



Wildlife Considerations in Local Planning

An Evaluation of a Decade of Progress in Vermont

Prepared by:
Vermont Natural Resources Council



Prepared for:
Vermont Fish and Wildlife Department



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Introduction

This study updates a similar assessment undertaken by the Vermont Department of Fish and Wildlife (Department) in 2000 [*Wildlife Considerations in Local Planning: A Vermont Review*, prepared by Burnt Rock Inc., Associates in Community Planning]. The current study was performed to provide insight into the progress made through municipal planning to address fish and wildlife resource conservation in Vermont over the past decade. To meet this goal, local plans and bylaws were evaluated to determine the extent to which Vermont municipalities have addressed issues related to fish and wildlife conservation. The progress made to date provides a basis for assessing the types of technical assistance that communities may need from the Department, other state agencies or partner organizations to support community-based conservation planning efforts.

The 2000 assessment, and this update, were undertaken because the Department recognizes the importance of local conservation planning in furthering the protection and management of the state's natural resources. Local conservation planning can be effective in preventing the loss of important fish and wildlife habitat, and negative impacts on local populations, from poorly planned and inappropriate land use and development practices.

Unlike the 2000 assessment, which evaluated only a sampling of land use regulations, this study involved a detailed evaluation of municipal plans, zoning bylaws and subdivision regulations. This comprehensive analysis provides greater insight into the relationships between adopted plan policies and the implementation of those policies through land use regulations.

In Vermont, 269 separate municipal governments have the authority to regulate land use and development. This places a considerable burden on the Department, which has a fiduciary responsibility to conserve, protect and manage fish and wildlife in Vermont, in addition to advising regional planning commissions and other entities on matters concerning the conservation of the state's wildlife resources. The Department is challenged with the

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VNRC Staff Photo

This study provides an opportunity to evaluate the degree to which these efforts... [have] impacted wildlife over the past ten years.

need to work with hundreds of local planners and decision makers, most of whom are volunteers, who may have very limited knowledge and expertise related to the complexity of issues affecting fish and wildlife resources.

The Department has responded to the challenge to provide technical assistance to local and regional planning bodies by implementing a variety of programs and initiatives. In 2004, the Department published *"Conserving Vermont's Natural Heritage: A Guide to Community-Based Planning for the Conservation of Vermont's Fish, Wildlife, and Biological Diversity."* This guide provides information and technical guidance to local planners and others on conservation planning in Vermont. Subsequently, the Department followed up with a more focused technical assistance effort known as the Community Wildlife Program. This program provides technical assistance on issues related to fish and wildlife habitat to communities, regional planning commissions and citizens. Development of this program resulted in greater focus and expanded staff capacity that has extended technical assistance beyond historical efforts.

In addition to the Department's efforts, other organizations have also expanded public education and outreach efforts around habitat conservation issues. Regional Planning Commissions (RPCs), to varying degrees around the state, have increased capacity for GIS analysis and technical assistance to communities over the past decade. Municipal planning has also benefited from the re-establishment of the Municipal Planning Grant (MPG) program in the late 1990s. MPGs have enabled

municipalities to hire consultants to work on open space and conservation planning efforts, conduct local natural heritage resource inventories, and update plans and bylaws.

Non-governmental organizations have also expanded their focus on habitat conservation at the municipal level. Land trusts, for example, have conserved thousands of acres of important wildlife habitat, which serves to increase public awareness of fish and wildlife issues. With regard to



land use planning, Vermont Natural Resources Council (VNRC) has partnered with state and federal agencies, RPCs, local conservation and planning commissions, and other conservation organizations to provide direct assistance to communities around planning for forest and habitat conservation.

This study provides an opportunity to evaluate to what degree these programs, and other technical assistance efforts from land use and resource conservation experts, have affected local planning for fish and wildlife conservation over the past ten years. It also points out opportunities to further improve habitat and conservation planning efforts in Vermont.

Summary of Key Findings

Towns and municipalities have made noticeable strides in improving attention to wildlife conservation through land use planning.

Towns and municipalities have made noticeable strides in improving attention to wildlife conservation through land use planning. Nearly every town or municipality recognizes the role of wildlife habitat as an important resource. Furthermore, a large majority of towns and municipalities recognize the public benefits of wildlife habitat, showing a noticeable increase over the past decade.

Eighty-seven percent of all municipalities and towns recommend the protection of wildlife habitat in their town plans, and the recommendation of both regulatory and non-regulatory policies have become more common. In addition, towns and municipalities have made significant strides in recommending habitat inventories and including mapped data in their municipal plan.

While gains have been made over the past decade in recognizing the importance of protecting wildlife habitat in municipal plans, more specific concepts that affect the management of wildlife, such as habitat fragmentation, habitat connectivity, invasive species, species extinction and reintroduction, and climate change, are infrequently addressed.

Many municipalities have done a good job in recommending the protection of wildlife habitat in their town plans, although there is a sharp disconnect between municipal plan recommendations for wildlife, and the actual implementation of those recommendations through zoning bylaws and subdivision regulations. A small percentage of the zoning bylaws reviewed contain conditional use standards or site plan requirements that mention wildlife habitat or specific wildlife related considerations.

For the 51% of municipalities in Vermont that have adopted subdivision regulations, there is greater attention to wildlife habitat in planning standards than is reflected in zoning bylaws. Still, less than half of the municipalities with subdivision regulations have specific policies for wildlife habitat.

Perhaps more concerning is the fact that only 2% of municipalities include a specific definition of “wildlife habitat” in their zoning bylaws, while only 8% of municipalities with subdivision regulations include a specific

definition of “wildlife habitat.” This is troubling, in light of the recent Vermont Supreme Court case (In re Appeal of JAM Golf, LLC) which held that vague policies or bylaws protecting wildlife habitat will be struck down and rendered unenforceable. According to this study, an overwhelming majority of municipalities may be in this situation, leaving the impression that many municipalities have not taken the necessary steps to protect wildlife habitat through local regulations. Strides in non-regulatory efforts, however, are worth noting, and some towns may be addressing wildlife conservation through non-regulatory channels as a preferred approach.

...many municipalities have not taken the necessary steps to protect wildlife habitat in the regulatory arena.



Planning Framework

Municipal Plans

Under Vermont planning statutes, towns and urban municipalities (cities and incorporated villages) are authorized, but not required, to prepare and adopt municipal plans. Municipal plans are prepared by appointed or elected planning commissions, and are typically adopted by the local legislative body (although statute allows for adoption by voters). Incorporated villages may develop a village plan or be incorporated into the town plan, or participate in the development of a joint plan for the town and village.



If a municipality does decide to adopt a local plan, state statute mandates that the plan include ten elements. These elements include a statement of policies

on the preservation of rare and irreplaceable natural areas and a land use plan that includes a map and statement of present and prospective land uses (e.g., for forests, recreation, agriculture, and open spaces reserved for conservation purposes).

To receive the benefits of having a plan “approved” by the regional planning commission, the municipal plan must also be consistent with a number of state planning goals, including a broadly stated goal to “maintain and improve the quality of air, water, wildlife and land resources.” [24 V.S.A. § 4302].

Zoning and Subdivision Bylaws

Under Vermont planning statutes, towns and municipalities are authorized to adopt zoning and subdivision bylaws. Vermont municipalities are granted broad authority to address a range of land use, land development and natural resource protection planning goals through zoning bylaws, which are one of the primary tools for regulating land development in the state. Zoning bylaws are required by statute to conform with the local plan and the state planning goals mentioned above, and a municipality

may not adopt zoning or subdivision bylaws without an adopted local plan and such bylaws.

Subdivision bylaws regulate the division of a parcel of land for sale, development, or lease in order to guide community settlement patterns and ensure that the necessary efficient extension of municipal services is provided. According to Vermont law, subdivision bylaws must contain standards for the protection of natural resources and the preservation of open space, as deemed appropriate in the municipality. This is usually addressed under the authority and purpose, planning standards, and/or sketch plan and plat mapping sections.



Availability of Planning Documents

The Department of Housing and Community of Affairs (DHCA) maintains the most complete repository for municipal planning documents. By statute, copies of draft plans must be sent to the department as part of the local adoption process. However, 73% of adopted plans can also be found online, either on the regional planning commissions' websites, or on the many municipal websites that now exist.

...257 out of 269 municipalities in Vermont have adopted a town plan.

Methodology

Review of Planning Documents

According to 2009 data from the Vermont League of Cities and Towns, 257 out of 269 municipalities in Vermont have adopted a town plan. This report summarizes a review of all available town plans in Vermont, which includes a total of 248 plans, representing 257 towns, cities, incorporated villages, and unincorporated townships (some towns and villages share plans).

In addition to town plans, this study evaluated all available zoning regulations (only a sample of municipal bylaws were reviewed as part of the 2000 study). In total, this study reviewed 219 municipal zoning regulations, 204 zoning bylaws, and 137 subdivision regulations. This review collected information from 204 of 249 towns and cities, as well as separately adopted zoning bylaws for 13 of 18 incorporated villages. Out of the 137 subdivision regulations that were reviewed, 132 were adopted by towns and cities, and 5 were adopted by incorporated villages.

Program & Plan Evaluation

This study is similar to the 2000 Burnt Rock assessment to facilitate comparisons. Program and plan evaluation criteria were revised and

expanded from the evaluation template used for the 2000 study. The review criteria are included as Appendix A.

Following the format of the 2000 study, four broad categories were identified for plan and bylaw evaluation. These four categories encompass a variety of variables associated with planning for wildlife habitat and natural resources conservation. The four categories include:



- **Plan Policies and Recommendations:** This category includes criteria to determine whether plans include statements of support for protecting wildlife habitat and whether that support is articulated in more specific non-regulatory and/or regulatory policies. In addition, it was noted whether there were policies or recommendations for coordinating habitat protection efforts with other municipalities, state agencies (including the Department), federal agencies, and private and non-governmental organizations, or whether there were instances in which plans identify the need for additional information and/or inventories.
- **Plan Data:** “Plan data” includes an assessment of whether inventory data and resource mapping are included in local plans. The inclusion of natural resource inventory data is an indication of a community’s awareness of natural resources within it’s boundary.
- **Plan Concepts:** Plan concepts include criteria to discern whether communities are viewing wildlife habitat in a broad, species-specific, and/or isolated manner. Key concepts include biodiversity, habitat connectivity (i.e., contiguous tracts of core habitat and connecting travel corridors), habitat fragmentation, invasive species, species extinction, species reintroduction, and climate change. Plan concepts also consider whether the plan recognizes the relationship between human activities and the loss, maintenance and/or protection of habitat, and whether the public benefits of wildlife and wildlife habitat are identified.
- **Planning Program:** This category is intended to evaluate the municipal planning program’s capacity for habitat conservation. Though difficult to measure, indicators, such as the formation of a conservation commission, were identified as signals of local conservation commitment and capacity.

...the formation of a conservation commission was identified as an indicator of local conservation commitment and capacity.



Summary statistics for the four categories was derived from a review and evaluation of individual plans. Although an evaluation of this nature requires a certain amount of subjective analysis, this study attempted to literally and consistently interpret plan language in relation to the established evaluation criteria explained above and in Appendix A.

Criteria relating to zoning and subdivision regulations were used to evaluate the effectiveness of municipal regulatory bylaws with regard to the conservation and protection of wildlife habitat. Specific zoning districts related to natural resource conservation were evaluated for their effectiveness. Other considerations include whether bylaws include review processes and associated habitat protection standards, whether the clustering of residential and commercial development (Planned Unit Development) is allowed or required, whether habitat assessments or consultation with wildlife and conservation professionals is required as part of a development review process, and whether specific habitat inventories or impact assessments are referenced, and whether the bylaws included a specific definition of habitat to be protected.

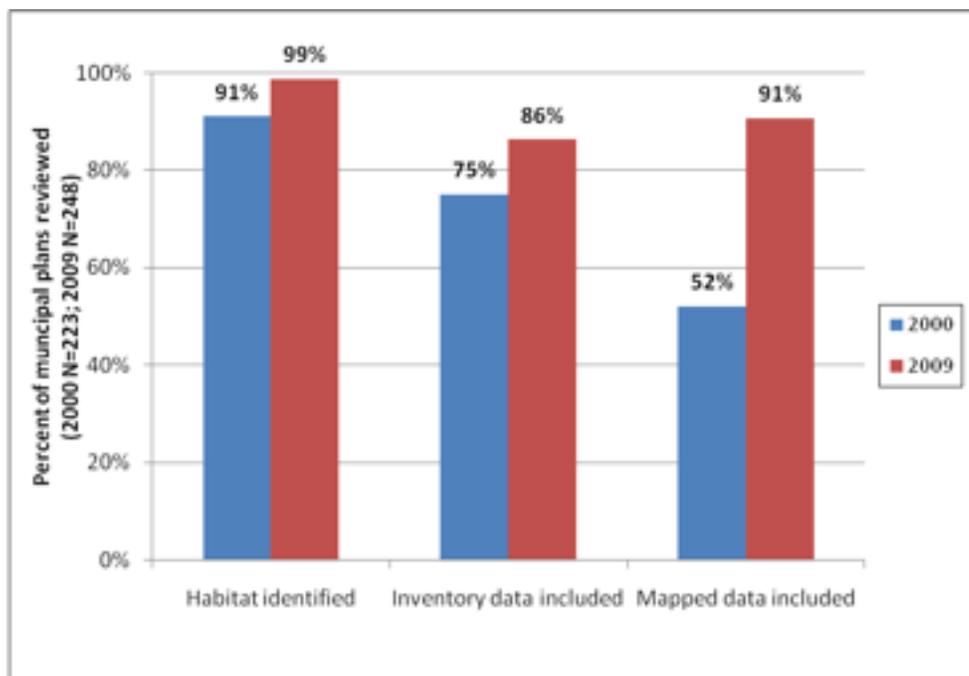


Findings from the plan and bylaw review are described in the following charts, tables, maps, and narrative. An additional section summarizes the data by applicable regional planning commission (RPC). Since RPCs have a significant influence on municipal plan and bylaw development, summarizing data within the geographic areas of the RPCs is a useful way to look at regional trends. See Appendix A for a more in-depth discussion of the individual variables within all of the categories used in the evaluation.

[Does] the plan recognize the relationship between human activities and the loss, maintenance and/or protection of habitat, and... the public benefits of wildlife and wildlife habitat...?

Plan and Bylaw Review

Figure 1: Habitat data, information, and maps



Overwhelmingly, Vermont communities identify some form of habitat in municipal plans (99%), an increase of 8% from 2000. Additionally, most plans (86%) include some form of natural resource inventory data, an increase of 11% from 2000. Furthermore, plans include a much greater increase in the inclusion of mapped data, from 52% in 2000 to 91% in 2009. This likely reflects the significant increase in the use and availability of landscape scale GIS data, widely used in the development of plan maps.

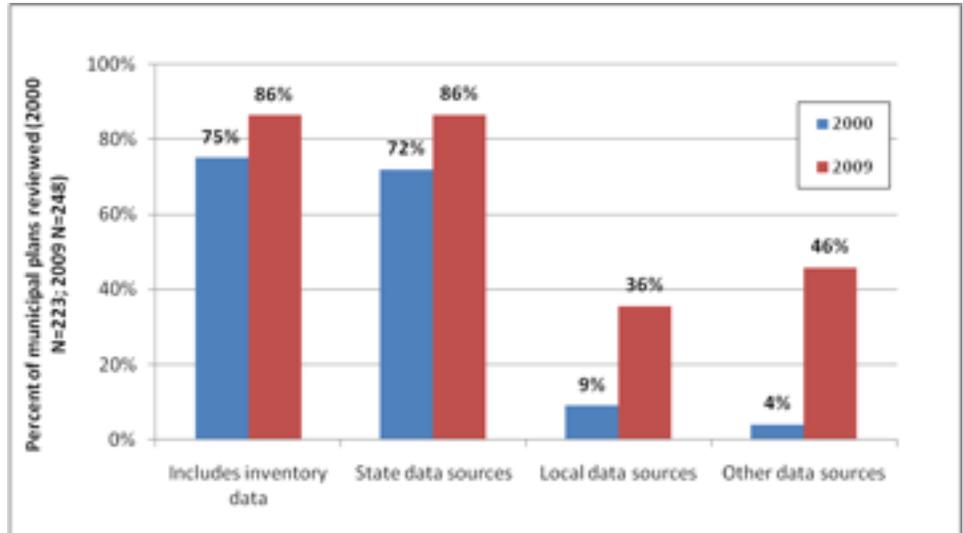
Municipal Plan Evaluation

Overwhelmingly, Vermont communities identify some form of habitat in municipal plans (99%), an increase of 8% from 2000.

Because of the large land-area required to sustain viable populations of black bear, they serve as an “umbrella” species for Vermont wildlife. This means that if habitat for black bear is maintained, habitat for other species also will be maintained. Generally, bears require large tracts of undeveloped forest with specific habitat needs including large stands of mast producing tree species (e.g., beech, oak). The Vermont Department of Fish & Wildlife Service has also identified one such mast production area in Moretown, on the eastern slope of the Northfield Range. (Moretown Town Plan 2008)



Figure 2: Inventory data included in plans



Results show an increase in the inclusion of inventory data in municipal plans over the last decade. The inclusion of state data increased by 14% since 2000, and observations reveal that this may be a result of the inclusion of the Department’s statewide assessment of rare and endangered habitats. Significant increases in the “other data” category are largely driven by the increased inclusion of Natural Resources Conservation Service soil inventory in the plan evaluations. Also noteworthy is that 36% of plans include local data, up from only 9% in 2000.

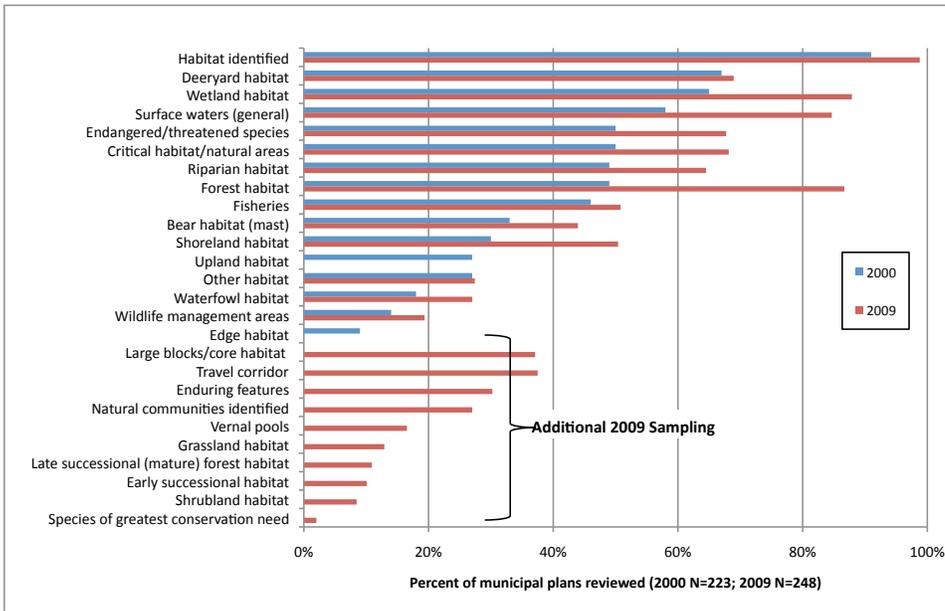
Conduct a mapped inventory of critical wildlife habitat areas in town. Develop GIS-based parcel maps to track changes in land use and subdivision patterns; to provide available parcel-based natural, cultural and land use information to individual landowners, and to identify and inform affected landowners of proposed changes in land use designations.

(Fletcher Town Plan 2005)

*Many species require particular habitats in which to live. The distribution of some of these wildlife habitat types are well known in the Town, while the distributions of habitat types for other species are poorly understood. Using aerial photographs and ground surveys, wildlife biologists have mapped deer wintering areas and have determined that, in general, the mountainous areas in the eastern portion of Middlebury are important black bear habitat. **(Middlebury Town Plan 2007)***

Also noteworthy is that 36% of plans include local data, up from only 9% in 2000.

Figure 3: Plans that identify wildlife or habitat features



Over 20 different features related to fish and wildlife conservation were identified in municipal plans. The most often identified features were wetlands (88%), forests (87%), and surface waters (85%), indicating an expanded scope of municipal planning beyond deeryard habitat, which was the most prevalent feature listed in the 2000 survey. This expansion may reflect a broader understanding of habitat benefits, as well as the greater availability of mapped resource data beyond the deeryard maps that were disseminated by the Department for several years prior to 2000. Additionally, 10 new habitat features are included in the 2009 survey, several of which (large blocks/core habitat, travel corridors) are identified in over one third of plans.

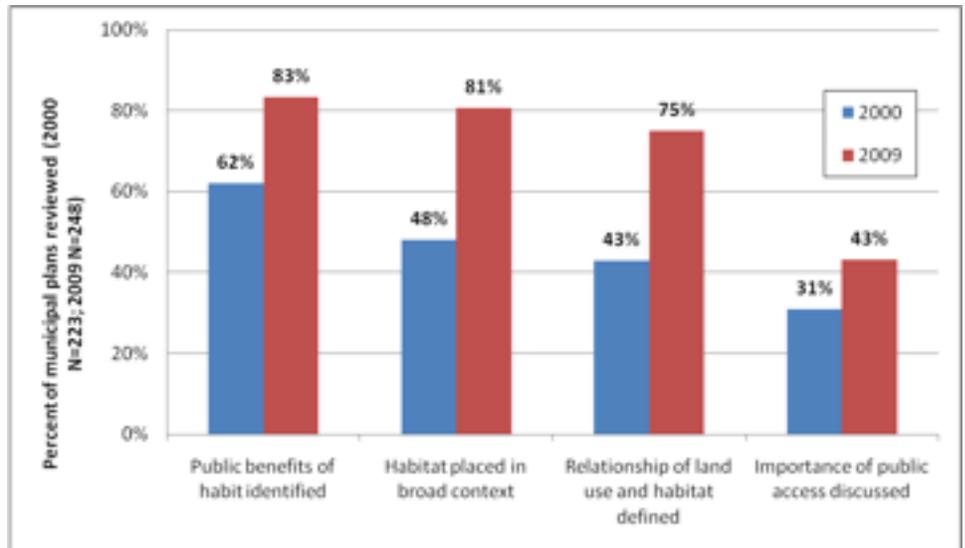
The most often identified habitat features are wetlands, forests, and surface waters, indicating an expanded approach to municipal planning beyond deeryard habitat....

Wetlands are indispensable but fragile natural resources. They are important for a variety of reasons. They provide temporary storage for floodwaters and thereby reduce flooding and protect the quality and quantity of ground water. They improve surface water quality by storing organics, chemically breaking down or removing pollutants, and filtering eroded sediments. They provide spawning and feeding habitat for fish and other aquatic life, and a wide diversity of habitat for other wildlife, including waterfowl, birds, mammals, furbearers, amphibians, and reptiles. Wetlands also provide habitat that may be critical for the survival of rare, threatened, or endangered species, valuable resources for education and research in the natural sciences, and a diversity of recreational opportunities and economic benefits. Finally, wetlands contribute to community open space, and the overall beauty of the landscape. (Berkshire Town Plan 2005)



The study reveals a substantial increase since 2000 in the recognition of the relationship between wildlife habitat, public values and human activity.

Figure 4: Plans that identify public benefits of habitat

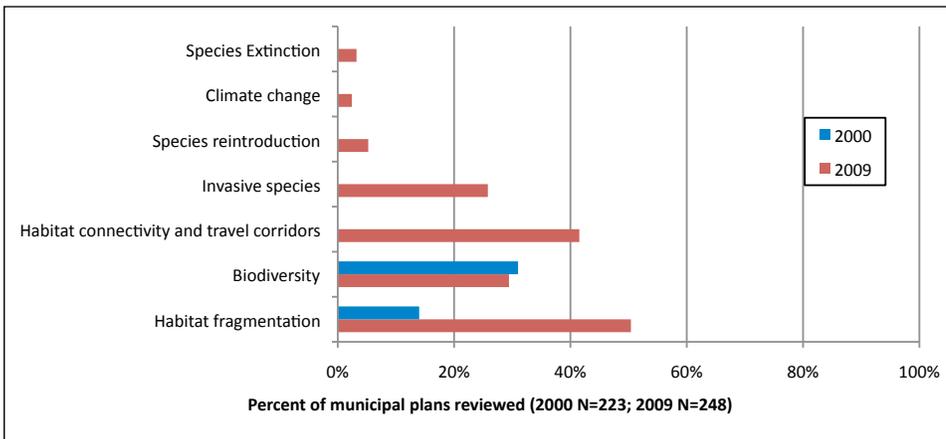


The study reveals a substantial increase since 2000 in the recognition of the relationship between wildlife habitat, public values and human activity. The sharp increase in the number of plans that address the relationship between land use and habitat is especially promising in that it indicates a foundation for specific conservation policies. Despite the increased awareness of the public benefits of habitat, combined with increased recognition of various habitat types, only 43% of plans note the importance of public access to habitat.



Aside from the obvious recreational and economic benefits that local game species provide, wildlife has intrinsic value as an important part of the natural environment. Wildlife populations maintain fragile natural systems and often serve as barometers of environmental health. As the local environment deteriorates, so too does wildlife habitat, causing wildlife populations to disappear. Loss of habitat, for example, from the clearing or draining of land for agriculture and development, has caused the extinction of local wildlife populations in the past, and may continue to do so unless significant habitat areas are identified and protected. A healthy environment includes a diversity of available habitat and ensures an abundant wildlife population. (Berkshire Town Plan 2005)

Figure 5: Plans that discuss the relative importance of ecosystem concepts



Only a small proportion of plans recognize the importance or relevance of key ecosystem concepts. Habitat fragmentation and travel corridors are identified as important in 34% and 38% of plans, respectively. Invasive species and biodiversity are recognized in a smaller percentage of plans, and just two percent of all plans recognize the potential impacts of climate change on wildlife.

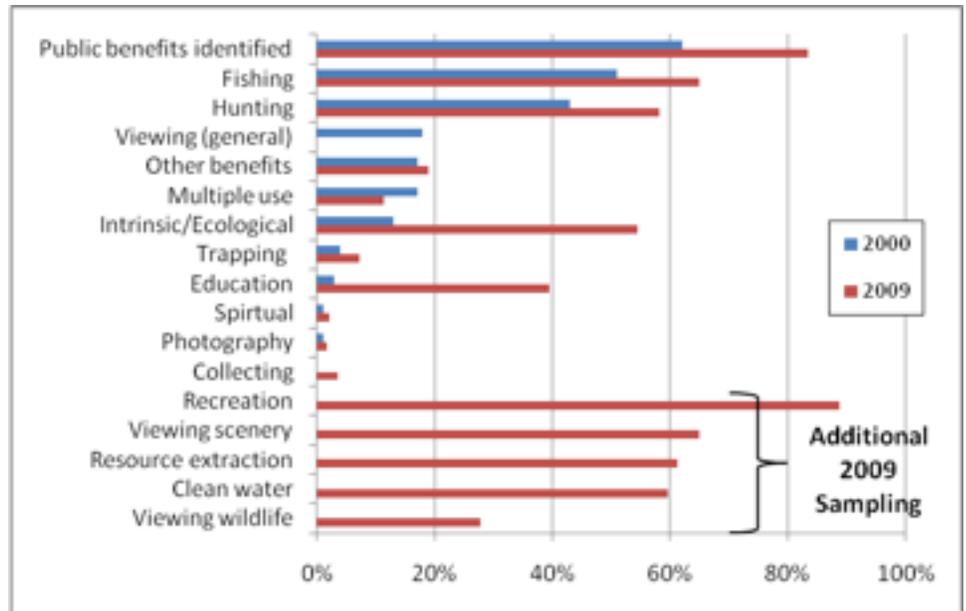
Habitat fragmentation and travel corridors are identified as important in 34% and 38% of plans, respectively.

Natural heritage also includes the concept of biodiversity, which is the variety of life in all forms and all interactions between living things and their environment. To sustain our natural heritage for present and future generations, it is imperative that conservation be one of our highest priorities. This means protecting our fish, wildlife, plants, natural communities and the ecological processes and landscapes that allow them to exist. Natural heritage is degraded by development through loss of diversity, destruction and fragmentation of habitat, disruption of movement and migration patterns, introduction of invasive species, degradation of water quality and aquatic habitats and the loss of public appreciation for the environment. (Danville Town Plan 2009)



...recreation is the most commonly identified public benefit of habitat.

Figure 6: Public benefits of habitat

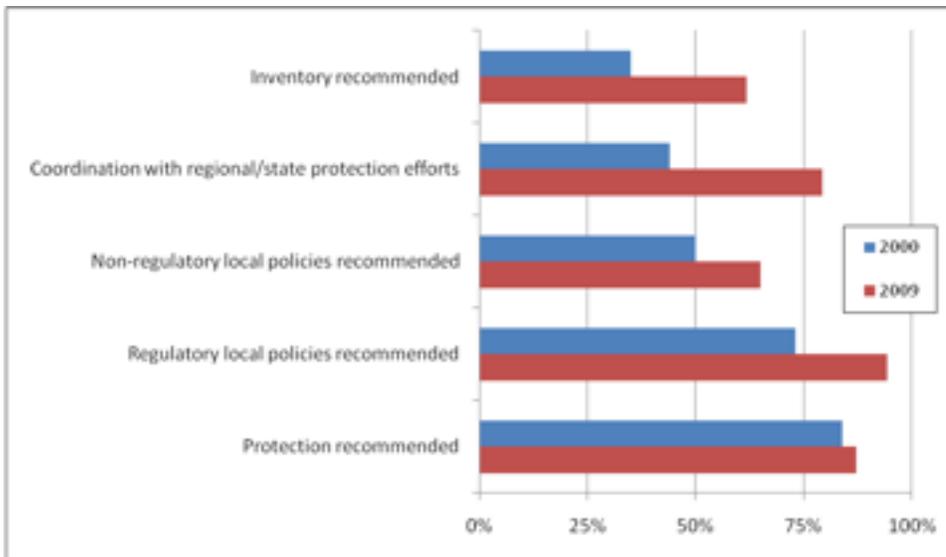


Though the protection of public access is not found to be excessively prevalent in municipal plans (43%), an overwhelming majority (83%) of plans identify the public benefits of habitat, a notable increase from 2000 (62%). The importance of outdoor recreation throughout the state is reflected in the plans, as recreation is the most commonly identified public benefit of habitat (89% of plans that identify public benefits). All other categories that have been re-sampled from the 2000 survey have increased, with the exception of multiple use of habitat. This is probably a result of plans being more explicit in 2009, and identifying specific uses rather than generalizing under an encompassing term.



Almost three quarters of the Town is forest that provides a variety of benefits to residents: income from forest products; habitat for wildlife species; recreational opportunities for residents; and clean water by filtration of surface waters and recharge of groundwater aquifers. Plentiful wildlife also provides many benefits to the people of the town, including hunting, fishing, and tracking. (Calais Town Plan 2009)

Figure 7: Plans that include polices and recommendations



Just as there has been a sharp increase in the identification of habitat in municipal plans since 2000, there has been a corresponding increase in the inclusion of specific policies and recommendations regarding habitat conservation. Most notable is the 21% increase in regulatory policies recommended in municipal plans. This increase may reflect an increase in the general understanding of the importance of regulatory policies in the conservation of open space, wildlife and protection of habitat.

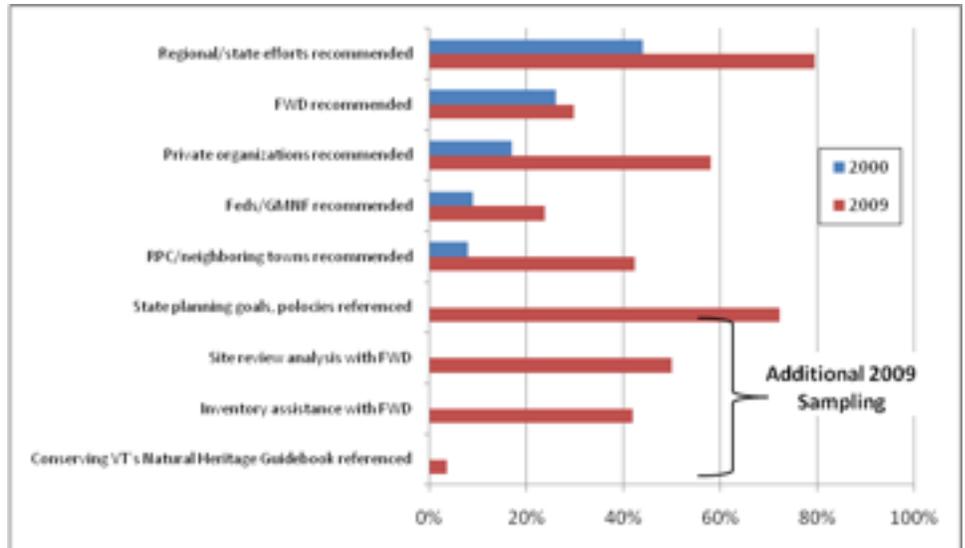
Observations from data collected in 2009 demonstrate that plans that include information from the Department tend to suggest more regulatory policies for the protection and conservation of wildlife habitat. Similarly, a substantial increase in the recommendation of habitat inventories reflects an increased awareness of the need for habitat data in order to implement conservation practices. Additionally, a substantial increase in recommended coordination in conservation efforts may reflect an increased appreciation for the Department's expanded public outreach and landowner and wildlife community assistance programs.

...plans that include information from the Department tend to suggest more regulatory policies for the protection and conservation of wildlife habitat.



Deer wintering areas and bear habitat must be protected from development and other uses that threaten the ability of the habitat to support the species. Commercial, residential, and industrial development shall not occur in these areas. Developments will be permitted adjacent to deer wintering area only if it is demonstrated, in consultation with the Department of Fish and Wildlife, that the integrity of the area for deer habitat will be preserved. (Morristown Town Plan 2008)

Figure 8: Coordination efforts recommended



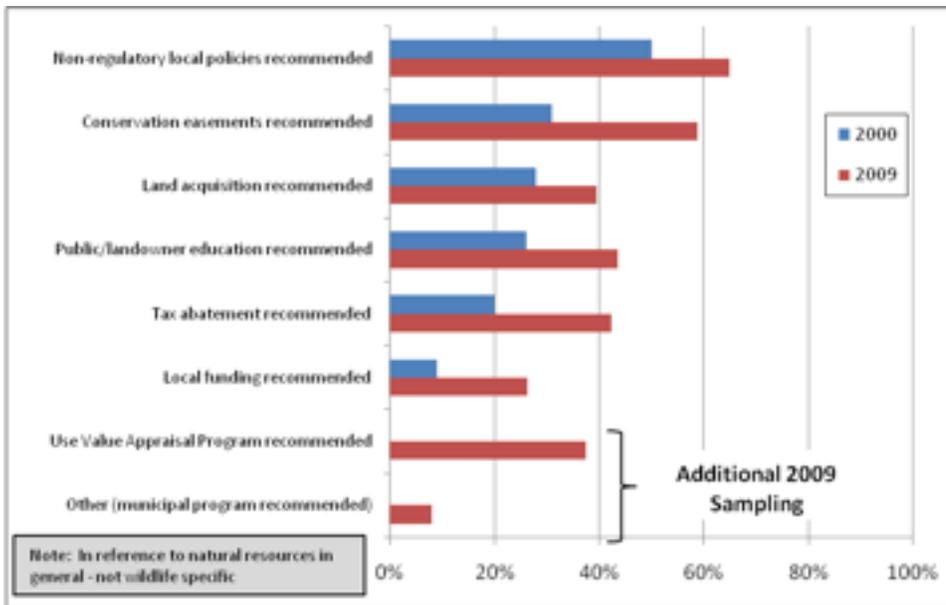
The addition of four new categories in the 2009 survey highlights the importance of outreach and assistance programs offered to municipalities by the Fish and Wildlife Department. Of the 30% of municipalities that recommend coordination with the Fish and Wildlife Department, 50% specifically recommend coordination for site review analysis (largely for identifying deeryards), and 42% recommend coordination with habitat inventory assistance.



The Town shall work with other towns, as well as the Windham Regional Commission, the Natural Resources Conservation District, State and Federal officials, to identify and map information relating to fish and wildlife within our boundaries in order to identify the critical areas for wild animal and fish preservation. (Westminster Town Plan 2007)

...the 2009 survey highlights the importance of outreach and assistance programs offered to municipalities by the Fish and Wildlife Department.

Figure 9: Non-regulatory policies



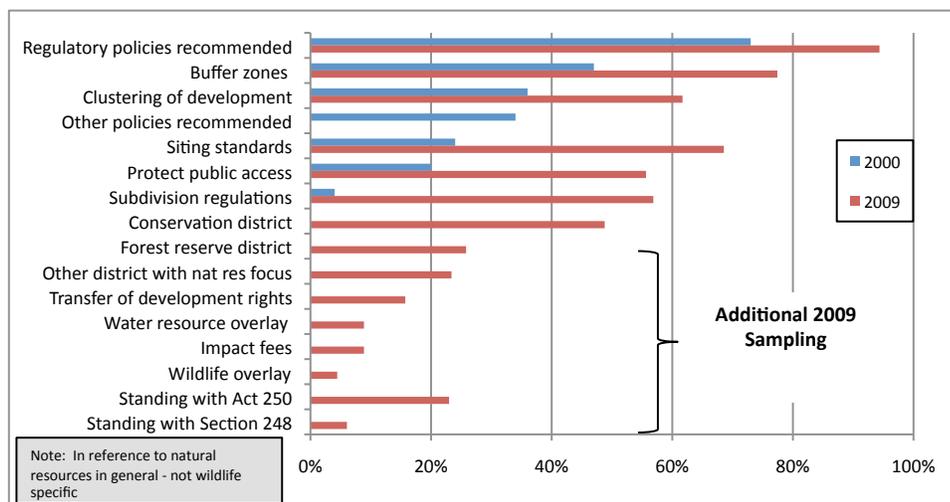
All categories of non-regulatory policies re-sampled from the 2000 surveys exhibit an increase. Two new categories have been added to the 2009 survey including the recommendation of the Use Value Appraisal (UVA) tax abatement program for land conservation. Overwhelmingly municipalities recommend UVA for the conservation of the working landscape. This study reveals that there is relatively strongly acknowledgement (38%) for the application of UVA specifically for the conservation of natural resources. Additionally, 59% of plans recommend conservation easements as a tool for the conservation of natural resources, nearly double the 2000 survey proportion. General trends show an increase in the awareness of non-regulatory tools available to towns for the conservation of natural resources.

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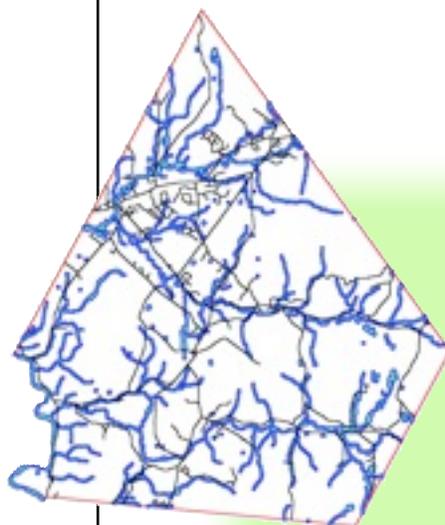
Non-regulatory and incentive based programs are generally more widely supported, and are an important supplement to land use and development regulations. This is especially true with the passage of Act 60 in 1997, which eliminated the relationship between a community's property wealth (grand list) and its ability to fund local education. There are several regional and state organizations working to protect open space and productive farm and forest land, such as the Vermont Housing & Conservation Board, Vermont Land Trust, and Mad River Watershed Conservation Partnership. Supporting the efforts of these – and other – organizations through membership and active participation, can go a long way in maintaining Moretown's character. (Moretown Town Plan 2008)

94% of plans identify at least one regulatory policy for the conservation of wildlife habitat, ... with setback and buffer zones being the most common regulatory policy suggested.

Figure 10: Regulatory policies

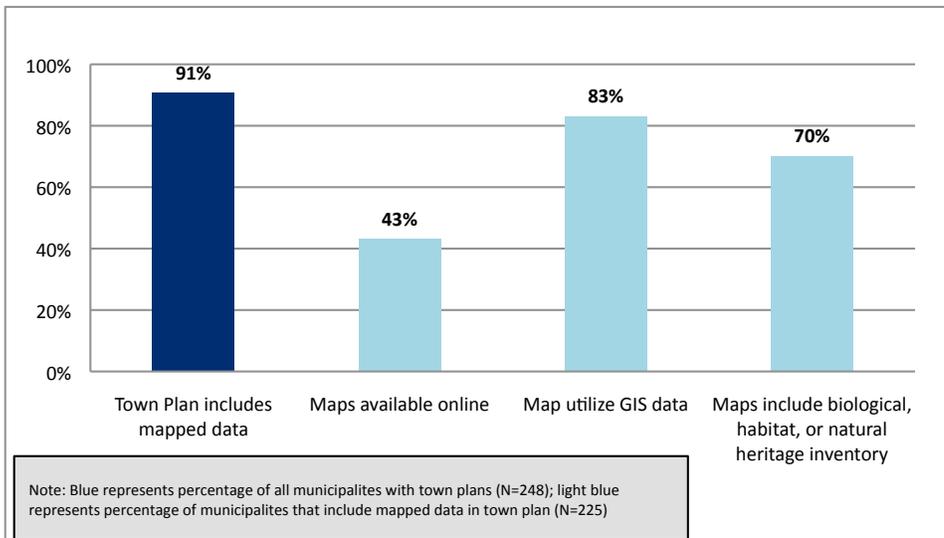


Generally, all categories re-sampled from the 2000 study show a substantial increase in the recognition of regulatory mechanisms available to municipalities for the conservation of wildlife habitat. Ninety-four percent of plans identify at least one regulatory policy for the conservation of wildlife habitat compared with 63% recommending non-regulatory policies. Setbacks and buffer zones associated with critical habitat, riparian corridors, and land adjacent to shorelines are the most common regulatory policies suggested (77%). Most notable is an increase in the recommendation for subdivision regulations from 4% to 57% of plans, highlighting the increased recognition of the effectiveness of subdivision regulations towards the conservation of natural resources.



Burlington requires a shoreline setback of 50 feet outside the urban core. However, the zoning should be amended to require vegetative buffers or other erosion control techniques along our wetland, river, and lake shorelines in areas outside the downtown waterfront. These buffers must at a minimum reflect the required buffers imposed by state and federal agencies. The City must at the same time, work to establish public access through easements in places that will not harm the natural environment along shorelines. (Burlington City Plan 2006)

Figure 11: Mapped data



A large majority of municipal plans (91%) include mapped data.

A large majority of municipal plans (91%) include mapped data. Of the plans that include mapped data, most (83%) include GIS data (largely data supplied by the state), 70% of which include specific wildlife habitat data. A majority of the wildlife habitat mapping includes the Fish and Wildlife Department state-wide deeryard and bear habitat inventory. Similarly, examination of 2009 plans reveals that Department mapping of rare, threatened and endangered species is also often included. In the case where no rare, threatened and endangered species habitat is identified in the plan, the plan often includes the caveat that more intensive inventory effort is needed to confirm the absence of critical habitats within municipal borders.

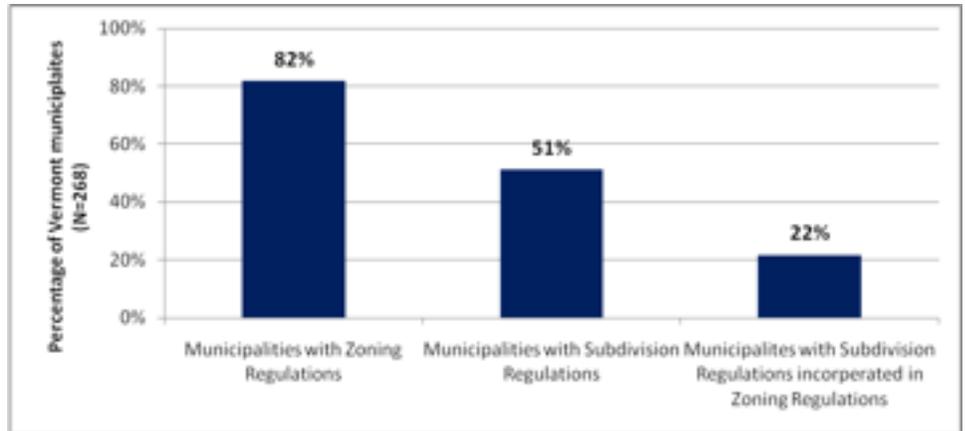
The boundaries of existing winter deer yards have been mapped by the Department of Fish and Wildlife (see the Natural Resources Map in the Appendix), but are subject to change due to fluctuations in environmental conditions. Deer wintering areas need to be protected from indiscriminate logging, residential and commercial development, and intensive winter recreation. Through Vermont's Act 250, some protection is available under Criterion 8(A) - Wildlife Habitat and Endangered Species, which provides a detailed system to weigh evidence for a project and determine if a permit can be allowed. (Springfield Town Plan 2005)



Land Use Regulation Evaluation

A majority of municipalities in Vermont have adopted zoning regulations (82%), while roughly half of municipalities have adopted subdivision regulations. Less frequently, subdivision regulations are incorporated into zoning regulations as unified land use regulations (22%).

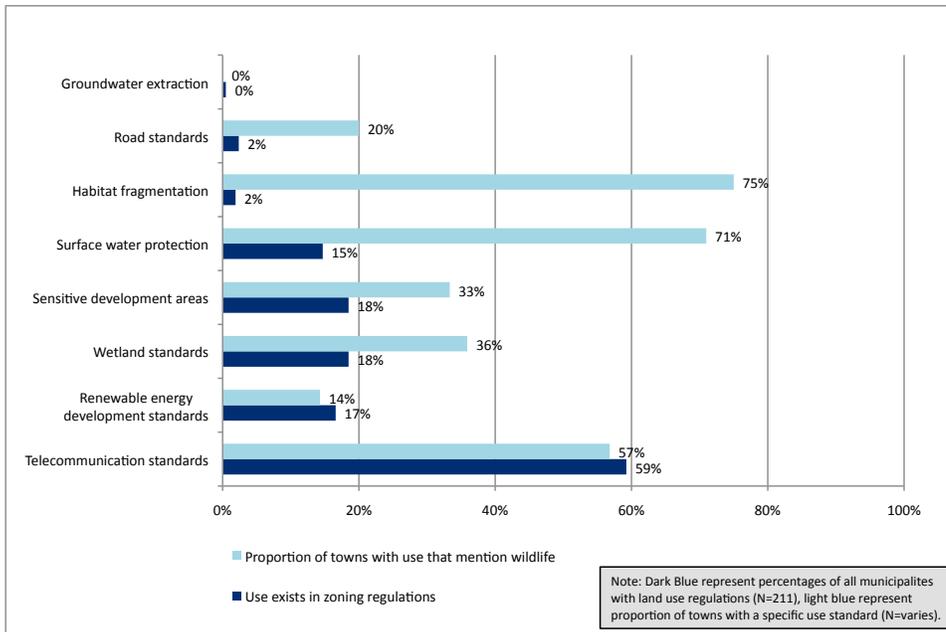
Figure 12: Land use regulations in Vermont



A majority of municipalities in Vermont have adopted zoning regulations (82%), while roughly half of municipalities have adopted subdivision regulations. Less frequently, subdivision regulations are incorporated into zoning regulations as unified land use regulations (22%).



Figure 13: General use standards



For the most part, general use standards have not been employed as a tool for habitat conservation in Vermont municipal zoning regulations.

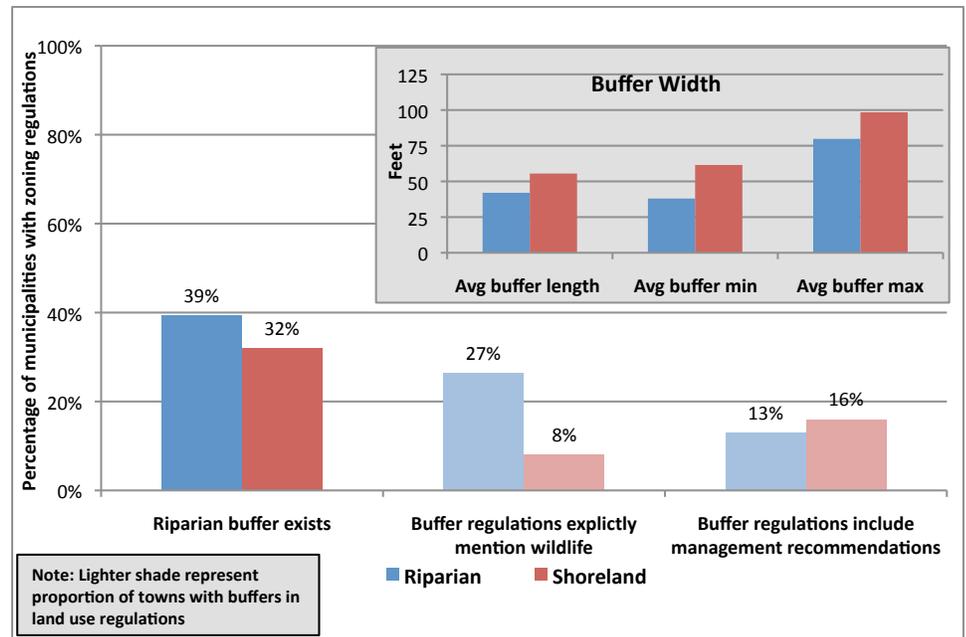
As part of the evaluation of zoning bylaws, eight general use standards were evaluated because of the potential impact they may have on habitat conservation. Part of the evaluation considered whether the standards specifically address wildlife habitat. For the most part, general use standards have not been employed as a tool for habitat conservation in Vermont municipal zoning regulations. However, this does not necessarily suggest that the use of specific wildlife habitat protection standards is ineffective at protecting wildlife habitat.

Of the eight identified use standards, telecommunication standards are most often included in zoning regulations (59%). Many municipalities have adopted a variation of model regulations promulgated by the Vermont League of Cities and Towns and regional planning commissions, which include a provision mandating that telecommunication facilities not interfere with rare and endangered species habitat.



Relatively few municipalities include buffer standards within zoning bylaws.

Figure 14: Shoreland and riparian buffers



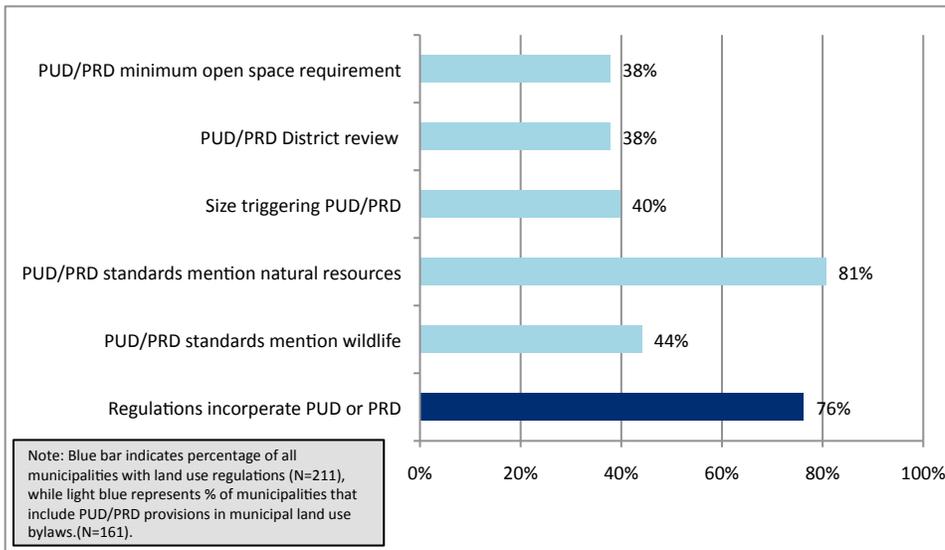
Relatively few municipalities include buffer standards within zoning bylaws (39% - riparian; 32% - shoreland), with a small percentage of those specifically referencing wildlife or including management prescriptions. The average buffer width suggested in Vermont zoning regulations is 42 feet. This is less than the width widely considered necessary by the Vermont Agency of Natural Resources through its guidance on riparian buffers to provide for ecological functions (e.g., erosion control, hazard mitigation, nutrient control), although several municipalities include a sliding buffer-width scale based on the slope of the adjacent stream bank or shoreline.

(10) Protection of Natural Resources. Proposed development shall not have an adverse impact on important natural resources or features located on the parcel, including wetlands, steep slopes, rivers and streams, critical wildlife habitat and habitat diversity, groundwater source protection areas, floodplains and/or the other features in Section 3.13, identified in the town plan, zoning overlay maps, or through field investigation. The Board may require the following protection measures to ensure the protection of natural resources and features:

- a. establishment of buffer areas;*
- b. permanent protection as designated open space;*
- c. designation of development envelopes to ensure that activities incidental to the operation of the development use, including clearing and yard area, do not adversely impact identified resources;*
- d. preparation and implementation of management plans for protected resources and associated buffer areas; and/or*
- e. such other measures as noted in Section 3.3 of the Norwich Subdivision Regulations.*

(Norwich Subdivision Regulations 2008)

Figure 15: Development density controls



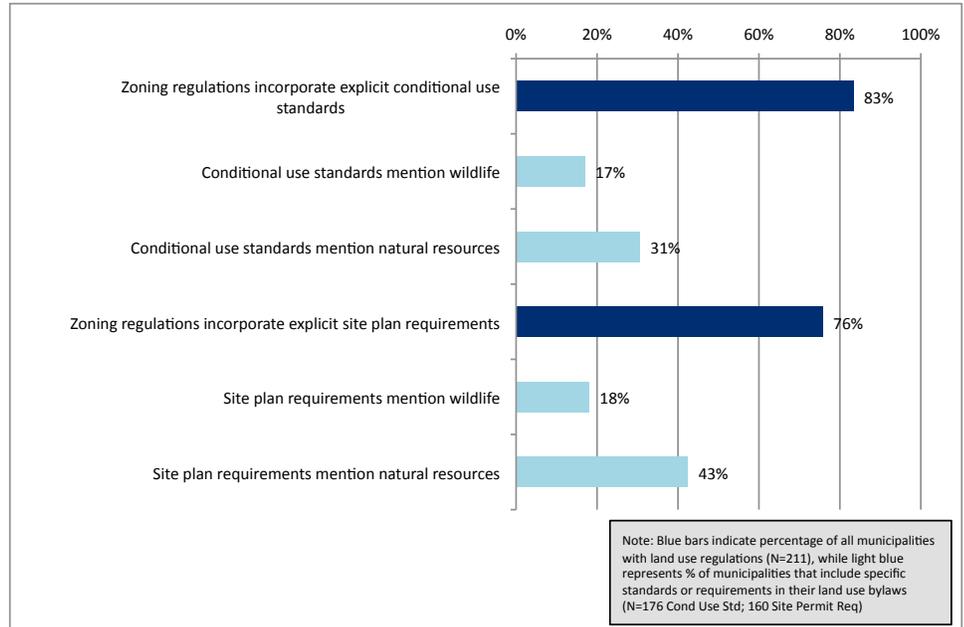
...only 38% of municipalities mandate explicit open space thresholds to regulate the preservation of open space.

Over three quarters of zoning regulations include Planned Unit Development and/or Planned Residential Development provisions. PRDs/PUDs are a common development review process that authorizes the municipality to waive certain dimensional standards to achieve local development and conservation goals, such as clustering development on small lots on a portion of the site in order to preserve open space on another portion of the property. Of the bylaws that include PUD/PRD's, 81% mention natural resources in the standards, and 44% specifically mention wildlife. Often natural resource issues are mentioned broadly, or in the context of the preservation of open space. Although most regulations include PUD/PRD provisions as a means of preserving open space, only 38% of municipalities mandate explicit open space thresholds to regulate the preservation of open space.



Very few zoning bylaws explicitly mention wildlife within their standards.

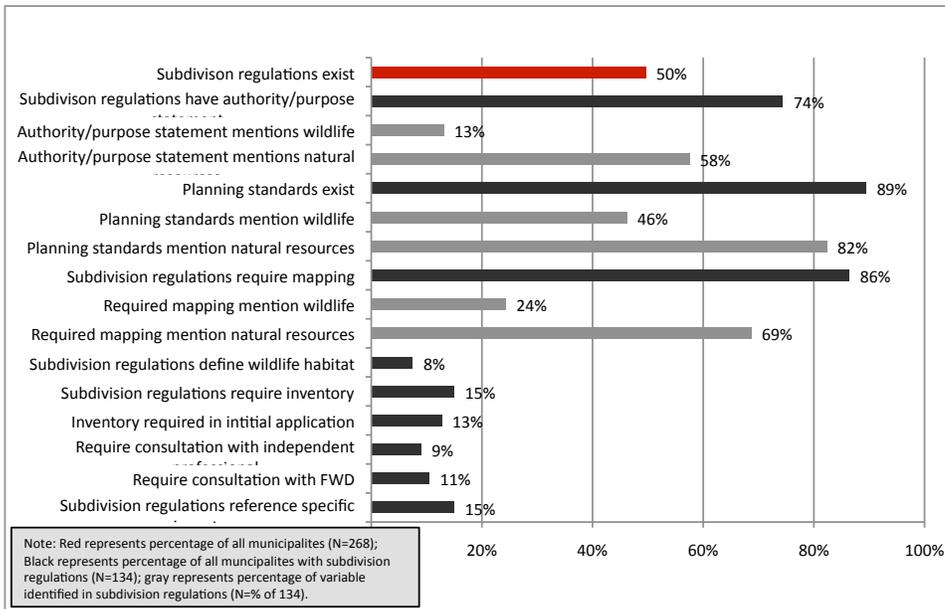
Figure 16: Conditional use standards and site plan requirements



A majority of municipal zoning bylaws include conditional use (83%) and site plan review (76%) provisions. Conditional use and site plan review are the two most commonly used development review procedures in zoning bylaws. Very few zoning bylaws, however, explicitly mention wildlife within their standards; only 17% of conditional use and 18% of site plan review standards mention wildlife. The lack of inclusion of wildlife within these potential protective mechanisms indicates a disconnect between municipal plans and land use regulations. Assessment of municipal plans revealed that 94% of plans recommend regulatory policies for the protection of natural resources and wildlife habitat with 87% of plans specifically recommending protection of wildlife habitat. However, these policies are not being enacted through the zoning bylaws.



Figure 17: Subdivision regulations



Of the 133 subdivision regulations reviewed, three quarters included a purpose statement, 13% of which specifically mentioned wildlife habitat and 58% of which specifically mentioned natural resource protection. This indicates that many municipalities promote natural resource conservation, but not necessarily wildlife habitat conservation, as a land use priority. Still, subdivision regulations appear to better reflect key conservation concepts expressed in municipal plans than do zoning bylaws.

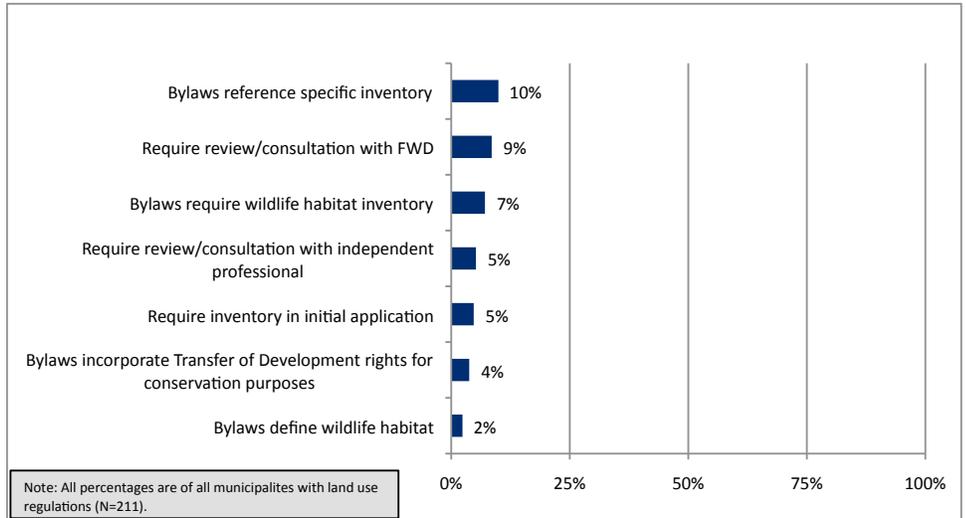
(E) Protection of Wildlife Habitat and Natural Areas. Subdivision boundaries, lot layout and Development Envelopes shall be located and configured to minimize adverse impacts on critical wildlife habitat, including travel corridors, and natural areas identified in the Norwich Town Plan, by the Vermont Department of Fish & Wildlife, or through site investigation. Methods for avoiding such adverse impacts include but may not be limited to the following:

- (1) Development envelopes shall be located to exclude identified natural areas and wildlife habitat, including deer wintering areas, and other critical habitats. A buffer area of adequate size shall be established to ensure the protection of critical habitat.*
- (2) To avoid the fragmentation of natural areas and wildlife habitat, including large tracts of forest land and undeveloped corridors serving as wildlife travel corridors between larger tracts of core habitat, the Commission may require the submission of a wildlife habitat assessment, prepared by a wildlife biologist or comparable professional, to identify the function and relative value of impacted habitat and provide recommended management strategies to maintain or enhance the those values and function. The Commission may also consult with Vermont Fish and Wildlife Department staff prior to issuing a decision.*
- (3) Roads, driveways and utilities shall be designed to avoid the fragmentation of identified natural areas and wildlife habitat.*
- (4) Identified natural areas and critical wildlife habitat should be designated as open space. (Norwich Zoning Bylaws 2008)*

... subdivision regulations appear to better reflect key conservation concepts expressed in municipal plans than do zoning bylaws.

Figure 18: Additional requirements in bylaws

This figure highlights the lack of inclusion of considerations related to wildlife in zoning bylaws.



This figure highlights the lack of inclusion of considerations related to wildlife in zoning bylaws. Most notable is the widespread lack of the inclusion of a specific wildlife habitat definition (2%). Although 30% of plans recommend coordination with the Fish and Wildlife Department for inventories and development review, only 10% of municipalities require coordination with the Department. Finally, despite 62% of plans recommending wildlife habitat inventories, only 5% of zoning bylaws require an inventory as part of the development review process.



Table 1: Evaluation of zoning districts specific to wildlife habitat conservation

All percentages are of towns with land use regulations (N=211)	Conservation District	Forest Reserve District	Water Resource District	Shoreland District	Natural Resource Overlay	Wildlife Overlay	Other Districts specific to Rural/Natural Resources
Percentage of towns where district exists (% of towns with Zoning Regulations)	51%	22%	4%	26%	11%	1%	68%
Explicitly mention wildlife in district regulations (% of towns with District)	49%	40%	13%	6%	58%	100%	17%
District allows single-family residence as a permitted use (% of towns with District)	51%	40%	50%	67%	-	-	-
District allows single-family residence as a conditional use (% of towns with District)	29%	38%	25%	33%	-	-	-
District prohibits single-family residence (excluding seasonal camp) (% of towns with District)	20%	22%	25%	-	-	-	-
District has specific wildlife review (% of towns with District)	8%	17%	0%	4%	-	-	-
Average lot size within district (acres)	15.0	14.7	8.1	2.9	-	-	-

The establishment of specific conservation-oriented zoning districts can be an effective way to protect and conserve wildlife habitat. This study reviewed zoning bylaws to determine whether they include one or more of several types of zoning districts. Although a majority of plans recommend protecting wildlife habitat (87%), only 51% of municipalities with zoning regulations have adopted conservation districts. Of these districts, over half allow residential development with only administrative review for compliance with basic density and dimensional standards, while 29% require conditional use approval for single family dwellings, and 20% don't allow year-round residential development.

Despite the fact that 87% of plans identify forests as a valuable habitat type, a small percentage of municipalities that have zoning bylaws include a forest reserve district (22%). Forest reserve districts are similar to conservation districts with regard to allowed



When considered
in combination
with the
widespread
allowance of
residential
development, the
density standards
within these
districts may
actually be
exacerbating
habitat
fragmentation....

uses (including the treatment of single family dwellings) and maximum density/minimum lot size. With regard to the latter, the average minimum lot size (the most common density standard) is 15.0 acres for conservation districts and 14.7 acres for forest reserve districts. When considered in combination with the widespread allowance of residential development, the density standards within these districts may actually be exacerbating habitat fragmentation by requiring excessive land area for a single home while not requiring an area large enough to maintain ecological functions.

Finally, the use of overlay districts for the purpose of protecting wildlife habitat is rare in Vermont, despite the potential effectiveness of this tool for protecting specific habitat types. The increase in the use of mapped habitat data, however, may result in greater application of overlay districts in the future should municipalities strengthen their bylaws to better implement plan policies.

The Forest Reserve District is to protect significant forest resources and water supply watersheds at higher elevations and to limit development in areas with steep slopes, shallow soils, unique or fragile resources, headwater streams, wildlife habitat, and poor access to Town roads and community facilities and services. (Waitsfield Zoning Bylaws 2007)

Pursuant to Section 4414 of the Act, there is hereby established a Sensitive Wildlife Resource Overlay District for the Town of Dover. The Sensitive Wildlife Resource Overlay District contains areas that have been identified as either a travel way or containing important food sources used by bears in Dover. It is not the Town's intention to prevent development in these areas but rather to encourage development that will minimize and mitigate the impacts on the sensitive wildlife resources. (Dover Zoning Bylaws 2007)

Regional Comparisons

A comparison of information among the regional planning commissions allows for the identification of regional trends or similarities in how communities within different regions approach wildlife issues.

Selected Regional Comparison of Planning Program Data

PERCENT OF TOWNS IN EACH RPC THAT HAVE A CONSERVATION COMMISSION



Selected Regional Comparison of Plan Concepts

PERCENT OF TOWN PLANS IN EACH RPC THAT MENTION HABITAT FRAGMENTATION

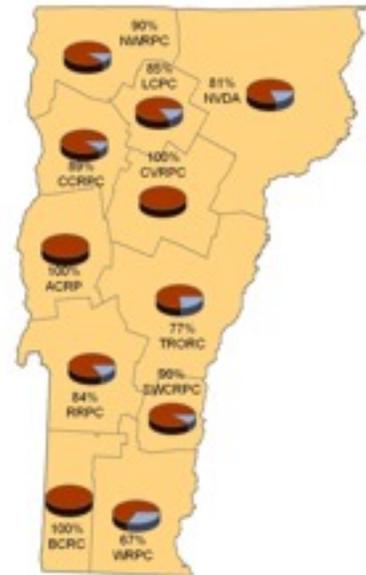


Selected Regional Comparison of Plan Data

PERCENT OF TOWN PLANS IN EACH RPC THAT
INCLUDE MAPPED NATURAL RESOURCE INVENTORIES



PERCENT OF TOWN PLANS IN EACH RPC THAT
INCLUDE NATURAL RESOURCE INVENTORY DATA



Selected Regional Comparison of Plan Policies and Recommendations

PERCENT OF TOWN PLANS IN EACH RPC THAT
IDENTIFY NON-REGULATORY POLICIES

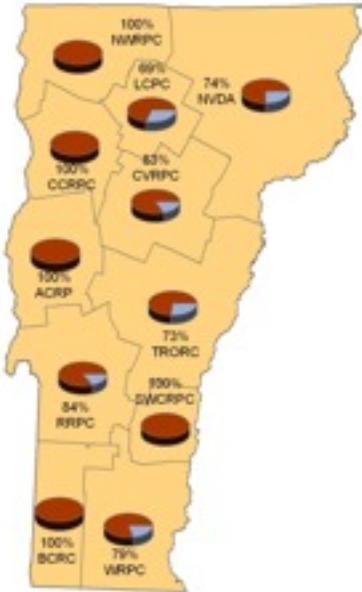


PERCENT OF TOWN PLANS IN EACH RPC THAT
RECOMMEND DOING A NATURAL RESOURCE INVENTORY



Selected Regional Comparison of Land Use Regulations

PERCENT OF TOWNS IN EACH RPC THAT
HAVE ZONING REGULATIONS



PERCENT OF TOWNS IN EACH RPC THAT
HAVE SUBDIVISION REGULATIONS



Selected Regional Comparison of Land Use Regulations

PERCENT OF TOWNS IN EACH RPC THAT
DEFINE WILDLIFE HABITAT



PERCENT OF TOWNS IN EACH RPC WHOSE
SUBDIVISION REGULATIONS DEFINE WILDLIFE HABITAT



Observations & Findings

There is much to celebrate in this report. There are also some important take-home messages if municipal planning and land use regulation is to be an effective mechanism for managing and conserving the state's wildlife resources.

Municipalities have made noteworthy strides in improving attention to wildlife conservation through land use planning and development regulations. There is much to celebrate in this report. There are also some important observations that require attention if municipal planning and land use regulation is to be an effective mechanism for managing and conserving the state's wildlife resources.

Municipal Plans

The municipal plan offers an excellent opportunity for communities to educate residents about wildlife resources and provide goals for wildlife management and conservation. In Vermont, almost every municipality has taken the important first step of recognizing the role of wildlife habitat as an important resource. Furthermore, a large majority of municipalities recognize the public benefits of wildlife habitat, with a noticeable increase in awareness over the past decade.

Municipalities have also made important strides in including mapped data in local plans. For example, over the past decade, the inclusion of mapped data in local plans increased by almost 40%. In addition, municipalities have significantly increased the use of local data while also increasing the use of state and other data sources, such as Natural Resources

Conservation Service soil inventory data. Furthermore, the number of municipalities recommending that habitat inventories be conducted has increased, and a much greater number of plans recommend coordination with regional and state management and conservation efforts.

The municipal plan is also a place where municipalities can outline practical goals for wildlife management or conservation. These goals can be stand-alone goals for action, such as non-regulatory strategies or action steps, or recommended actions to be implemented through zoning bylaws and subdivision regulations. An impressive 87% of municipalities recommend the protection of wildlife habitat in their town plans, with regulatory and non-regulatory policies increasingly adopted since 2000.



While it is important to note the gains that have been made over the past decade in recognizing the importance of protecting wildlife habitat in municipal plans, much work remains to integrate ecological and biological concepts that affect the management and conservation of wildlife. For example, almost half of the municipal plans identify the effect of habitat fragmentation on wildlife, and 42% note the importance of habitat connectivity and travel corridors, while invasive species, species extinction, species' sensitivities to habitat loss and disturbance, and species reintroduction suffer from much less recognition. Furthermore, while this is a complex concept, only 2% of municipal plans identify the importance and/or relevance of climate change and its effects on wildlife habitat.



Zoning Bylaws and Subdivision Regulations

One of the most striking observations of this study is the sharp disconnect between municipal plan recommendations for wildlife and the implementation of those recommendations through zoning bylaws and subdivision regulation.

For example, although 62% of municipalities recommend conducting wildlife habitat inventories, and 30% of municipal plans recommend coordination with the Vermont Fish and Wildlife Department for inventories and development review, less than 10% of zoning bylaws actually require review or consultation with Fish and Wildlife Department as part of the local development review process, and even less, 5%, require a habitat inventory.

Furthermore, although many municipalities recommend the protection of wildlife habitat, a much smaller percentage have enacted regulatory protection standards that are specific to habitat. A large majority of the zoning bylaws reviewed contain conditional use standards and site plan requirements that shape the type of development that will be allowed in a particular district. Only a small percentage,

Communities Recognize the Importance of Wildlife Habitat

Of the 248 municipal plans reviewed:

- 99%** identify wildlife habitat as an important resource
- 91%** include mapped data, an increase of 39% since 2000
- 86%** include natural resource inventory data (86% of which was from state sources)
- 87%** recommend the protection of wildlife habitat
- 83%** note public benefits associated with wildlife habitat
- 50%** identify the effect of habitat fragmentation on wildlife habitat (42% note the importance of habitat connectivity and travel corridors)
- 2%** identify the importance and/or relevance of climate change effects on wildlife habitat



however, include conditional use standards or site plan requirements that mention wildlife habitat or specific wildlife related considerations.

For municipalities that include specific zoning districts that relate to land or resource conservation goals, such as conservation districts or forest reserve districts, there is a tendency to more specifically address wildlife habitat. Still,

even though a significant amount of municipalities have established conservation districts (51%) and forest reserve districts (22%), less than half of these districts have explicit policies for wildlife

habitat. Furthermore, municipalities commonly allow single-family homes within those districts without review by a local regulatory panel. In addition to the common practice of allowing residential development within conservation and forest reserve districts, municipalities are requiring minimum lot sizes of, on average, only 15 acres. This can exacerbate habitat fragmentation because parcels of such acreage may be too small to manage for many important ecological functions.

This study has also found that municipalities have not implemented zoning districts that are tailored to wildlife considerations. For example, the wildlife habitat overlay district is perhaps the most specific zoning approach to habitat protection, but only 1% of the municipalities have implemented such a district in the state.

An encouraging note is that 51% of municipalities

Local Zoning Lags Behind Plans

Of the 211 zoning bylaws reviewed:

- 88%** include conditional use standards (17% of which mention wildlife habitat)
- 75%** include site plan requirements (18% of which mention wildlife habitat)
- 51%** included some form of conservation district (49% of which mention wildlife habitat)
- 39%** include explicit riparian buffers (the average buffer width was 42 feet)
- 22%** include a forest reserve district (40% of which specifically mention wildlife habitat)
- 2%** of the municipalities include a specific definition of “wildlife habitat” in their zoning bylaws.
- 1%** (3 municipalities) include a wildlife habitat overlay district

have adopted subdivision regulations. This is noteworthy in that subdivision regulations are an important tool to address many habitat protection goals, especially in rural communities where land subdivision for residential development in scattered locations is the predominant development activity. Subdivision regulations more frequently include planning standards that pay greater attention to wildlife habitat than those included in zoning bylaws. Still, with less than half of the municipalities with subdivision regulations including specific protection standards, it is clear that many municipalities have not taken the necessary steps to protect wildlife habitat in Vermont.

The notion that towns have not taken the necessary steps to protect wildlife is reinforced by the fact that only 2% of municipalities include a specific definition of “wildlife habitat” or features in their zoning bylaws, while only 8% of municipalities with subdivision regulations include a specific definition of “wildlife habitat.” This is a significant cause for concern in light of the recent Vermont Supreme Court case (*In re Appeal of JAM Golf, LLC*), which held that vague policies or bylaws protecting wildlife habitat will be struck down and rendered unenforceable. Therefore, if municipalities have not defined the wildlife resources they are trying to protect, overly broad regulations supporting wildlife habitat protection may not be sufficient to protect the resource. According to this study, an overwhelming majority of municipalities may be in this situation.

Subdivision Regulations Are an Increasingly Important Tool for Conserving Habitat

Of the 133 subdivision regulations reviewed:

- 89% include planning standards (46% of which mention wildlife habitat)*
- 86% require mapping during subdivision review (24% of which mentioned wildlife habitat)*
- 51% of municipalities in Vermont have Subdivision Regulations; however only 8% of these municipalities include a definition of wildlife habitat in these regulations*

JAM Golf: Making Bylaws More Specific

*Municipalities need to be made aware of the Vermont Supreme Court case *In re Appeal of JAM Golf, LLC*, which held that vague policies or bylaws protecting wildlife habitat and natural resources may be struck down and rendered unenforceable. Municipalities should consult with their attorney to review the implications of *JAM Golf*, and understand whether existing or proposed bylaws and policies are written in a sufficient manner to withstand legal scrutiny. At a minimum, municipalities should ensure that all bylaws offer specific definitions and policies for natural resources management and conservation. Having specific policies and definitions can offer clarity for applicants, and planning commissions and development review boards that review development proposals.*

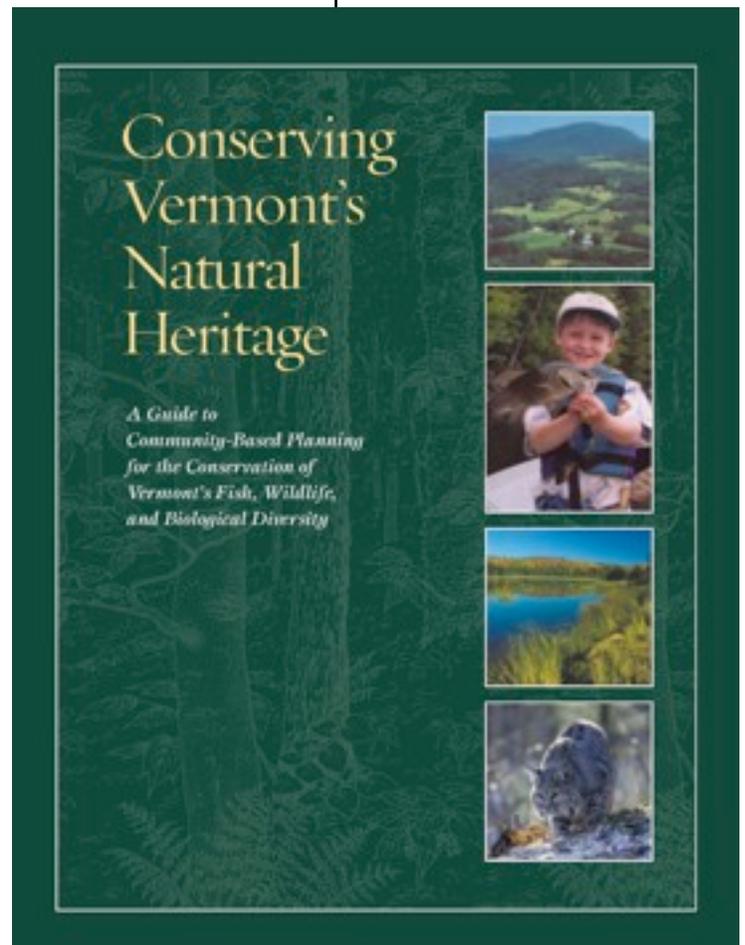
Additional Conclusions

- Regional planning commissions have a significant effect on municipal plan development. When plans are compared regionally, commonalities within regional planning commission jurisdictions are readily apparent.
- As in the 2000 study, the Vermont Fish and Wildlife Department and other departments of the Agency of Natural Resources are a primary source of information included in municipal plans. Specifically, plans that reference the Department tend to include a more in-depth discussion of wildlife habitat, and recognize the importance of wildlife habitat.
- While it is impossible to draw a direct correlation between the activities of any one entity or organization and the noteworthy increase in the consideration of wildlife issues in municipal plans since 2000, the heavy reliance on ANR data in conjunction with the establishment of the Department's Community Wildlife Program and publication of *Conserving Vermont's Natural Heritage* likely indicates that the Department's outreach efforts have improved local planning for wildlife conservation.
- This study has focused on regulatory implementation of municipal plans to a much greater extent than non-regulatory implementation. This focus was not intended to imply greater emphasis on regulatory tools over non-regulatory tools to address habitat conservation. It merely reflects that the nature of land use regulation in Vermont makes the documentation of regulatory tools much easier than documenting the wide range of non-regulatory tools available to municipalities. The widespread support for non-regulatory tools reflected in municipal plans, coupled with the state's track record regarding habitat management, voluntary land conservation, and the Department's community outreach and public education initiatives, indicate that non-regulatory plan implementation is popular and likely having an impact on wildlife management in Vermont.

Recommendations

The following recommendations are based upon the observations and conclusions reported in this study, and the experience of the authors and their advisors with regard to municipal planning, Vermont land use law, and conservation tools and techniques available to local planners. They are intended for consideration by the Department and other state officials, municipal planners, and other organizations involved in some aspect of local planning and resource conservation.

- (1) Continue, and expand upon, the Department's Technical Assistance Project, specifically assistance to municipal government organizations via the Community Wildlife Program and related outreach and technical assistance programs. With the reduction in funding of other state programs to promote municipal planning (e.g., municipal planning grant program), it is critical that the Department continue to support this successful effort. One focus of that effort should be following up on the *Conserving Vermont's Natural Heritage* publication with materials specifically targeted to improve the disconnect between strong plan policies and weak or nonexistent implementation. This could include example bylaw provisions and related model implementation tools.
- (2) Improve coordination between the Department and regional planning commissions to build capacity for Commissions to assist municipalities with conservation planning, and to address habitat issues on a regional scale – especially issues such as habitat fragmentation, travel corridors, etc. that transcend municipal boundaries.
- (3) Continue to fund the Municipal and Regional Planning Fund, funded through a dedicated percentage of the property transfer tax, and make conducting wildlife habitat inventories a priority activity for grant funding.





- (4) Support efforts to develop standardized GIS-based habitat data to assist municipalities with the preparation of plans.
- (5) Support efforts to help towns define with specificity the wildlife resources they are trying to conserve. In light of the Supreme Court case, *JAM Golf*, municipalities need to guard against implementing overly broad and unenforceable policies for wildlife conservation. A planning manual should be created to help municipalities understand how to draft specific policies for wildlife and habitat conservation that are enforceable and predictable for applicants going through the development review process.
- (6) Convene a group of stakeholders, to include municipal and regional planners, wildlife and conservation biologists and land use attorneys, to develop examples of bylaw language to address:
 - a. Development review standards that clearly articulate a standard of review for ensuring that development does not unduly or adversely affect wildlife resources;
 - b. Development review standards that articulate how wildlife resources could be protected through zoning bylaws and subdivision regulations; and
 - c. Potential definitions of “significant wildlife habitat” that could be coordinated with existing wildlife data and local input.
- (7) Continue to expand the relationship between the Department and non-government organizations and partners to assist in technical assistance programs, workshops, and educational materials for municipalities. Convene an annual workshop on conservation planning for wildlife at the municipal and regional level.
- (8) The Department, in conjunction with interested stakeholders (e.g., Vermont League of Cities and Towns, Vermont Housing & Conservation Board, Vermont Planners Association, regional planning commissions, and conservation organizations), should inventory non-regulatory implementation tools being used throughout the state and document those tools for other communities to emulate.

Appendix A

Definitions of variables used in evaluation

Below is a description of the questions (*italicized*) that were used to standardize the review of the town plans and zoning regulations. Each question was asked as a simple binary (true/false) answer (with the exception of a few questions that asked more specific measurement based questions such as “what is the buffer width recommended”). In order to standardize the review process and minimize subjective bias, definitions of how each question should be interpreted were created. Below are descriptions of the interpretations used to guide the review of both the town plans and the land use regulations, and minimize bias between reviewers.

Town Plans:

General:

-Presence of a planning commission

-The town had a planning commission at the time the plan was written.

-Presence of a conservation commission

-The town had a conservation commission at the time the plan was written, this did not include if the town plan suggested that a conservation commission should be formed.

-Presence of a trails committee

-The town had a specific trails committee at the time the plan was written; this did not include recreation committees.

-Is the plan expired

-The town plan expired at the time of the survey (surveys were completed between June and September of 2009)

-Does the town have zoning regulations

-The town adopted zoning regulations at the time of the survey. The most current information available from the Vermont League of Cities and Towns as well as the Vermont Department of Housing and Community Affairs and regional planning commissions was used to determine if municipalities had adopted land use regulations.

-Does the town have subdivision regulations

-The town adopted subdivision regulations at the time of the survey. The most current information available from the Vermont League of Cities and Towns as well as the Vermont Department of Housing and Community Affairs and regional planning commissions was used to determine if municipalities had adopted land use regulations.

Town Plan data:

-Does the plan include/reference inventory data

-The plan included any type of inventory related to natural resources (including but not limited to NRCS soil surveys, ANR bear habitat and deeryard surveys, and the National Wetland Inventory)

-Does the plan include/reference state data

-The plan included any state natural resource inventory. These inventories were predominantly state wetland inventories, bear habitat, and deeryard habitat inventories.

-Does the plan include/reference FWD Nat Heritage Guidebook

-The plan specifically referenced or mentions in the body of the text, the FWD Natural Heritage Guidebook.

-Does the plan include mapped data

-The plan included natural resource related mapped data (general land use maps, soil maps, or slope maps did not count). Layers included were: wetland habitat, bear habitat, deeryards, rare or threatened species habitat, and other related layers.

-Is the mapped data available online

-The plan mapped data specific to natural resources was available online with the town plan. No additional searching beyond the location of the plan itself was conducted; if maps were included at a different location (not with the town plan) they were not included. The rationale for this was to determine if maps were readily and easily identifiable for people reading the town plans.

-Does the mapped data include GIS data

-Metadata attached to the maps, or the presence of obvious ArcMap fonts/legends was used to determine if GIS data was used to create the maps.

-Does the mapped data include biological/natural heritage/ habitat inventory

-The plan included specific natural resources data related to habitat. Simply delineating wetlands was not acceptable, specific habitat types such as deeryards, bear habitat, rare/endangered species habitat had to be identified and mapped.

-Does the plan include conservation or open space plan

-The plan included a conservation or open space plan. The plan had to be incorporated into the town plan, or referenced directly in the town plan.

Habitat types:

-Riparian, vernal pools/seeps, shoreland, surface waters, fisheries, wetland, forest, late successional forest, shrubland, grassland, early successional forest, deeryard, bear habitat, waterfowl, endangered/threatened species, species of greatest conservation need, critical habitat/natural areas, large blocks/core habitat, travel corridors, wildlife management areas, other habitat

-The plan specifically mentioned the habitat type in the context of wildlife habitat.

-Natural communities identified

-The plan specifically mentioned at least one natural community. This included the mention of natural community names (such as cedar swamp, northern hardwood forest) as well as the specific mention of the term “natural community”.

-Enduring features mentioned

-The plan described specific geologic features in the context of the associated fauna and flora with the feature. Simply describing surficial geology without relating it to community ecology was not sufficient. Examples included calcareous cliffs with rare and endangered species, and talus slopes.

Habitat concepts:

-Habitat is placed in broad context

-The plan broadly mentioned habitat, without specifying species or habitat types

-Plan recognizes the importance/relevance of habitat fragmentation

-The plan explicitly described some form of impact of habitat fragmentation. Simply mentioning habitat fragmentation was not sufficient, the plan had to relate habitat fragmentation to some consequence or describe a broader impact of wildlife species.

-Plan recognizes the importance/relevance of biodiversity

-The plan described the importance of biodiversity or the impact of the loss of diversity. Generally this did not have to be described in great depth, but had to mention something beyond the word diversity. For example, “maintaining a diverse grouping of species is important for the health of forests.”

-Plan recognizes the importance/relevance of species extinction

-The plan referred to the complete loss of an animal species. This could include local extirpation and does not explicitly refer to global extinction.

-Plan recognizes the importance/relevance of species reintroduction

-The plan explicitly described or referred to planned reintroduction of native fauna as part of a planned management action. This included re-stocking of native fish species to streams and water bodies.

- Plan recognizes the importance/relevance of invasive species*
 - Beyond mentioning invasive species, the plan described the relative impact of the invasive species on native species and habitats. The term “invasive” did not necessarily have to be mentioned, specific referral to known invasive species (such as Eurasian milfoil and zebra mussels) was accepted.
- Plan recognizes the importance/relevance of climate change*
 - Beyond generally mentioning climate change (either historic or current anthropogenically induced), the plan referred to the impacts of climate change on wildlife species or habitat. As this definition included habitat, the effects of climate change on local flora and fauna were included.
- Plan recognizes the importance/relevance of connectivity and travel corridors*
 - Plan explicitly referred to the functional role of travel corridors or the necessity of landscape level habitat connectivity for the health and sustainability of local wildlife populations.
- Does the town recognize the relationship between land use and habitat*
 - Plan specifically described the effect of anthropogenic change to the landscape on wildlife. For example, plans may recognize the impacts of agricultural practices on adjacent stream habitat and fish populations.
- Does the plan discuss the importance of working landscapes/forests*
 - The plan specifically referred to the importance of the working landscape/forests in reference to the conservation of wildlife or wildlife habitat. This did not include plans that discussed the importance of the working landscape in the preservation of agriculture, social, or scenic values.
- Are the public benefits of habitat identified (specifically: multiple use, hunting, fishing, trapping, viewing wildlife, viewing scenery, collecting, photography, education, spiritual, ecological, clean water, recreation, production, other*
 - The plan specifically mentioned the public benefit in relation to wildlife or habitat. As habitat was used in addition to wildlife, plans that mentioned public benefits from forests such as recreation or timber and maple syrup (which were included as two types of production) were included. Another example were towns that mentioned the role wetlands play in filtering water, reducing the impacts of flooding, and habitat for wildlife.

Plan recommendations:

- Plan recommends inventory*
 - The plan specifically recommended a wildlife habitat inventory.
- Plan recommends protection*
 - The plan specifically recommended the protection of wildlife and/or wildlife habitat.
- Plan recommends coordination with regional/state protection efforts*
 - The plan recommended coordination with any of the groups/organizations described below for the protection of wildlife and wildlife habitat.
- Plan references state planning goals and policies*
 - The plan referenced state planning goals and policies that are directed towards the preservation and protection of natural resources and habitat. This included, but was not limited to, Accepted Management Practices for forest management activities, and wetland protection standards.
- Plan references Conserving VT Natural Heritage Guidebook*
 - The plan referenced the VT Natural Heritage Guidebook and the recommendations within the guidebook for the protection of wildlife and wildlife habitat.
- Plan recommends coordination with RPC/neighboring towns*
 - The plan specifically recommended coordination with neighboring towns/rpc for the purpose of the protection of wildlife or wildlife habitat. This did not include plans that simply recommended a broad coordination effort with other towns for general purposes.

- Plan recommends coordination with FWD (for inventory assistance, site review)*
 - Plan recommended that the town or citizens work with the VT FWD for the protection or preservation of wildlife or wildlife habitat. Two additional questions focused on what specific actions the plan was suggesting which

coordination should be used for (inventory of wildlife habitat, or site review for impacts of development or land management on wildlife habitat).

-Plan recommends coordination with Feds/GMNF

-Plan recommended coordination with a federal organization such as NRCS or GMNF for the protection of wildlife or wildlife habitat.

-Plan recommends coordination with private orgs/NGOs

-Plan recommended coordination with a private organization (such as Keeping Track Inc., VLT, or other NGOs), for the protection of wildlife or wildlife habitat.

Non-regulatory local policies:

-Conservation easements recommended

-The plan explicitly suggested the use of conservation easements or the purchase of developmental rights for the protection of natural resources or wildlife and wildlife habitat (open space was included)

-Land acquisition recommended

-The plan explicitly suggested the use of land acquisition for the protection of natural resources or wildlife and wildlife habitat.

-Tax abatement recommended (current use or other municipal tax abatement recommended)

-The plan explicitly suggested the use of tax abatement programs for the protection of natural resources or wildlife and wildlife habitat. Two sub-questions specifically teased out if the recommended program was the Use Value Appraisal Program, or another municipal tax abatement program. Each of these sub-questions was further stratified between programs specific for the protection of natural resources or more specifically wildlife and wildlife habitat.

-Public/landowner education recommended

-The plan suggested public/landowner education for either the protection of natural resources or wildlife and wildlife habitat.

-Local funding recommended

-The plan recommended local funding for the protection of natural resources or wildlife and wildlife habitat. This was often in the form of conservation funds directed by municipal conservation commissions for the acquisition of lands or the purchase of development rights.

Regulatory local policies:

-Buffer zones recommended

-The plan recommended any type of buffer around wildlife habitat (deeryard, rare and endangered species), or surface waters (streams, lakes, ponds, wetlands).

-Siting standards recommended

-The plan recommended general siting standards for development. This did not mean explicitly recommending standards in land use regulations, but rather was more inclusive of any suggested siting of development (such as limiting development on steep slopes, or within a certain distance of any major water body).

-Subdivision regulations recommended

-The plan recommended, or the municipality had already adopted at the time the plan was written, subdivision regulations and specifically mentioned this in the town plan. For this reason, towns that had adopted subdivision regulations but do not mention this in their town plan were not included in this category.

-Clustering development recommended

-The plan explicitly recommended clustered development. The term “high density” or recommending PUD/PRD was not included, unless the plan explicitly used the terminology “clustered”.

-Forest reserve district recommended

-The plan recommended a forest reserve district, or already had one in the municipal land use regulations and specifically mentioned it in the plan. Towns with such a district that do not include it in the plan would not be included.

-Conservation district recommended

-The plan recommended a conservation district, or already has one in the municipal land use regulations and specifically mentioned it in the plan. Towns with such a district that do not include it in the plan would not be included.

-Water resource district recommended

-The plan recommended a water resource district, or already has one in the municipal land use regulations and specifically mentioned it in the plan. Towns with such a district that do not include it in the plan were not included.

-Wildlife overlay district recommended

-The plan recommended a wildlife overlay district, or already has one in the municipal land use regulations and specifically mentioned it in the plan. Towns with such a district that do not include it in the plan were not included.

-Protection of public access recommended

-The plan explicitly recommended the protection of public access to habitat areas (forest, wetland, etc) or open space areas.

-Impact fees recommended

-The plan recommended impact fees as a means of protection of wildlife or wildlife habitat.

-Transfer of development rights recommended

-The plan recommended the transfer of development rights from sending to receiving areas as a tool for the protection of wildlife or wildlife habitat.

-Regulatory state policies (standing with Act 250/Section 248)

-The plan explicitly recommended that the town plan be used in Act 250 hearings. Furthermore, the plan related the use of the plan in Act 250 hearings for the protection of wildlife and wildlife habitat.

Zoning Regulations:

General:

-Wildlife included in purpose statement

-The purpose statement of the zoning or land use regulations explicitly mentioned wildlife.

-Development regulations incorporate town plan

-The land use or zoning regulations incorporated the town plan by explicitly including definitions from the town plan, or referring to the town plan for guidelines and enforcement of specific standards or developmental regulations. The incorporation of the town plan in some way increased the legal standing of the plan, enabling it in some way to be legally binding in relation to the specific developmental standard or regulation being discussed.

-Subdivision regulations incorporated in zoning regulations

-The zoning regulations incorporated subdivision regulations. This was done in two ways: 1) adopting land use regulations that include both zoning and subdivision regulations; 2) the inclusion of subdivision regulations in the general standards or conditional use review of the zoning regulations.

Zoning Districts:

*For all of the zoning districts the following questions were asked:

-The zoning regulations described a conservation district. If the district did exist, sub-questions help determine the specific requirements of the district.

-Does the district explicitly mention wildlife or wildlife habitat (does not include the mention of wildlife refuges)

-Does the district allow single-family dwellings as a permitted or conditional use.

-If the district does allow single-family dwellings, is there a maximum density or a minimum lot size

-Is there a district specific review for wildlife (specific requirements related to wildlife, beyond simply mentioning wildlife in the district description)

*Below is a listing of district types that were specifically identified as present or not in zoning regulations.

- Conservation district*
- Forest Reserve district*
- Water Resource district*
- Shoreland district*

*Additionally two overlay districts were identified as present or not in zoning regulations. If the overlay district was present, two additional questions were used to identify how effectively the district addressed wildlife habitat conservation:

- Does the overlay district description explicitly mention wildlife*
- Does the overlay district description explicitly mention natural resources*

*Overlay districts:

- Natural resource overlay district*
- Wildlife overlay district*

*Up to three other districts were recorded if they referred to low residential density areas. However, these additional districts were not included in the analysis as there was no way to standardize the different district types in order to compare and contrast their differences.

Conditional and Permitted uses:

-Road standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific road standard. If the standard did exist, did it mention wildlife or wildlife habitat?

-Habitat fragmentation standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific habitat fragmentation standard. If the standard did exist, did it mention wildlife or wildlife habitat?

-Surface water protection standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific surface water protection standard. If the standard did exist, did it mention wildlife or wildlife habitat?

-Sensitive development areas standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific sensitive development standard (includes steep slopes, high elevation, or other areas that may be particularly sensitive to developmental impacts). If the standard did exist, did it mention wildlife or wildlife habitat?

-Groundwater extraction standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific groundwater extraction standard. If the standard did exist, did it mention wildlife or wildlife habitat?

-Telecommunications standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific telecommunication standard. Most often, towns that included telecommunication standards had a boiler-plate description of developmental standards derived by the FCC. If the standard did exist, did it mention wildlife or wildlife habitat?

-Renewable energy development standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific renewable energy development standard. Most often towns that included these standards used them as a means of preserving mountain ridgelines from wind energy development. Towns that included protection of renewable energy as a conditional use standard but did not have specific standards in place to do so were not included. If the standard did exist, did it mention wildlife or wildlife habitat?

-Wetland standards exist

-In the conditional use, general use, or specific use standards the zoning regulations included a specific road standard. If the standard did exist, did it mention wildlife or wildlife habitat?

Buffers:

*In order to qualify as a riparian or shoreland buffer, the associated setback had to be applied throughout the entire municipality or a given district. Different buffer widths could be used depending on district or the gradient of the stream bank. Buffers that were specific to a certain waterbody such as an individual stream or pond were also included as zoning regulation buffers. If a buffer did exist three additional questions were asked to obtain more details about the buffer:

- Does the buffer description mention wildlife or wildlife habitat
- What is the buffer width (and for municipalities with varying buffer widths what are the minimum and the maximum buffer width)
- Does the buffer description include a management description (i.e. a vegetated buffer of native species should be maintained)

*Below are the two types of buffers that were identified as present or not in municipal zoning regulations.

- Riparian buffers
- Shoreland buffer

Development density control:

-Planned Unit Development (or PRD)

-The zoning regulations explicitly included either PUD or PRD developmental controls, this did not include other density control designs. If PUD or PRD development controls were included in regulations, 5 additional questions were asked to obtain more information about the PUD/PRD:

- Does the description of the PUD/PRD mention wildlife
- Does the description of the PUD/PRD mention natural resources
- Is there a size triggering PUD/PRD standards
- Is there a minimum requirement for proportion of open space in PUD/PRD developments
- Is there a district specific review for all PUD/PRD developments

Regulatory controls:

-Explicit conditional use standards exist

-The zoning regulations included explicit conditional use standards. If the zoning regulations include conditional use standards two additional questions were asked:

- Do the standards explicitly mention natural resources
- Do the standards explicitly mention wildlife or wildlife habitat

-Explicit site plan requirements exist

-The zoning regulations included explicit site plan requirements. If the zoning regulations include site plan requirements two additional questions were asked:

- Do the requirements explicitly mention natural resources
- Do the requirements explicitly mention wildlife or wildlife habitat

-Bylaws require inventory (in initial application)

-The zoning bylaws required an inventory of wildlife or wildlife habitat. This is an additional inventory beyond the general mapping requirements of a sketch plan in the subdivision plat review. For example, this would include an inventory of wetlands, as a wetland is a critical type of wildlife habitat. However, it would not include a general soil inventory beyond the NRCS soil survey commonly used by towns, as this would be a general natural resource inventory rather than an inventory specifically related to wildlife or wildlife habitat.

-Bylaws require review/consultation with independent professional

- The zoning regulations require review or consultation with an independent professional. Independent professional is defined as a person trained in wildlife habitat inventories such as a biologist or a forester.
- Bylaws require review/consultation with FWD*
 - If zoning regulations do require an inventory, did they require that the inventory be completed by or with the assistance of VT FWD? Often times in town plans, it was suggested that consultation with FWD be pursued when developing in bear habitat or near deeryards.
- Bylaws reference specific inventory*
 - The zoning regulations referenced a specific natural resource inventory (including general natural resource inventories such as the NRCS soil surveys, National Wetland Inventory, and more specific wildlife habitat inventories completed by the state or independent professionals).
- Define wildlife habitat*
 - The zoning regulations explicitly defined wildlife habitat (often listed as critical habitat, significant habitat, or wildlife habitat). This did not include definitions of wildlife management areas.
- Transfer of development rights*
 - The zoning regulations included transfer of developmental rights within the bylaws.

Subdivision regulations:

- Authority/purpose statement exists*
 - The subdivision regulations included an authority and purpose statement, and the statement specifically mentioned natural resources or wildlife. This question was asked as a basic litmus test to see how conscious the subdivision regulations were of wildlife.
- Planning standards exist*
 - The subdivision regulations incorporated specific planning standards. If standards did exist, did they specifically mention wildlife habitat, wildlife, or natural resources?
- Required mapping (mention wildlife, mention natural resources)*
 - The subdivision regulations required mapping in subdivision minor or major plat reviews. If mapping was required, two additional questions were asked
 - Did the mapping mention wildlife or wildlife habitat (i.e. map must include all deeryards)*
 - Did the mapping include or mention natural resources (i.e. map must include all wetlands).*
 - Sketch maps as part of minor and major plat reviews were included as a type of mapping. Mapping did not necessarily need to be completed by an independent professional.
- Define wildlife habitat*
 - The subdivision regulations explicitly defined wildlife habitat (often listed as critical habitat, significant habitat, or wildlife habitat). This did not include definitions of wildlife management areas.
- Require wildlife habitat inventory in initial application*
 - Subdivision regulations required a wildlife habitat inventory in the initial application.
- Require review/consultation with independent professional*
 - If subdivision regulations required wildlife habitat inventory, did the mandate that it be done by an independent professional?
- Require consultation with FWD*
 - If subdivision regulations required wildlife habitat inventory, did the mandate that it be done with consultation from VT FWD?
- Reference specific inventory*
 - The subdivision regulations referenced a specific natural resource inventory (including general natural resource inventories such as the NRCS soil surveys, National Wetland Inventory, and more specific wildlife habitat inventories completed by the state or independent professionals).

