitat
30	Approximately 70% or greater sediment and pollutant removal	May have use as a wildlife travel corridor as well as general avian habitat
50	Approximately 75% or greater sediment and pollutant removal	Minimal general wildlife habitat value
75	Approximately 80% sediment and pollutant removal	Fair-to-good general wildlife and avian habitat value
100	Approximately 80% sediment and pollutant removal	Good general wildlife habitat value; may protect significant wildlife habitat
200	Approximately 90% sediment and pollutant removal	Excellent general wildlife value; likely to support a diverse community
600	Approximately 99% sediment and pollutant removal	Excellent general wildlife value; supports a diverse community; protection of significant species

but does result in a given buffer width that will better approximate a specific performance standard. The modeled approach, however, will only be as good as the site-specific data from which the model is run. High quality data for use in a model will often be expensive (e.g., time put into collecting it), which may limit its overall practicality for general use in resource management programs. Furthermore, most modeled approaches only consider one vegetated buffer benefit — pollutant removal, for instance — and neglect other potential benefits. Many of the existing buffer delineation models were developed to mitigate construction impacts, and therefore may not be readily applicable in establishing multiple-use vegetated buffers in already developed or undeveloped areas. A further limitation to the site-specific modeled approach is that regulatory staff will be required to delineate vegetated buffers on a case-by-case basis, which could become time consuming. Furthermore, permit applicants will not be able to incorporate vegetated buffer widths during the initial design process. This will add cost to all development requiring a permit, and the cost will be borne by both the permit applicant and the permitting agency.

Despite its limitations, the modeling approach is often considered the most accurate and dependable method of delineating vegetated buffer widths, and is commonly used by regulatory agencies. A strictly modeled approach, because it is based solely upon "real" data, leaves less room for argument of required buffer widths (other than whether or not the input data or the actual model is appropriate) and is therefore generally viewed as more "justifiable." Since a strictly modeled approach is very "black-and-white," it is generally inflexible, and may limit full implementation of multiple-use vegetated buffers by resource managers. Using a modeled approach to determine buffer widths to achieve a given pollutant removal standard, and then reviewing the modeled buffer width using best professional judgment to achieve other benefits (e.g., provision of wildlife habitat) may provide more flexibility and a better multiple-use vegetated buffer program.

Each approach to the application of vegetated buffers as a management tool has both good and bad points, and it will be up to the implementing authority to determine what trade-offs are the most reasonable and the most acceptable. Costs and benefits will have to be weighed and examined in light of the

RI 4

Table 8. Tiered buffer zones and setbacks for Rhode Island's freshwater wetlands.

Tier/ Wetland type	Bordering land [1] (ft)	Buffer zone[2] (ft)	Setback[3] (ft)
TIER 1 • Perennial watercourses.	200	150	175
TIER 2 • Permanent or semi-permanent standing water bodies • Permanent or semi-permanently flooded vegetated wetlands • Bogs and fens • Natural Heritage sites • Critical amphibian habitat (CAH)[4]	100	100	100
TIER 3 • Seasonal standing water bodies other than CAH • Seasonally or temporarily flooded vegetated wetlands other than CAH • Intermittent watercourses	100	75	100
TIER 4 • Seasonally saturated vegetated wetlands	100	50	75

[1]DEM jurisdictional zone.
[2]Portion of bordering land maintained in a natural, undisturbed condition.
[3]Minimum distance from landward edge of freshwater wetland at which certain approved activities or alterations (e.g., homes, septic systems) may take place.
[4]Any freshwater wetland habitats that are known to support breeding wood frogs, spotted salamanders, marbled salamanders.

RI 5

buffer requirements for enhanced protection and should be clearly identified in the buffer regulations. The values recommended represent the distance from the edge of a resource (e.g., stream bank, not the centerline).

Table 3-1 Recommended Minimum Buffer Widths. (Adapted from Environmental Law Institute, 2003)

Function	Range of Riparian Buffer Widths		Minimum Recommended Buffer Width
	Environmental Law Institute (2003)	*Fischer and Fischneich (2000)*	
Stream Stabilization	30-170 ft	30-65 ft	50 ft[1]
Water Quality Protection	15-300 ft (remove nutrients)[2] 10-400 ft (remove sediment)	15-100 ft	100 ft[3]
Flood Attenuation	65-500 ft	65-500 ft	FEMA 100-year floodplain plus an additional 25 ft[4]
Riparian/Wildlife Habitat	10 ft-1 mile	100 ft-0.3 mile	300 ft[5]
Protection of Cold Water Fisheries	>100 ft (5 studies) 50-200 ft (1 study)	--	150 ft[6]

1. Larger buffers may be necessary based on steep slopes and highly erodible soils.
2. Different buffer designs should be considered for protection of different resources (coastal vs. inland).
3. Larger buffers may be necessary based on land use, resource goals, slope, and soils.
4. Additional buffer recommended to compensate for variability in flood model results at a site level and due to a changing climate.
5. Larger buffers may be necessary based on species and vegetation.
6. Larger buffers are necessary as the impervious cover in the watershed exceeds 8%.

In developed areas, as stormwater runoff flows over impervious surfaces such as asphalt and concrete, it increases in temperature before reaching a stream or other water body. Water temperatures are also increased due to shallow ponds and impoundments along a watercourse as well as fewer trees along streams to shade the water. Since warm water can hold less dissolved oxygen than cold water, this "thermal pollution" further reduces oxygen levels in suburban and urban streams. As described in the RI Stormwater Manual, temperature changes can severely disrupt certain aquatic species, such as trout and stoneflies, which can survive only within a narrow temperature range.

From: James Boyd, Coastal Policy Analyst, RI Coastal Resources Management Council

Definitions in the CRMP for consideration within the commission report/recommendations

Buffer zone - A land area on or contiguous to a shoreline feature that is retained in its natural undisturbed condition. (CRMP Glossary)

Coastal Buffer Zone - A Coastal Buffer Zone is a land area adjacent to a Shoreline (Coastal) Feature that is, or will be, vegetated with native shoreline species and which acts as a natural transition zone between the coast and adjacent upland development. A Coastal Buffer Zone differs from a construction setback (Section 140) in that the setback establishes a minimum distance between a shoreline feature and construction activities, while a buffer zone establishes a natural area adjacent to a shoreline feature that must be retained in, or restored to, a natural vegetative condition (Figure 2). The Coastal Buffer Zone is generally contained within the established construction setback. (CRMP Section 150.A)

Setbacks. The minimum distance from the inland boundary of a coastal feature at which an approved activity or alteration may be permitted. (CRMP Glossary)

Setback - a setback is the minimum distance from the inland boundary of a coastal feature at which an approved activity or alteration may take place. (CRMP Section 140.A)

CRMC jurisdiction is defined in CRMP Sections 100.1, 100.2, 100.3 and 100.4 as follows:

100.1. Tidal Waters, Shoreline Features, and Contiguous Areas
A. A Council Assent is required for any alteration or activity that are proposed for (1) tidal waters within the territorial seas (including coastal ponds, some of which are not tidal but which are coastal waters associated with a barrier beach system, and are physiographical features); (2) shoreline features; and (3) areas contiguous to shoreline features. Contiguous areas include all lands and waters directly adjoining shoreline features that extend inland two hundred (200) feet from the inland border of that shoreline feature. A Council Assent is required for any alteration or activity any portion of which extends onto the most inland shoreline feature or its 200 foot contiguous area.

Section 100.2
Inland of Shoreline Features and Contiguous Areas
A. The Council reserves the right to review the following categories of alterations and activities proposed inland of shoreline features and their contiguous areas:
1) Power-generating plants (excluding facilities of less than a 40-megawatt capacity);
2) Petroleum storage facilities (excluding those of less than a 2,400-barrel capacity);
3) Chemical or petroleum processing;
4) Minerals extraction;
5) Sewage treatment and disposal facilities (excluding individual sewage disposal systems);
6) Solid waste disposal facilities; and,
7) Desalination plants.

Section 100.3
Critical Coastal Areas
A. Watersheds of Poorly Flushed Estuaries

1. The Council reserves the right to review any activity proposed within the watersheds of poorly flushed estuaries and critical coastal areas. Therefore the Council has developed and adopted Special Area Management Plans in order to address the specific environmental concerns of those priority management areas. In addition to those activities captured under the Council's management program, activities within Special Area Management Plans (as delineated by the poorly flushed estuary boundary on the attached RICRMP maps, and on the maps accompanying each SAM plan) that have a reasonable probability of conflicting with the goals of this plan must submit an application for an assent. These activities are:
a) Subdivisions, cooperatives, and other multi-ownership facilities [of six (6) units or more];
b) Any structure serviced by an on-site sewage disposal system servicing 2,000 gallons or more per day;
c) Any activity which results in the creation of 40,000 sq. ft. or more of impervious surface;
d) Construction or extension of municipal or industrial sewage facilities or systems (not connections to individual homes); and,
e) Water distribution systems or extensions of supply lines (not connections to individual homes).

Section 100.4
Freshwater Wetlands in the Vicinity of the Coast
A. Applicability
1. A Council Assent is required for any project or activity which may alter the character of any freshwater wetland in the vicinity of the coast. Applicants are referred to the CRMC's Rules and Regulations for the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast (i.e., the Rules) for specific programmatic requirements.