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Policy Gap Analysis of Wildlife Conservation Objectives and Environmental Policies in Vermont, USA

Master's Research Project Paper

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Abstract

While Vermont (USA) is often heralded as a success story for restoring much of its forests from unsustainable land use practices, the state is now seeing a decline in forestland. Several wildlife species are once again declining as a result of land use change and its associated impacts. A variety of federal, state, and local regulatory and nonregulatory policies benefit wildlife conservation and seek to conserve the unique natural landscape in Vermont. The current suite of wildlife protections in the state was born from a piecemeal approach, and while effective at several levels, is less integrated, which has led to management and conservation gaps. There has not been a comprehensive survey of Vermont's wildlife policies across levels, which could inform current policy directions for wildlife and natural resource authorities and lead to more effective management planning. I identified six state-level environmental policies deemed to be the most consequential for terrestrial wildlife conservation in Vermont: Act 250, Section 248, the Vermont Endangered Species Law, the Vermont Wetlands Rules, Act 171, and Current Use (Use Value Appraisal). A review of relevant caselaw, Vermont Fish and Wildlife Department (VFWD) legislative reports, VFWD-issued guidance documents, and peer-reviewed scientific literature informed the development of the Vermont Wildlife Policy Gap Survey. Utilizing established methodologies, the Vermont Wildlife Policy Gap Survey was designed to identify gaps in Vermont's current regulatory structure for the conservation of wildlife by eliciting feedback from a selected pool of conservation professionals in Vermont. The survey was distributed to 64 conservation professionals in Vermont and 20-25 respondents (31.3-39.1%) completed the entire survey or a portion of the survey. Survey respondents reached several meaningful conclusions. Respondents were clear in stating that Act 250 is inadequate in preventing forest fragmentation. There was considerable overlap between Act 250 and Section 248, and respondents agree that VFWD lacks the requisite capacity to fully engage in their regulatory review role in each policy. The survey affirmed the Vermont Endangered Species Law's implementation as primarily a fine-scale conservation tool; however, the respondents described the law as weak in achieving several habitat-related conservation objectives. Despite the importance of forested wetlands, respondents described the Vermont Wetlands Rules as weak in minimizing forest fragmentation. Finally, although described as an effective planning tool, Act 171 was the least well understood policy in the survey. The gaps identified provide a foundation for developing new policies and laws for achieving more comprehensive wildlife conservation in the state.

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Chapter I. Introduction

A Changing Landscape

According to a recent groundbreaking report by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, around one million plant and animal species already face extinction globally (Diaz et al. 2019). Land use change is identified as one of the largest drivers of species extinction, as 75% of the earth's land surface has been significantly altered by humans (Diaz et al. 2019). While Vermont is often heralded as a success story for restoring much of its forests from unsustainable land use practices (e.g., over-harvest of timber and land clearing for agriculture during the 19th century), the state is now experiencing a decline in forestland. For example, from 2012 to 2017, Vermont lost an estimated 102,000 acres of forestland (Morin et al. 2017). Several wildlife species are declining as a result of land use change and its associated impacts. A changing climate amplifies existing threats and may lead to substantial alterations in species abundance and composition. Further, human demographics and population trends in the state are predicted to change significantly in coming decades. These threats create significant challenges for wildlife, which are important ecologically, economically, and culturally to the state and region (Roman and Erickson 2015).

By 2030, Vermont is expected to have an additional 85,000 residents compared with 2013 (Vermont Department of Forests, Parks, and Recreation 2015). This growth will stress the natural environment and lead to increased fragmentation and parcelization of wildlife habitat. The vast majority of Vermont's forestland (~80%) is held by private landowners and is thus more vulnerable to fragmentation and parcelization than forest on public lands (Vermont Department of Forests, Parks, and Recreation 2015). Coupled with increases in the per-acre value of land and decreases in the amount of land in larger

parcels across the state, it is clear that fragmentation is already occurring, and economic pressure may continue to drive fragmentation in the coming years (Fidel et al. 2018). According to the Vermont Fish and Wildlife Department (VFWD, the Department), Vermont loses approximately 4,800 acres of habitat each year to regulated development alone and this may comprise only one-third of all development in the state each year (Vermont Fish and Wildlife Department 2015). In this statistic, it's important to note that regulated development refers to development which proceeds through the Act 250 and Section 248 regulatory review processes. The current rate of development is increasing twice as fast as the state's population and population growth is mostly occurring in rural areas (Vermont Department of Forests, Parks, and Recreation 2015). Potentially as a result of the Covid-19 Pandemic, the year of 2020 saw a massive increase in the number of Vermont residential property sales to out-of-state buyers (Vermont Center for Geographic Information 2021). The state is undergoing significant change and many species of wildlife are already experiencing impacts.

Wildlife Impacts

Historically, the state successfully recovered several emblematic wildlife species that once faced extirpation, including moose (*Alces alces*), common loon (*Gavia immer*), and bald eagle (*Haliaeetus leucocephalus*) (Vermont Fish and Wildlife Department 2015; Vermont Agency of Natural Resources 2022). However, land use change now threatens a host of species and their habitats. One form of land use change—development—contributes to habitat fragmentation, alteration, and loss of habitat, as well as the proliferation of invasive species, and increased pollution. Many species of vertebrates including mammals and birds are target species for conservation and have experienced

negative impacts from development (Torres et al. 2016; Shackelford et al. 2017; Newbold et al. 2016). Historic conversion of grasslands to agriculture, reforestation of farmland, agricultural intensification, and conversion of farmland to suburban and urban developments, threatens several state-designated High Priority Species of Greatest Conservation Need (SGCN) such as the grasshopper sparrow (*Ammodramus savannarum*), golden-winged warbler (*Vermivora chrysoptera*), and blue-winged warbler (*Vermivora cyanoptera*) (LaBarr et al. 2014; Vermont Fish and Wildlife Department 2015). Another grassland bird species, the upland sandpiper (*Bartramia longicauda*), has also markedly declined in recent years with surveys finding only 2 birds in 2008 (LaBarr et al. 2014). Birds are not the only species that have suffered from the impacts of development in the state. By 2012, it was estimated that approximately 400,000-600,000 bats are killed each year from wind energy operations in the U.S. (Hein and Schirmacher 2016). Vermont's utility-scale wind and solar energy development threatens a number of high priority SGCN bats, in addition to the Bicknell's thrush (*Catharus bicknelli*) (a high priority SGCN), American black bears (*Ursus americanus*), and several other species (Vermont Fish and Wildlife Department 2015). Between 2015 and 2017 the population of Indiana bats (*Myotis sodalis*)—a federally Endangered species—in Vermont declined by an estimated 23% (U.S. Fish and Wildlife Service 2018).

The Vermont Wildlife Action Plan (2015) identifies habitat fragmentation as a high-ranking threat to wildlife in the state and highlights the importance of increasing landscape-level connectivity. Vermont sits in a unique position within the ecological context of the New England landscape. Of the six high priority wildlife linkages across the northeastern US and Canada identified by the Staying Connected Initiative, four are

located in Vermont—the Adirondack Mountains to the Southern Green Mountains linkage, the Taconic Mountains to Southern Green Mountains linkage, the Worcester Range linkage across Northern New Hampshire to Maine, and the Northern Green Mountains in Vermont and Canada Linkage (New Hampshire Fish and Game Department 2008). These connectors have been identified as key areas that will allow the movement of wildlife through fragmented patches of habitat. The extent to which the intervening habitat between suitable patches facilitates or impedes dispersal can be critical for population persistence, especially as populations and species shift their distributions in the face of changing climate (Anderson et al. 2016). The 2018 Vermont Conservation Design supports the Staying Connected research and further identifies important landscape features such as interior forest blocks, connectivity blocks, and wildlife road crossings whose conservation will be critical in facilitating wildlife populations persistence (Sorenson and Thompson 2018).

The northeastern United States is expected to see continued rises in annual average precipitation and may see an increase of surface temperature between 5°F and 9°F by the end of the century (D.R. Reidmiller 2018). These rapid changes will impact natural communities and the species assemblages of northern hardwood forests in the region (Reidmiller et al. 2018). Forest composition is expected to change as spruce-fir forests decline and some species of mammals, birds, insects, and plants may shift their distributions (Reidmiller et al. 2018). The VFWD identified 5 SGCN that are highly vulnerable to climate-driven impacts including the: Jefferson salamander (*Ambystoma jeffersonianum*), Canada lynx (*Lynx canadensis*), brook trout (*Salvelinus fontinalis*), Eastern pearlshell mussel (*Margaritifera margaritifera*), and Bicknell's thrush (Vermont

Fish and Wildlife Department 2015). The moose population in Vermont is once again under threat and fell by an estimated 44% between 2010-2017, largely due to mortality caused by winter ticks (*Dermacentor albipictus*) as shorter winters are allowing winter tick numbers to increase in areas of greater moose density (DeBow 2020). Further, the Department identified 8 habitats as highly vulnerable to climate-driven impacts including several wetland and several upland habitats (Vermont Fish and Wildlife Department 2015).

Vermont's Policy Framework

A variety of federal, state, and local regulatory and nonregulatory policies benefit wildlife conservation and seek to conserve the unique natural landscape in Vermont. Many of these existing policies are criticized for providing preferential protections to game animals such as white-tailed deer (*Odocoileus virginianus*) and black bear. Some policies overlap and require coordination between agencies (e.g, Act 250, Use Value Appraisal). While other policies may seem to be working towards opposing goals. Inherently the goals of the Agency of Natural Resources (ANR) may conflict with the goals of agencies of Transportation, Commerce and Community Development, or Agriculture, thus their rules and policies may not necessarily coalesce. The current suite of wildlife protections in the state was born from a piecemeal approach, and while effective at several levels, is less integrated, which has led to management and conservation gaps.

As a first step in the analysis, I identified six nonregulatory and regulatory state policies deemed to be the most consequential for terrestrial wildlife conservation in Vermont with the input of my graduate committee members. The policies included: Act

250, Section 248, the Vermont Endangered Species Law, the Vermont Wetlands Rules, Act 171, and Current Use ([Table 3. Vermont Environmental Policy Table](#)). Act 250 is Vermont's comprehensive land use law which established a quasijudicial regulatory review program for subdivision and development (Board). Section 248 requires certain development projects to obtain a Certificate of Public Good (CPG) from the Vermont Public Utility Commission (PUC) for energy generation, energy storage, energy transmission, and telecommunication facilities (30 V.S.A. § 248). The Vermont Endangered Species Law mirrors the federal Endangered Species Act and authorizes the Secretary of the Vermont Agency of Natural Resources to adopt a State endangered species list and a State threatened species list (10 V.S.A. § 5402(a)). This regulatory program prohibits the taking, possession, or transportation of wildlife that are members of a threatened or endangered species (10 V.S.A. §5403(a)(1)). The Vermont Wetland Rules establishes a permitting program for any construction or activity in a Class I or Class II wetland or its buffer zone (10 V.S.A. § 913). Act 171 is a nonregulatory policy which added requirements to the state's land use planning goals to manage Vermont's forestlands so as to maintain and improve forest blocks and habitat connectors (Vermont Center for Geographic Information 2018). Additionally, the law established new municipal and regional planning requirements related to forest integrity (Vermont Center for Geographic Information 2018). Current Use, or Use Value Appraisal, is a nonregulatory tax equity program that enables landowners who practice long-term forest management to have their enrolled land appraised for property taxes based on its value for forestry rather than its fair market value (Vermont Department of Forests, Parks, and Recreation 2020). While these policies have significant impact wildlife conservation

outcomes, they do not comprise an exhaustive list of the regulatory and nonregulatory policies which have terrestrial wildlife conservation implications in Vermont.

Several regulatory federal programs impact terrestrial wildlife in Vermont including: the federal Endangered Species Act, the U.S. Army Corps of Engineers General Permit, the National Environmental Policy Act, and others. In Vermont, in addition to the Indiana bat (endangered), there are 4 species of terrestrial wildlife currently listed as threatened or endangered under the federal Endangered Species Act, including: the Northern long-eared bat (*Myotis septentrionalis*, threatened), the Canadian lynx (threatened), the Eastern mountain lion (*Puma concolor cougar*, locally extinct), and the red knot (*Calidris canutus*, threatened) (Vermont Fish and Wildlife Department 2015). Similar to 10 V.S.A. §5403 of the Vermont Endangered Species Law, §9 of the federal Endangered Species Act prohibits the ‘take’ of an endangered species, where take includes: harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or to attempt to engage in any such conduct. A U.S. Army Corps of Engineers General Permit may be required for certain impacts to waterways including dredging, discharge of fill material, fish and wildlife harvesting activities, agricultural activities, and others (Corps of Engineers 2018). This federal permit program has implications for terrestrial wildlife that rely upon wetland, shoreland, and riparian habitats. The National Environmental Policy Act (NEPA) requires a detailed statement on the environmental impact of a proposed action for “major Federal actions significantly affecting the quality of the human environment” (U.S. Environmental Protection Agency 2021). NEPA review is triggered for proposed management activities in the Green Mountain National Forest. One example of a recent NEPA project that had terrestrial

wildlife impacts is the Early Successional Habitat Creation Project, which was aimed at providing habitat for neotropical migrant passerine birds and other wildlife species requiring early successional habitats in Bennington, Rutland, Windham and Windsor Counties, Vermont (Barnes 2019). Projects that may also require NEPA review include federal oil and gas leasing, federal mineral extraction, federal highway construction and repair, and others (Coggins et al. 2014). Other federal regulatory programs that may impact terrestrial wildlife in Vermont include the Federal Energy Regulatory Commission dam relicensing process, the Clean Water Act, the National Forest Management Act, and others.

In addition to the regulatory federal programs, several nonregulatory federal programs also impact terrestrial wildlife in Vermont. The original Farm Bill, the Food Security Act of 1985, created several incentive programs to help remove highly erodible land and wetland from crop production (Glaser 1986). The Act created the Conservation Reserve Program (CRP) which compensates farmers for converting highly erodible land away from crop producing and implementing an approved conservation plan (Glaser 1986). In 2021, producers and landowners across the U.S. enrolled 5.3 million acres through CRP signups (U.S. Department of Agriculture 2022). Born out of the CRP, the Environmental Quality Incentives Program (EQIP), provides financial and technical assistance to agricultural producers and non-industrial forest managers to address natural resource concerns and deliver environmental benefits such as improved or created wildlife habitat (United States Department of Agriculture 2022). As of 2020, there were over 48,000 acres of land enrolled in an EQIP contract in Vermont (Natural Resource Conservation Service 2020). The State Wildlife Grant Program (SWG) was created from

the Conservation and Reinvestment Act of 2000 and instituted through the FY 2001 Interior Appropriations Act (Commission 2006). To be eligible for SWG's, state agencies had to develop and submit comprehensive Wildlife Action Plan's to the U.S. Fish and Wildlife Service and states update their plans every 10 years (Arkansas Game and Fish Commission 2006). The SWG program is a matching fund program that will provide 75% of the funding to an agency for Wildlife Action Plan planning related activities and 50% for Wildlife Action Plan implementation activities (Arkansas Game and Fish Commission 2006). In Fiscal Year 2020, Vermont received \$3,647,470 through the program (U.S. Fish and Wildlife Service 2020). More recently, in the fall of 2021, the U.S. Senate passed the Infrastructure Investment and Jobs Act which included \$350 million for a Wildlife Crossings Pilot Program to be administered by the U.S. Department of Transportation (Bies 2021). The Pilot Program will provide grants to fund wildlife crossing construction and improve habitat connectivity (Bies 2021). The U.S. Department of Agriculture, U.S. Department of Transportation, U.S. Environmental Protection Agency, and U.S. Fish and Wildlife Service offer other various incentive programs and provide technical outreach which benefit the conservation of terrestrial wildlife.

Looking beyond federal policies and programs, several other state regulatory and nonregulatory programs impact terrestrial wildlife in Vermont. The Vermont Department of Environmental Conservation (DEC) administers the stream alteration and stream crossing permitting program which regulates streambank stabilization, road improvements near streams, bridge construction or repair, and utility crossings under streambeds (Vermont Agency of Natural Resources 2022). This program has implications for terrestrial wildlife that utilize riparian corridors. The Vermont Department of Forests,

Parks, and Recreation (VDFPR) administers a licensing and special use permitting program for certain activities on ANR lands such as those activities which alter or remove natural resources (Vermont Agency of Natural Resources 2022). VDFPR also administers a heavy cut permitting program if a landowner plans to conduct a heavy cut of 40 acres or more (Vermont Agency of Natural Resources 2022). This permitting program has impacts for a variety of species reliant upon forestland habitat, including interior forest bird species.

Hunting, fishing, and trapping licenses and taxes on gear related to these forms of recreation account for approximately 70% of Vermont's wildlife conservation funds (Vermont Fish and Wildlife Department 2015). In 2019, these federal excise taxes on gear—Pittman-Robertson and Dingell-Johnson taxes—generated nearly \$1 billion to support state conservation programs (U.S. Fish and Wildlife Service 2020). Through the Competitive-SWG Program, the U.S. Fish and Wildlife Service distributes these funds to eligible state agencies (U.S. Fish and Wildlife Service 2020). States must have an approved Wildlife Action Plan to receive State Wildlife Grant funding (Vermont Fish and Wildlife Department 2015). In 2020, the state of Vermont received \$3,647,470 in federal funding through the SWG Program (U.S. Fish and Wildlife Service 2020). Despite a recent surge during the Covid-19 pandemic, hunting and fishing license sales have been steadily declining in Vermont, creating considerable concerns about the future of the Department's funding (Vermont Fish and Wildlife Department 2021; Berl et al. 2022). While traditional uses such as hunting, fishing, and trapping used to be the driving forces which informed public opinion on wildlife management, we are now seeing a shift in values. A domination wildlife value orientation—which clearly separated humans from

animals and justified treatment of wildlife in utilitarian terms—has been largely replaced by a mutualism orientation towards wildlife which emphasizes equality and individuals acting for the welfare of all (Manfredo et al. 2009). Many question the sustainability of this approach—its ability to accomplish conservation goals, and whether agencies are adequately adapting to meet these shifting public values (Henderson et al. 2021). Further, some researchers argue that a reluctance among agencies to adapt to this change is rooted in continued dependence on hunting and fishing license revenues to support agency programs and in a perception that new public interests conflict with personal and institutional interests borne from a prior era (Gill 1996).

Conservation in Vermont, Broadly

Another state government entity, the Vermont Housing and Conservation Board (VHCB), has contributed to conservation in Vermont through the purchase of conservation easements and the funding of land acquisitions by municipalities. Since 1987, VHCB has permanently protected 213,511 acres of working forestland and 37,606 acres of forestland that supports unique natural communities, wildlife habitat, and important recreational uses (Vermont Department of Forests, Parks, and Recreation 2015). Nonprofit organizations also contribute significantly to conservation in Vermont through easements, outright ownership, collaborative partnerships with the ANR, and through technical outreach. For example, in 2020-2021, the Vermont Land Trust, the largest land trust in the state, conserved over 9,800 acres of forestland and 655 acres of wetlands through conservation easements (Vermont Land Trust 2022). Additionally, the Nature Conservancy in Vermont has helped conserve over 300,000 acres of land and manages and maintains 58 natural areas spanning 30,000 acres that are open to the public

(The Nature Conservancy in Vermont 2020). These are just a few of the nonprofit environmental organizations who contribute to wildlife conservation in Vermont.

It is important to note that while the positive impacts of conservation are well studied and often cited in the scientific literature, there are also drawbacks to conventional conservation methods. Absolute commitment to the conservation of biodiversity often conflicts with anthropocentric concerns including culture, tradition, and livelihood (Minteer and Miller 2011). The well-being of local peoples living in or near protected areas is often pitted against threatened species and threatened ecosystems conservation (Minteer and Miller 2011). Historically, many conservation efforts began with the forced expulsion of local residents to create parks (Sarkar and Montoya 2011). Some scientists now advocate for social ecology models of conservation which require the establishment of socio-cultural goals and the designation of local residents as privileged stakeholders (Sarkar and Montoya 2011). Similarly, many professionals now advocate for a social ecological systems-based approach to ecosystem conservation which links human and biophysical components and consider the costs and benefits of alternative management decisions over a range of ecological, economic, and social objectives (De Young et al. 2008; Berl et al. 2022). Protected area conservation is not the only conservation strategy riddled with issues of inequity. Conservation easements permanently restrict the development potential of a property and often prevent the development of affordable housing. Additionally, conservation easements typically increase the value of surrounding properties, reducing the affordability of the area (Reeves et al. 2018). Further, the conservation movement has historically privileged certain values and worldviews (Friedman et al. 2018). For example, even though

indigenous peoples steward 4% of the land area in the United States, traditional ecological knowledge has been largely excluded by academics, scientists, and policymakers (Kimmerer 2002). These are just a few of the equity issues inherently linked to land conservation and the conservation movement more broadly.

Vermont Wildlife Policy Review

Despite the plethora of federal and state policies impacting terrestrial wildlife, this review was focused on the six previously mentioned regulatory and nonregulatory structures: Act 250, Section 248, the Vermont Endangered Species Law, the Vermont Wetlands Rules, Act 171, and Current Use. The policies were selected because they were deemed to have the greatest impact on terrestrial wildlife conservation in the state. Further, they represent a diversity of policy implementation tools—including several regulatory tools, a planning tool, and an incentive-based tool. The policies are all authorized through state-level statutes and implemented by state or local authorities. Many of the policies have significant statutory overlap and frequently interact with one another. Each of the six policies were systematically reviewed utilizing Najam’s model of the 5C’s protocol of the policy implementation conceptual framework (Najam 1995). The 5C’s are: content, context, commitment, capacity, and clients and coalitions (Najam 1995). The standardized review analyzed the content of the policy, the context of the policy, the commitment of the Department and any other participating entities, the administrative capacity of the Department and other administrating parties in implementing the policy, and the coalitions or parties whose interests are enhanced or threatened by the policy. This review focused on caselaw research, existing reports from the Department, Department-issued guidance documents, and relevant peer-reviewed

scientific literature. The review informed the development of the Vermont Wildlife Policy Gap Survey and the six policies reviewed were central to the survey.

The Vermont Wildlife Policy Gap Survey

Quantitative assessment of six statewide policies for their conservation impacts would be burdensome and overwhelmingly complex. While it may be possible, for example, to quantify empirically how well Act 250 prevents forest fragmentation, by analyzing variables such as the number of projects permitted in forest blocks and the size of the projects, this would be a very timely, costly, and difficult inquiry. In Calendar Year 2020 alone, 339 permit applications were filed to the Natural Resources Board (NRB) for Act 250 review to ascertain meaningful conclusions this analysis would require sifting through years' worth of permitting and mapping data (Vermont Natural Resources Board 2021). Conversely, qualitative survey techniques allow for quick and effective data collection (Pearman-Gillman et al. 2020). The Vermont Wildlife Policy Gap Survey uses a modified illustrative screening matrix framework to identify gaps in Vermont's current policy framework for the conservation of wildlife, eliciting feedback from a selected pool of conservation professionals in Vermont (Nilsson et al. 2012). While many conservation scientists actively shy away from outwardly lobbying for science-related policies, an anonymous survey allows the conservation professionals to provide discreet feedback on public policies related to their area of scientific expertise (Nyssa 2019). The Vermont Wildlife Policy Gap analysis will describe policy coherence among the six policies to identify gaps and synergies between interacting policies that have implications for the conservation of terrestrial wildlife in Vermont (Nilsson et al. 2012).

Hypothesis and Objective

There has not been a comprehensive survey of Vermont's wildlife policies across levels, that could inform current policy directions for wildlife and natural resource authorities and lead to more effective management planning. A survey of the current regulatory structures will reveal gaps where environmental policies are less effective at maximizing wildlife conservation. By identifying these gaps, new priorities and policies can be proposed.

Vermont's participation in wildlife-associated recreation ranks second only to Alaska nationally (U.S. Fish and Wildlife Service 2012). In addition to the ecological importance of wildlife, Vermonter's value wildlife economically and culturally (Roman and Erickson 2015). Maximizing wildlife conservation continues to be a priority for policymakers in Vermont. Recent efforts to amend Act 250 to include forest fragmentation-related criteria and the 2020 passage of the Global Warming Solutions Act show a statewide desire for updating environmental laws. The dynamic natural systems of the state need innovative policy solutions informed by the current gaps in the regulatory structure to address the imminent threats wildlife face in the future.

Hypothesis: Current environmental laws in Vermont only benefit a fraction of wildlife species in need of conservation and many of the current threats to wildlife and wildlife habitat are unaddressed in the current legal system.

Objective: To identify the gaps in the current environmental policy suite and assess the impact of those gaps on the conservation needs of wildlife in Vermont.

Chapter II. Policy Review

Introduction

As a first step in the research process each of the six policies were systematically reviewed utilizing Najam's model of the 5C's protocol of the policy implementation conceptual framework (Najam 1995). The 5C's are: content, context, commitment, capacity, and clients and coalitions (Najam 1995). The standardized review analyzed the content of the policy (i.e., goals and methods), the context of the policy (i.e., the procedures that the VFWD follows in implementation of the policy and any boundaries to implementation), the commitment of the Department and any other participating entities, the administrative capacity of the Department and other administrating parties in implementing the policy, and the coalitions or parties whose interests are enhanced or threatened by the policy. There are a variety of methods for describing policy and policy implementation tools, this methodology provided an opportunity to investigate the commitment and capacity of a natural resources agency. Although the VFWD is not the primary implementing party for each of the six policies, the Department's engagement in each policy was reviewed and highlighted. It is important to note that the Department often summarizes their engagement in Act 250 and Section 248 together, and beyond the statutory link between the two laws, there is significant overlap in the Department's commitment and capacity with regard to these regulatory programs. Additionally, many of the coalitions share similarities across the policies. This review focused on caselaw research, existing reports from the Department, Department-issued guidance documents, and relevant peer-reviewed scientific literature. The review provides an overview of the six policies and informed the development of the Vermont Wildlife Policy Gap Survey.

Act 250

Content

Born in response to development pressure during the 1960s, Vermont's Land Use and Development Law—or Act 250 as it is commonly called today—was signed into law by Governor Dean Davis (Vermont Natural Resources Board n.d.). Act 250 established a quasijudicial regulatory review program for subdivision and development (Vermont Natural Resources Board n.d.). Certain development and subdivision projects require review conducted by one of nine District Environmental Commissions (or District Commissions), where projects are reviewed for compliance with statutory criteria. Projects that fall under Act 250 jurisdiction include construction above an elevation of 2,500 feet, construction on more than 10 acres of land, construction of 10 or more housing units, subdivision creating 10 or more lots, drilling of oil or gas, and several other categories of development (10 V.S.A. § 6001(3)). District Commissioners are volunteer citizen members appointed by the Governor (10 V.S.A. § 6026). Each District Commission consists of three members; two of the members are appointed to four-year terms and the Chair is appointed to a two-year term (10 V.S.A. § 6026). District Commissioners must evaluate Act 250 applications using the ten criteria described in 10 V.S.A. § 6086, which include assessing project impacts on air pollution, water pollution, erosion, transportation, educational services, municipal services, local and regional planning, and others.

Criterion 8 addresses impacts to scenic or natural beauty, aesthetics, historic sites, and rare and irreplaceable natural areas (10 V.S.A. § 6086). Criterion 8A prohibits the granting of a permit if it is demonstrated by any party opposing the applicant that a

development or subdivision will destroy or significantly imperil necessary wildlife habitat or any endangered species habitat (10 V.S.A. § 6086). Criterion 8A has been one of the most significant drivers of habitat conservation through regulatory review in the state of Vermont, the VFWD estimates that 6,000 acres of necessary habitat are protected each year through their Act 250 and Section 248 review (Vermont Fish and Wildlife Department 2021).

Context

Criterion 8A is aimed at preventing destruction or significant imperilment of necessary wildlife habitat or any endangered species habitat. In statute, ‘necessary wildlife habitat’ is defined as concentrated habitat that is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period in its life, including breeding and migratory periods (10 V.S.A. § 6001(12)). This definition has been further qualified in the courts. In *In Re White Sands Realty Company*, the Vermont Environmental Board clarified that necessary wildlife habitat “need not be decisive to the survival of the entire population of a species of wildlife but must be critical only to the survival of a portion of the population which is dependent upon the habitat” (Brooks 1997). This understanding has been upheld in subsequent caselaw.

When reviewing a permit application for Criterion 8A, the District Commission must first determine whether necessary wildlife habitat is present at the site proposed for development or subdivision (Brooks 1997). If present, then the District Commission must decide whether the project will have an impact greater than or equal to ‘significant imperilment’ (Brooks 1997). Generally, if the habitat is going to be modified such that animals are no longer able to physically reside on the site, or if areas near or on the site

will be changed to such a degree that the animals will be scared away, or if the site that contained critical food for the animals will no longer offer that food due to the impact of the proposed development, then ‘significant imperilment’ will occur (Brooks 1997). If it is determined that significant imperilment of necessary wildlife habitat will occur because of a project, then the District Commission proceeds to the subcriterion of Criteria 8A.

Criterion 8A employs a cost-benefit-analysis through three subcriterion. In clear cases of overriding public benefit, the following subcriterion may allow destruction of wildlife (Brooks 1997):

- (i) the economic, social, cultural, recreational, or other benefit to the public from the development or subdivision will not outweigh the economic, environmental, or recreational loss to the public from the destruction or imperilment of the habitat or species; or
- (ii) all feasible and reasonable means of preventing or lessening the destruction, diminution, or imperilment of the habitat or species have not been or will not continue to be applied; or
- (iii) a reasonably acceptable alternative site is owned or controlled by the applicant which would allow the development or subdivision to fulfill its intended purpose (Issuance of permit; conditions and criteria).

When evaluating subcriterion (i), the applicant’s economic investment and the economic impact to the applicant are not considered (Brooks 1997). Subcriterion (ii) has encouraged the introduction of conditions to permit applications. While some applicants include mitigation plans in their initial application, this subcriterion allows District Commissions to mandate certain mitigation activities to reduce impacts (Brooks 1997). The District Commission frequently looks to the VFWD to provide technical assistance in the development of mitigation conditions. If the District Commission finds that the applicant owns or controls a reasonable alternative site to the proposed area, the Board may refuse to grant a permit to the applicant (Brooks 1997). If the District Commission

finds that all three subcriteria are met in an application, then they may rule that Criterion 8A is satisfied.

The implementation of Criteria 8A is bounded by various statutory and caselaw limitations. Under Criterion 8, the applicant has the burden of production, while the party challenging the application has the burden of proof (or persuasion) and must persuade the District Commission that an undue adverse impact exists (Brooks 1997). The *In Re Quechee Lakes* case established the now famous Quechee Test, to determine whether an undue adverse effect will occur. Using the Quechee Test, District Commissions must determine whether a proposed project will have an adverse impact based upon its ‘fit’ with its surrounding (Brooks 1997). If the project would not ‘fit’, it is ‘adverse’ and then the District Commission must conclude whether the adverse impact is ‘undue’ (Brooks 1997). This burden of persuasion or burden of proof can be a difficult burden to meet and often requires the application of legal and scientific expertise, which may create financial limitations. In comparison with Section 248, another limitation is that while Section 248 requires that projects will not have an undue adverse effect on *the natural environment*; Act 250 is much narrower in requiring that projects not have an undue adverse effect on *the scenic or natural beauty of the area, aesthetics, historic sites, or rare and irreplaceable natural areas* (30 V.S.A. § 248(b)(5)) (10 V.S.A. § 6086(8)(A)). Other boundaries include statutory definitions of ‘development’ and ‘necessary wildlife habitat’, as well as jurisdictional triggers which are briefly described above (Vermont). The law has been criticized as not adequately addressing the cumulative impacts of development and failing to meet landscape-level conservation goals. Other limitations include the expertise required of local citizens to meaningfully engage in the process and

the equity and access to the process. Beyond the expertise of the citizens engaging in the process, the expertise of the District Commissioner's may also be limited. There are nine District Commissions which are each composed of a chair, two members, and four alternates (Vermont Natural Resources Board n.d.). District Commissioners must reside in the district from which they serve, and commissioners come from a diversity of backgrounds (Vermont Natural Resources Board n.d.). Because commissioners review a diversity of cases for a broad variety of impacts, each commissioner may have variable expertise across the ten criteria and not every commissioner is an expert on natural resources. These are just a few of the limitations of this historic law, and while much of the caselaw discussed above has bounded the implementation of Act 250, other cases highlight the potential conservation impact of the law.

Building off the *In Re White Sands Realty Company* decision, *Luce Hill Partnership* highlights where the Act has been used to limit cumulative impacts of development, also called the "death by a thousand cuts" (Brooks 1997). In *Luce Hill Partnership*, a developer wanted to build an 11-lot subdivision in a deeryard (Brooks 1997). The applicant argued that because the development would not destroy the entire deeryard, the deer could move to the portion of the deeryard that was not destroyed (Brooks 1997). The Environmental Board denied the application, stating that:

"Such an argument would allow the area to be nibbled away until none of it is left...so long as a portion of the deeryard remains, development of the balance of the yard would escape Act 250 protection."

Despite this case and other related caselaw, Act 250's failure to address the cumulative impacts of development still concerns many conservation professionals. The impact of such cases may not have been precedent setting.

Commitment

The VFWD's engagement in the Act 250 regulatory review process has been largely voluntary since the enactment of the law (Vermont Fish and Wildlife Department 2021). The law provides that any state agency affected by a proposed project is afforded party status (Vermont Fish and Wildlife Department 2021). The NRB, the agency primarily responsible for administration of the review program, may request technical support from state agencies and departments (Vermont Fish and Wildlife Department 2021). However, there is no legal obligation for any other state agency to provide technical support to this process without a formal request (Vermont Fish and Wildlife Department 2021). Through the VFWD's engagement in both the Act 250 regulatory review and Section 248 regulatory review processes, an average of 30,000 acres of necessary wildlife habitat are protected every 5 years and 60,000 acres of habitat since 2009 (Vermont Fish and Wildlife Department 2021). Annually the VFWD reviews an average of 400 permit applications and protects 6,000 acres of necessary wildlife habitat (Department). It is interesting to note that 31,000 acres of the total 60,000 acres protected since 2008 is deer wintering habitat (Vermont Fish and Wildlife Department 2021).

10 V.S.A. § 6086(c), gives District Commissions the power to attach conditions to the approval of an Act 250 permit. For example, two Act 250 land use permit amendments for ski resorts have had conditions related to protecting the Bicknell's thrush, a High Priority Bird Species of Greatest Conservation Need. Jay Peak, Inc. sought to replace an existing wastewater disposal system with a new sewer service connection (Vermont District Seven Environmental Commission 2012). The District Commission

required that any sewer line construction above 3,200 feet elevation remain within the existing trail clearing and that no construction could occur between June 1st and July 15th in this area (Vermont District Seven Environmental Commission 2012). Similarly, when requesting a permit amendment for constructing a new snowmaking water pumphouse, the District Commission stated that construction was prohibited between June 1st and July 31st (Vermont District Seven Environmental Commission 2012). Both conditions were meant to protect nesting Bicknell's thrush. Rather than issuing conditions or sometimes in addition to condition, mitigation for impacts to necessary wildlife habitat may be recommended by ANR as part of a permit. The VFWD has also established mitigation guidelines for the Act 250 and Section 248 processes for several species. For mitigation of impacts to white-tailed deer wintering areas, on-site mitigation should be prioritized and if off-site mitigation is required, land within the town should be prioritized (Vermont Fish and Wildlife Department 1999). The Department has outlined a mitigation ratio of 2:1 (2 acres of deer wintering area protected for every 1 acre impacted) for on-site mitigation and 4:1 for off-site mitigation (Vermont Fish and Wildlife Department 1999). One example of on-site mitigation for deer wintering habitat was the 2013 issuance of a Land Use Permit to the Black Mountain Estates, LLC in Dummerston (District Two Environmental Commission 2013). In this case, the developer who was permitted to develop a retirement facility was required to maintain deed covenants on 7.8 acres of deer wintering habitat on the property to prohibit development and further subdivision (District Two Environmental Commission 2013). The Department has published similar guidance and mitigation ratios for impacts to significant black bear habitat, particularly focused on beech and oak stands (Vermont Fish and Wildlife Department 2006).

Mitigations ratios vary based on the deemed importance of the habitat type, with significant wetland habitat having the highest mitigation ratio of 10:1 (Vermont Fish and Wildlife Department 2006). Bats, grassland birds, and great blue herons also have development review guidelines listed on the Department website.

Capacity

In 2020, the VFWD spent a total of \$407,812 and 7,980 hours, or the equivalent of 3.8 full time employees on regulatory review for both Act 250 and Section 248 review (Written Testimony on Act 250 bill back provision 2021). Regulatory review is largely supported by staff salaries which rely on federal Pittman-Robertson and Dingell-Johnson funds (75%) and state funds (25%) (Porter 2021). It was reported in 2021, that \$163,300 of the total \$211,600 Department funds used for Act 250 review came from federal funds (Coster 2021). Overall Department staff costs for this work in both divisions is ~\$400,000 (Porter 2021). There have been recent legislative efforts to modify the funding structure for the Department's engagement in these processes (Porter 2021). Currently, ANR collects \$0.75 per each \$1,000 of a project for the first \$15M of cost to account defray some of the costs associated with ANR involvement with Act 250 proceedings and review (Coster 2021). Proposed modifications include amending the current billback structure in statute or changing the current Act 250 permit fee structure (Porter 2021). Increasing engagement in regulatory review raises the importance of securing long-term, stable funding sources for the Department.

Coalitions

The primary beneficiaries from the VFWD's engagement in the Act 250 regulatory process are the wildlife species whose habitat is protected or mitigated through

the review process. However, there are several other parties who reap direct and indirect benefits. Consulting firms who provide technical assistance to project applicants are one clear beneficiary of the policy. Additionally, there are multiple benefits to the people of Vermont who derive ecological, economical, and cultural value from wildlife (Roman and Erickson 2015). The Trust for Public Land found that for every \$1 invested in land conservation, which includes Act 250 regulatory review, \$9 are returned in natural goods and services (Trust for Public Land 2018). Further, these regulatory approaches to land protection are viewed favorably by many people in the state. According to a 2015 report conducted by Responsive Management, 83% of Vermonters agree that the use and development of land should be restricted to protect fish and wildlife (Duda et al. 2015). The report also documented strong support (75% strongly favor) the provision of technical assistance as a strategy for protecting land for wildlife (Duda et al. 2015). Yet there are detractors of this policy, and the regulated community bears financial impacts from the costs of review.

Commercial, industrial, and residential developers may be impacted by this regulatory program. Oil and gas exploration and drilling companies will likely have to proceed through review (State of Vermont n.d.). Most foresters and farmers can avoid review except in narrow circumstances (State of Vermont n.d.). In 2020, 50.3% of all Act 250 applications were processed in less than 30 days, while 13.3% of all applications processed took over 120 days (Vermont Natural Resources Board 2021). In the same year, 74.4% of all minor applications took less than 90 days to be processed (Vermont Natural Resources Board 2021). However, 78.6% of all major applications took over 120 days to be processed (Vermont Natural Resources Board 2021). While a slim majority of

all applications are processed in less than 30 days, the processing times for major applications can be significantly greater. A longer processing period can lead to construction delays and increased permitting costs for developers. In 2020, the total permit application fees collected by Act 250 was \$2.091 million (Vermont Natural Resources Board 2021). The impact to the regulated community has caused frequent political pushback to attempts to expand the reach of the law. Policy solutions that expand the conservation impact of the policy without imposing dramatically increased financial burdens to developers would likely receive the greatest political support.

Section 248

Content

30 V.S.A. § 248 requires certain developments to obtain a CPG from the Vermont PUC for energy generation, energy storage, energy transmission, and telecommunication facilities. The CPG is meant to ensure that approved projects promote the general good of the state. The PUC is a quasijudicial board, which consists of a chair and two members, that conducts evidentiary hearings and issues decisions (orders) (Vermont Public Service Board n.d.) (30 V.S.A. § 3). The two members are appointed to a 6-year term by the Governor with the consent of the Senate, and the Chair is nominated, appointed, and confirmed in the manner of a Superior judge (30 V.S.A. § 3). When determining whether to grant a CPG for a proposed project, the Board considers whether the proposed project meets statutory criteria. Before the PUC issues a CPG under this section, it shall find that the proposed facilities cannot have an undue adverse effect on aesthetics, air and water purity, and the natural environment (30 V.S.A. § 248a(c)(1)).

Issuance of a CPG requires that due consideration is given to certain Act 250 criteria, including Criterion 8A (30 V.S.A. § 248(b)(5)). Criterion 8A prohibits the granting of a permit if it is demonstrated by any party opposing the applicant that a development or subdivision will destroy or significantly imperil necessary wildlife habitat or any endangered species habitat (10 V.S.A. § 6086). Criterion 8A has been one of the most significant drivers of habitat conservation through regulatory review in the state of Vermont, the VFWD estimates that 6,000 acres of necessary habitat are protected each year through their Act 250 and Section 248 review (Vermont Fish and Wildlife Department 2021).

30 V.S.A. § 248(p) requires that woody biomass energy generation facilities receiving a CPG must annually disclose the amount, type, and source of wood acquired to generate energy. The VFWD has entered into CPG agreements with Ryegate Associates and the City of Burlington Electric Department (BED) to review timber harvest notifications (Vermont Public Service Board 1981, 1992). Under the conditions of the order entered on June 22nd, 1983, between the BED and the Public Service Board of Vermont (PSB, now the PUC), BED's timber harvester shall advise the VFWD in advance of harvesting operations and adhere to the VFWD's recommendations regarding harvest near deeryards, wetlands, or the habitat of any endangered species (Vermont Public Service Board 1983). Under the Memorandum of Understanding entered between the Ryegate Associates, the Vermont Agency of Natural Resources, and the Vermont Department of Public Service on December 1st, 1992, the Ryegate Wood Energy Company shall develop and send a "whole tree chip/roundwood harvest notification" to the appropriate VFWD biologist (Vermont Agency of Natural Resources 1992). The BED CPG has been amended twice (in 2008 and 2009) to limit the scope of timber harvest activities that require review (Austin 2019). The 2009 amendment exempted timber harvest notification for harvest operations that have been certified by a recognized third-party and that did not include areas with known wetlands, deer wintering areas, or endangered or threatened species habitat (Austin 2019). Ryegate Associates has not pursued similar amendments (Austin 2019).

Context

Under 30 V.S.A. § 248(a)(4)(E), the ANR is required to appear as a party under any Section 248 proceedings to provide evidence and offer recommendations with

respect to effects on the natural environment and the relevant Act 250 criteria described above (30 V.S.A. § 248(b)(5)). The authority granted under Act 250 at 10 V.S.A. § 6086(c), gives the District Commission the power to attach conditions to the approval of an Act 250 permit or to a §248 CPG. Mitigation for impacts to necessary wildlife habitat may be recommended by ANR as a condition of the CPG and then required by the District Commission.

Under the conditions of the order entered between the BED and the PSB, VFWD biologists have 15 days to respond to a “whole tree chip/roundwood harvest notification” with an approval or modification of the proposed operation (Vermont Public Service Board 1981). A biologist may determine that modification is necessary to protect deer wintering areas, wetlands, or the habitat of threatened or endangered species (Vermont Public Service Board 1981). A similar process is described for Memorandum of Understanding entered for the Ryegate Associates CPG (Vermont Agency of Natural Resources 1992).

The implementation of §248 is bounded by various statutory and caselaw limitations with respect to its potential to advance wildlife conservation objectives. The review only applies to energy generation, energy storage, energy transmission, and telecommunication facilities. The review process described in the BED and Ryegate Associates CPG’s is limited only to impacts to deer wintering areas, wetlands, or the habitat of threatened or endangered species (Vermont Public Service Board 1983, 1992). Further, VFWD biologists have a short timeline to conduct this review (15 days) (Vermont Public Service Board 1983, 1992). Criterion 8A of Act 250 creates other limitations that have been described in the Act 250 section. In sum, these limitations

include: the Queechee Test, the difficulty of meeting the burden of proof as a project opponent, and the statutory definition of ‘necessary wildlife habitat’. One difference between Act 250 and §248 is that 24 V.S.A. §248(b)(1) requires that due consideration is given to the recommendations of the municipal and regional planning commissions, the recommendations of the municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality. Meanwhile, Act 250 requires applications are in “conformance with any duly adopted local or regional plan” (10 V.S.A. 6086(a)(10)). While §248 is limited by some caselaw, recent PUC orders highlight how the review program may contribute to conservation goals in the future.

A 2017 order may set a precedent for habitat conservation in §248 proceedings (Vermont Public Utility Commission 2017). In this case, the PUC rejected the proposed construction of a Verizon Wireless cell tower due to the potential for disturbance to the Shutesville Hill wildlife corridor (Vermont Public Utility Commission 2017). The Shutesville Hill wildlife corridor was deemed a ‘rare and irreplaceable natural area’ and the PUC found that the project violates 10 V.S.A. § 6086(a)(8) because the fragmenting effects of the tower would result in an undue adverse impact to a rare and irreplaceable natural area and the natural environment (Vermont Public Utility Commission 2017). The PUC also found that the tower was not in keeping with the Waterbury town plan which recommends protecting critical wildlife corridors and avoiding forest fragmentation (Vermont Public Utility Commission 2017). This is just one example of how the law may be applied in the future for a broader conservation impact.

The language of the statute may also provide for a broader conservation impact. In comparison with Act 250, while Act 250 is narrower in requiring that projects not have

an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites, or rare and irreplaceable natural areas; Section 248 requires that projects will not have an undue adverse effect on the natural environment (10 V.S.A. § 6086(8)(A)) (30 V.S.A. § 248(b)(5)). Preventing an undue adverse effect on the natural environment allows the PUC to consider a much broader scope of environmental impacts in their permitting decisions.

Commitment

Through the VFWD's engagement in both the Act 250 regulatory review and Section 248 regulatory review processes, an average of 30,000 acres of necessary wildlife habitat are protected every 5 years and 60,000 acres of habitat since 2009 (Vermont Fish and Wildlife Department 2021). Annually the VFWD reviews an average of 400 permit applications and protects 6,000 acres of necessary wildlife habitat (Vermont Fish and Wildlife Department 2021). It is interesting to note that 31,000 acres of the total 60,000 acres protected since 2008 is deer winter habitat (Vermont Fish and Wildlife Department 2021).

In addition to timber harvest notification review, the Department also engages in this regulatory program through the production and application of their established mitigation guidelines for several species. For mitigation of impacts to white-tailed deer wintering areas, on-site mitigation should be prioritized and if off-site mitigation is required, land within the town should be prioritized (Vermont Fish and Wildlife Department 1999). The VFWD has outlined a mitigation ratio of 2:1 (2 acres of deer wintering area protected for every 1 acre impacted) for on-site mitigation and 4:1 for off-site mitigation (Vermont Fish and Wildlife Department 1999). The VFWD has published

similar guidance and mitigation ratios for impacts to significant black bear habitat, particularly focused on beech and oak stands (Vermont Fish and Wildlife Department 2006). Mitigation ratios vary based on the deemed importance of the habitat type, with significant wetland habitat having the highest mitigation ratio of 10:1 (Vermont Fish and Wildlife Department 2006). Bats, grassland birds, and Great Blue Herons also have development review guidelines listed on the Department website. The VFWD has also issued guidance for rare, threatened, and endangered plant species inventories in the Section 248 process (Vermont Agency of Natural Resources 2016). These are just a few examples of the VFWD's engagement in the Section 248 process.

Capacity

In 2020, the VFWD spent a total of \$407,812, 7,980 hours, or the equivalent of 3.8 full time employees on regulatory review for both Act 250 and Section 248 review (Porter 2021). Regulatory review is largely supported by staff salaries which rely on federal Pittman-Robertson and Dingell-Johnson funds (75%) and state funds (25%) (Porter 2021). Overall VFWD staff costs for this work in both divisions is ~\$400,000 (Porter 2021). Additionally, in 2020, the ANR received \$224,348 in total fees under 30 V.S.A. § 248b (Coster 2021). These fees came from the review of 31 generation facilities, 14 telecommunication facilities, and 6 transmission facilities (Coster 2021). The VFWD's engagement in the § 248 process is not supported by these fees (Coster 2021).

Coalitions

The primary beneficiaries from the VFWD's engagement in the Act 250 regulatory process are the wildlife species whose habitat is protected or mitigated through

the review process. However, there are several other parties who reap direct and indirect benefits. Consulting firms who provide technical assistance to project applicants are another beneficiary of the policy. Energy generation, energy storage, and energy transmission may be burdened by the regulatory process and associated permitting costs. Similar impacts are experienced by telecommunication facilities seeking project approval. Regulatory review can be costly, in 2020 the cost of § 248b fees ranged between \$63 to \$64,000 for an application (Coster 2021).

Vermont Endangered Species Law

Content

The Vermont Endangered Species Law (VESL) is found at 10 V.S.A. § 5401-5410. Under the authority of the VESL, the Secretary of the ANR shall adopt a State endangered species list and a State threatened species list (10 V.S.A. § 5402(a)). A species is endangered if it normally occurs in the State and its continued existence as a sustainable component of the State is in jeopardy (10 V.S.A. § 5402(b)). A species is threatened if it is reasonable to conclude that its numbers are declining and unless it is protected, it will become an endangered species (10 V.S.A. § 5402(c)). There are several factors that the Secretary must consider when determining whether a species is threatened or endangered:

the present or threatened destruction, degradation, fragmentation, modification, or curtailment of the range or habitat of the species; any killing, harming, or over-utilization of the species; disease or predation affecting the species; the adequacy of existing regulation; actions relating to the species carried out or about to be carried out that may affect the species; competition with other species; the decline in the population; cumulative impacts; and other natural or human-made factors affecting the continued existence of the species (10 V.S.A. §5402(d)).

In this determination, the Secretary must use the best scientific, commercial, and other data available (10 V.S.A. §5402(e)(1)). The Endangered Species Committee (ESC), which consists of 9 members who are appointed by the governor with expertise in relevant fields, advises the Secretary on listing decisions (10 V.S.A. § 5404). As of 2015, there were 36 species of wildlife listed as state-endangered and 16 species listed as threatened (Vermont Fish and Wildlife Department 2015).

It is illegal to take, possess, or transport wildlife that are members of a threatened or endangered species (10 V.S.A. §5403(a)(1)). ‘Take’ or ‘taking’ is defined as:

pursuing, shooting, hunting, killing, capturing, trapping, harming, snaring, or netting wildlife; or an act that creates a risk of injury to wildlife, whether or not the injury occurs, including harassing, wounding, or placing, setting, drawing, or using any net or other device used to take animals (10 V.S.A. §5401(18)(a)).

And ‘harming’ as used in the definition of ‘take’, means:

an act that kills or injures a threatened or endangered species; or the destruction or imperilment of habitat that kills or injures a threatened or endangered species by significantly impairing continued survival or essential behavioral patterns, including reproduction, feeding, or sheltering (10 V.S.A. §5401(11)).

Taking of a threatened or endangered species may only be permitted by the Secretary if the taking is an authorized taking or an incidental taking. An authorized taking of a threatened or endangered species may be permitted by the Secretary after obtaining advice from the ESC if the taking is done for one of these purposes: scientific purposes, to enhance the survival of a threatened or endangered species, zoological exhibition, educational purposes, noncommercial cultural or ceremonial purposes, or special purposes consistent with the purposes of the federal Endangered Species Act (10 V.S.A. §5408(a)). An incidental taking of a threatened or endangered species may be permitted by the Secretary after obtaining advice from the ESC if:

the taking is necessary to conduct an otherwise lawful activity; the taking is not the purpose of the lawful activity; the impact of the permitted incidental take is minimized; and the incidental taking will not impair the conservation or recovery of any endangered species or threatened species (10 V.S.A. §5408(b)).

Both authorized taking and incidental taking permits have a term of 5 years (10 V.S.A. §5408(j)).

Finally, the Secretary may issue general permits for activities that will not affect the continued survival or recovery of a threatened or endangered species (10 V.S.A. §5408(l)). The Secretary may issue a general permit only if an activity or class of activities satisfies one of the following criteria:

the taking of a threatened or endangered species or the destruction of or adverse impact on critical habitat is necessary to address an imminent risk to human health; a proposed taking of a threatened or endangered species or the destruction of or adverse impact on critical habitat would enhance the overall long-term survival of the species; or the Secretary has approved best management practices that are designed, when applied, to minimize to the greatest extent possible the taking of a threatened or endangered species or the destruction of or adverse impact on critical habitat (10 V.S.A. §5408(1)(4)).

General permits have a 5-year term (10 V.S.A. §5408(1)(5)). A recent addition to the statute, critical habitat designation, has broadened the VESL's wildlife conservation impact.

On May 28th, 2016, Governor Shumlin signed Act 145 into law, amending the VESL at §5402 to create a process for critical habitat designation (Representative Deen 2016). The Secretary may adopt or amend by rule a critical habitat designation list for threatened or endangered species (10 V.S.A. §5402a(a)). It is not required that the Secretary designate critical habitat for every threatened or endangered species (10 V.S.A. §5402a(a)). Critical habitat may be designated in any part of the state (10 V.S.A. §5402a(a)). Critical habitat is defined as a delineated location within the geographical area occupied by the species that:

has the physical or biological features that are identifiable, concentrated, and decisive to the survival of a population of the species; and is necessary for the conservation or recovery of the species; and may require special management considerations or protection (10 V.S.A. 5401(4)).

Critical habitat may also be defined as a delineated location outside the geographical area occupied by a species at the time it is listed that:

was historically occupied by a species or contains habitat that is hydrologically connected or directly adjacent to occupied habitat; and contains habitat that is identifiable, concentrated, and decisive to the continued survival of a population of the species; and is necessary for the conservation or recovery of the species (10 V.S.A. 5401(4)).

When considering designating critical habitat, the Secretary must consider several factors, including:

the current or historic use of the habitat by the species; the extent to which the habitat is decisive to the survival and recovery of the species at any stage of its life cycle; the space necessary for individual and population growth of the species; the nutritional or physiological requirements of the species; cover or shelter for the species; sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; migration corridors; and overwintering; the present or threatened destruction, degradation, fragmentation, modification, or curtailment of the range or habitat of the species; the adequacy of existing regulation; actions relating to the species carried out or to be carried out that may affect the listed species; cumulative impacts; and natural or human-made factors affecting the continued existence of the species (10 V.S.A. §5402a(b)).

Similar to the listing of threatened or endangered species, when designating critical habitat, the Secretary must use the best scientific, commercial, and other data available (10 V.S.A. §5402a(c)(1)).

It is illegal to destroy or adversely impact critical habitat of a threatened or endangered species (10 V.S.A. §5403(a)(2)). ‘Destroy or adversely impact’ refers to a direct or indirect activity that negatively affects the value of critical habitat for the survival, conservation, or recovery of a listed threatened or endangered species (10 V.S.A. §5401(5)). The destruction of, or adverse impact to critical habitat may be permitted as an authorized taking (10 V.S.A. §5408(a)). The destruction of, or adverse impact to critical habitat may also be permitted as an incidental taking (10 V.S.A. §5408(b)).

Context

The VESL is modeled after the federal Endangered Species Act (ESA) which was passed in 1973 (Coggins et al. 2014). The VESL utilizes similar language and similar provisions as the ESA. §7 of the ESA provides that federal agencies must ensure that

their actions are not likely to ‘jeopardize the continued existence’ of a listed species and §5402 of the VESL states that the Secretary shall determine a species to be endangered if “its continued existence as a sustainable component of the State's wildlife...is in jeopardy” (Coggins et al. 2014) (10 V.S.A. §5402(b)). §5402 of the VESL, “Endangered and threatened species list” mirrors §6 of the ESA which defines the federal listing and delisting process for species (10 V.S.A. §5402) (Coggins et al. 2014). The ESA’s prohibition on ‘take’ in §9, is similar to VESL’s §5403 “Protection of endangered and threatened species” (Coggins et al. 2014) (10 V.S.A. §5403). The incidental take permitting process described in §10 of the ESA shares similarities with VESL’s §5408 “Authorized takings; incidental takings; destruction of critical habitat” (Coggins et al. 2014) (10 V.S.A. §5408). Additionally, the provisions in §4 of the ESA related to species recovery planning are comparable to the recovery planning authority of the VESL (Coggins et al. 2014) (10 V.S.A. §5405).

Under 10 V.S.A. §5405 the Secretary has the authority to establish conservation and recovery programs for the conservation or recovery of threatened or endangered wildlife species or for the conservation or recovery of critical habitat. These conservation or recovery programs may include the purchase of habitat and the formation of contracts for the purpose of management of wildlife refuge areas (10 V.S.A. §5405). There are currently recovery plans for 14 species of wildlife and fish in Vermont ([Table 4. VESL Species Recovery Plans Table](#)) (Vermont Agency of Natural Resources 2022). Nine of these recovery plans are for species that are currently listed as threatened or endangered (Vermont Fish and Wildlife Department 2015). Several species with a recovery plan, including the bald eagle (*Haliaeetus leucocephalus*), the Peregrine falcon (*Falco*

peregrinus), the common loon, and the Osprey (*Pandion haliaetus*), were all recently delisted (Vermont Fish and Wildlife Department 2015) (Cotton 2021; Vermont Agency of Natural Resources 2022). This may suggest the success of recovery plans in assisting the conservation of threatened and endangered species. Finally, there is a recovery plan for Vermont grassland birds generally which includes specific species recovery plans for the upland sandpiper, the grasshopper sparrow, the sedge wren (*Cistothorus stellaris*), and the Henslow's sparrow (*Ammodramus henslowii*) which are all listed as threatened or endangered species in Vermont (Vermont Agency of Natural Resources 2022) (Mark LaBarr 2014; Vermont Fish and Wildlife Department 2015). Recovery plans typically include a discussion of the species natural history, the species distribution in Vermont, current monitoring and management efforts, threats to the species survival in Vermont, and recommendations for the recovery of the species (LaBarr et al. 2014). While species recovery plans are one method of conserving threatened and endangered species, several threatened and endangered species benefit from conservation efforts that stem from the SWG program which is further discussed below. However, the primary avenue through which the VFWD contributes to the conservation of these species is through the permitting process.

Under 10 V.S.A. §5408(i)(2), the Secretary has the authority to require the implementation of mitigation strategies and collect mitigation funds to mitigate the impacts of an authorized or incidental taking, or the destruction of, or adverse impact on critical habitat. Mitigation may include:

a requirement to rectify the taking or to reduce the adverse impact over time; a requirement to restore land within the area of the proposed activity or in an area outside the proposed area as habitat for the threatened or endangered species; or

compensation, including payment into the Threatened and Endangered Species Fund, provided that any payment is commensurate with the taking or adverse impact proposed (10 V.S.A. §5408(i)(2)).

Similarly, when issuing a general permit, the Secretary has the authority to require the implementation of best management practices and the adoption of specific mitigation measures and required surveying, monitoring, and reporting (10 V.S.A. §5408(i)(3)).

There are several limitations to the implementation of the VESL, found both in the language of the statute and in recent legal proceedings. One statutory limitation to the VESL is the optional nature of critical habitat designation, which is not required for any threatened or endangered species. 10 V.S.A. 5402a(a) states that “the Secretary *may*...adopt or amend by rule a critical habitat designation list for threatened or endangered species”, and that, “...the Secretary *shall not be required* to designate critical habitat for every State-listed threatened or endangered species.” In October 2021, the VFWD held a public hearing on proposals for several critical habitat designations (Vermont Agency of Natural Resources 2021). In February 2022, the Department designated critical habitat for the common tern (*Sterna hirundo*), little brown bats (*Myotis lucifugus*), and spiny softshell turtles (*Apalone spinifera*) (Vermont Agency of Natural Resources 2022). Green Mountain Audubon, The Nature Conservancy, and the state of Vermont own 7 out of the 8 sites proposed for critical habitat designation (Vermont Agency of Natural Resources 2021, 2022). One criticism of the implementation of the VESL is the lack of critical habitat designations and critical habitat designations under the federal ESA are often met by strong resistance from private landowners. Another criticism of the implementation of the VESL is the lack of recovery planning. Similar to the language related to critical habitat designation, the language for recovery planning

found at 10 V.S.A. §5405 states that “the Secretary...*may* establish conservation programs and establish recovery plans for the conservation or recovery of threatened or endangered species of wildlife”. As noted above, very few recovery plans have been published and implemented, despite successful delisting of several threatened and endangered species with recovery plans.

Another potential limitation to the implementation of the VESL is the power of the ESC, which is limited to a purely advisory role. The ESC is a 9-member committee composed of the Secretary of Agriculture, Food and Markets, the Commissioner of Fish and Wildlife, the Commissioner of Forests, Parks, and Recreation, and six members appointed by the Governor from the public at large with expertise in relevant fields (10 V.S.A. §5404(a)). It is the responsibility of the ESC to advise the Secretary “on all matters relating to endangered and threatened species” (10 V.S.A. §5404(b)). Scientific Advisory Groups (SAG’s) composed of conservation experts help inform the ESC on listing decisions and assist the ESC in providing advice to the Secretary. There are six SAGs: mammals, birds, invertebrates, reptiles and amphibians, fish, and flora.

Ultimately, final action on any endangered or threatened species is at the discretion of the Secretary. The Secretary seeks advice from the ESC in permitting decisions (10 V.S.A. §5403); in recovery planning (10 V.S.A. §5404); in issues of authorized taking, incidental taking, or destruction of critical habitat (10 V.S.A. §5408); and in listing and critical habitat designation decisions (10 V.S.A. §5404(b)). The Secretary is not required to follow the recommendations of the ESC and some feel that the ESC should wield more power in the VESL implementation process.

Another statutory limitation of the VESL is authorized and incidental taking. As discussed above, an authorized taking may be permitted if the taking is done for: scientific purposes, to enhance the survival of a threatened or endangered species, zoological exhibition, educational purposes, noncommercial cultural or ceremonial purposes, or special purposes consistent with the purposes of the federal Endangered Species Act (10 V.S.A. §5408(a)). Some may not perceive zoological exhibition or educational purposes as legitimate justification for taking. An incidental taking may be permitted if: the taking is necessary to conduct an otherwise lawful activity; the taking is not the purpose of the lawful activity; the impact of the permitted incidental take is minimized; and the incidental taking will not impair the conservation or recovery of any endangered species or threatened species (10 V.S.A. §5408(b)). Additionally, no incidental take, or authorized take permit or rule shall interfere with farming, forestry operations, or accepted silvicultural practices (10 V.S.A. §5408(e)). This means that the imposition of conditions in a permit which restrict farming or forestry may not be allowed, significantly limiting the reach of the permitting program. Recently there has been considerable debate over the potential incidental taking of bats as a result of otherwise lawful pesticide application and the Department's decision to not require an incidental taking permit (Gjessing 2021).

The Vermont Law School (VLS) requested the ESC consider whether an incidental take permit was required for pesticide spraying by the Brandon-Leicester-Salisbury-Goshen-Pittsford (BLSG) Insect Control District (Gjessing 2021). As discussed above, the Secretary is not required to follow recommendations of the ESC. VLS suggests that an incidental take permit be required because the VESL defines 'take' as an

act that creates a risk of injury to wildlife, *whether or not the injury occurs* (10 V.S.A. §5401(18)(ii)). An independent scientific report found that the BLSG pesticide application program “is likely to present a high risk of exposure and injury to one or more individuals of...listed bat species” (Parsons 2020). The report found that bats flying through pesticide plumes are likely to experience acute toxic and sub-lethal effects on physiology (Parsons 2020). However, the Department argued that there is no evidence that demonstrates what impact the pesticide use at has or will have on bats in the area where spraying occurs and that requiring a permit in this case would require the adoption of a ‘precautionary principle’ (Gjessing 2021). The precautionary principle suggests that in the face of scientific uncertainty about impacts to a species, permitting agencies should proceed with precaution and “give the species the benefit of the doubt” (Gjessing 2021). The Department argued that there are no clear examples of utilization of the precautionary principle in VESL permitting and held that “there must be a reasonable likelihood (risk) of adverse impact such as injury or harm to the species” for a permit to be required (Gjessing 2021). Some may challenge this interpretation of the law and suggest that a precautionary principle be instituted. These are just a handful of the potential limitations to the implementation of the VESL.

Commitment

The VFWD Natural Heritage Inventory (VNHI), within the VFWD Wildlife Diversity Program, primarily oversees the implementation of the VESL (Vermont Fish and Wildlife Department 2022). The VESL interfaces with many other conservation-oriented policies in Vermont. The VNHI is often called upon to conduct rare, threatened, and endangered species inventories as a condition of permit approval for several

regulatory structures. Criterion 8A of Act 250 prohibits the granting of a permit if a development or subdivision will destroy or significantly imperil or any endangered species habitat (10 V.S.A. §6086). Because due consideration is granted to certain Act 250 criteria in the Section 248 process, including Criterion 8A, Section 248 also prohibits the granting of a permit if it will destroy or significantly imperil or any endangered species habitat (30 V.S.A. § 248(b)(5)) (10 V.S.A. § 6086). The VFWD has issued guidance for rare, threatened, and endangered plant species inventories in the Section 248 process (Vermont Agency of Natural Resources 2016). Functional Criteria 5.6 of the Vermont Wetland Rules: Rare, Threatened, and Endangered Species Habitat requires credible documentation that the wetland currently provides or has provided in the last 10 years “important habitat for any species on the federal or state threatened or endangered species list of animals” (Vermont Agency of Natural Resources 2020). Finally, in the Vermont Use Value Appraisal program one of the forestland eligibility categories, Ecologically Significant Treatment Areas (ESTA), includes Rare, Threatened, and Endangered Species Habitat (Vermont Agency of Natural Resources 2010). The presence of rare, threatened, or endangered species must be confirmed by VFWD for enrollment as an ESTA based on rare, threatened, and endangered species (Vermont Agency of Natural Resources 2010). The VFWD has developed “Standards for Mapping, and Documenting Significant Natural Communities, Vernal Pools, and Rare Plant and Animal Species for Use Value Appraisal (UVA) Enrollment as Ecologically Significant Treatment Areas (ESTA’s)” to guide inventories in the ESA process (Vermont Agency of Natural Resources 2010). Beyond identification and inventory, the VESL may also be triggered in the permitting programs of Act 250, Section 248, or the Vermont Wetland Rules.

Through the authority granted the Secretary of the ANR, the VFWD is the primary permitting agency for authorized taking, incidental taking, and general permits (10 V.S.A. §5408). The Secretary has the authority to require the implementation of mitigation strategies and collect mitigation funds (10 V.S.A. §5408). One example of the use of mitigation in regard to a species listed under the VESL, is the Deerfield Wind project (Vermont Public Utility Commission 2009). In the final order for the project, the PUC noted that acoustic surveys in the project area documented the presence of several *Myotis* species, which could include several *Myotis* species listed as threatened or endangered under the VESL including: the Eastern small-footed bat (*Myotis leibii*), the little brown bat, the Northern long-eared bat (*Myotis keenii*), the Indiana bat, and the tri-colored bat (*Perimyotis subflavus*) (Vermont Public Utility Commission 2009; Vermont Fish and Wildlife Department 2015). The amended Certificate of Public Good issued for this project in 2009 required several forms of monitoring and mitigation (Vermont Public Utility Commission 2009). As a first step, the developer was required to submit a post-construction bat mortality study to the Public Utility Commission (Vermont Public Utility Commission 2009). Working with the VFWD, the developer would then review the mortality study and if bat fatality estimates exceed established threshold ranges for mortality at wind projects, Deerfield must submit an adaptive management plan to ANR (Vermont Public Utility Commission 2009). This is one example of how the imposition of conditions during the permitting process may be utilized in relation to VESL-listed species in another regulatory program.

Capacity

10 App. V.S.A. §25(d) describes that the Vermont Nongame Wildlife Fund, which is supported by proceeds from sale of vehicle conservation license plates, federal funding sources, the business community, grants, voluntary contributions on tax returns, and other sources and will fund projects coordinated by the VNHI. These projects include inventories and status assessments that may inform VESL listing decisions (10 App. V.S.A. §25(d)(1)). These projects also include planning assistance and environmental review, such as engagement in the Act 250 process (10 App. V.S.A. §25(d)(3)). In Fiscal Year 2020, the Nongame Wildlife Fund was valued at \$150,827 and the Threatened and Endangered Species Fund was valued at \$39,628 (Vermont Agency of Natural Resources 2021). In 2020, the VFWD spent a total of \$407,812 and 7,980 hours, or the equivalent of 3.8 full time employees on regulatory review for both Act 250 and Section 248 review which may have included VESL-related review (Porter 2021). Regulatory review is largely supported by staff salaries which rely on federal Pittman-Robertson and Dingell-Johnson funds (75%) and state funds (25%) (Porter 2021). Threatened and endangered species conservation work was also likely supported by federal funding programs. Through the Competitive-SWG Program, the U.S. Fish and Wildlife Service distributes these funds to eligible state agencies (U.S. Fish and Wildlife Service 2020). In 2020, the state of Vermont received \$3,647,470 in federal funding through the SWG Program (U.S. Fish and Wildlife Service 2020). Nationwide, fish and wildlife agencies are often criticized for putting significantly more resources towards game species management. For example, since 2009, approximately half of the habitat protected by VFWD through Act 250 and Section 248 (~31,000 acres) has been deer wintering habitat (Vermont Fish

and Wildlife Department 2021). Hunting, fishing, and trapping licenses and taxes on gear related to these forms of recreation account for approximately 70% of Vermont's wildlife conservation funds (Vermont Fish and Wildlife Department 2015). Moving forward, the VFWD may look to diversify their funding sources to support further threatened and endangered species conservation efforts.

Coalitions

The primary beneficiaries from the VFWD's engagement in the VESL are the wildlife species whose habitat is protected or mitigated through the listing and critical habitat designation process, as well as the threatened and endangered species whose habitat is protected or mitigated through other regulatory review processes. However, there are several other parties who receive direct and indirect benefits. Consulting firms who provide technical assistance to project applicants and conduct threatened and endangered species inventory are another clear beneficiary of the policy. Detractors of this policy include the regulated community as well as private property owners who fear future regulatory implications.

Generally, threatened and endangered species conservation is viewed favorably in Vermont. As recently reported in the 2015 study, "Opinions on Fish, Wildlife, and Land Use Among Vermont Residents, Hunters, and Anglers", 95% of Vermonters believe that protecting endangered species is very or somewhat important (Duda et al. 2015). Additionally, 96% of residents agree with the statement "threatened and endangered species must be protected" (Duda et al. 2015). This may provide justification for strengthening the policy.

Vermont Wetlands Rules

Content

The authority for regulation in wetlands comes from 10 V.S.A. § 901, which “...declares the policy of the State that the water resources of the State shall be protected, regulated and, where necessary, controlled under authority of the State in the public interest and to promote the general welfare”. The Vermont DEC holds the power to propose to the Secretary of the ANR specific wetlands to be designated as Class I wetlands and to issue or deny permits for certain activities within wetlands (10 V.S.A. § 905b(18)) (Vermont Agency of Natural Resources 2020). The Secretary may designate a wetland as Class II or Class III upon a petition or upon their own motion and may recommend to the panel that a wetland be classified as a Class I wetland (10 V.S.A. § 914). Wetland determinations are based on an evaluation of the functions and values described in the Vermont Wetland Rules (the Rules) (Vermont Agency of Natural Resources 2020). A Class I wetland is a wetland identified on the Vermont Significant Wetlands Inventory (VSWI) maps as a Class I wetland, a wetland that the former Water Resources Board identified in rules of the Board as a Class I wetland, or a wetland that the Secretary determines is exceptional or irreplaceable in its contribution to Vermont's natural heritage and, therefore, merits the highest level of protection (10 V.S.A. § 902). A Class II wetland is a wetland other than a Class I or Class III wetland that is a wetland identified on the VSWI maps or that the Secretary determines to merit protection (10 V.S.A. § 902). A Class III wetland is a wetland that is neither a Class I wetland nor a Class II wetland (10 V.S.A. § 902). Any Class I or Class II wetland is considered a ‘significant wetland’ (10 V.S.A. § 902). Any person may petition the Secretary to classify

any wetland as Class I, or to reclassify any Class I wetland to a lower class (Vermont Agency of Natural Resources 2020). The DEC requires a permit for any construction or activity in a Class I or Class II wetland or it's buffer zone unless the use is defined as an allowed use (10 V.S.A. § 913).

The Rules are adopted under the authority of the Secretary pursuant to 10 V.S.A. § 905b(18) and outline exemptions to regulation, the wetland classification system, the functional criteria for evaluating wetlands, allowed uses in wetlands, wetland petitions, wetland determinations, the permitting program, and other aspects of the state's wetland regulation program (Vermont Agency of Natural Resources 2020). Because the DEC implements the permitting program described in the Rules, the VFWD has limited jurisdiction in the regulation of wetlands. VFWD is consulted when there are issues surrounding particular functional criteria including: Fish Habitat, Wildlife Habitat, Exemplary Wetland Natural Communities, and Rare, Threatened, and Endangered (RTE) Species (Vermont Agency of Natural Resources 2020).

Context

The VSWI maps describe the approximate location of significant wetlands (Vermont Agency of Natural Resources 2020). Wetland and wetland boundary delineation is conducted using the Federal Manual for Identifying and Delineating Jurisdictional Wetlands authored by the U.S. Army Corps of Engineers which examines vegetation, soils, and hydrology (Vermont Agency of Natural Resources 2020). A default 100-foot buffer zone is established contiguous to the boundaries of a Class I wetland unless the Secretary designates otherwise (Vermont Agency of Natural Resources 2020). There are 10 functional criteria which the Secretary uses to evaluate a wetlands

significance when making a determination of classification (Vermont Agency of Natural Resources 2020). The functional criteria include: Water Storage for Flood Water and Storm Runoff, Surface and Ground Water Protection, Fish Habitat, Wildlife Habitat, Exemplary Wetland Natural Community, RTE Species Habitat, Education and Research in Natural Sciences, Recreational Value and Economic Benefits, Open Space and Aesthetics, and Erosion Control (Vermont Agency of Natural Resources 2020).

Under the Wildlife Habitat criterion, consideration is given to the extent that the wetland provides habitat for migratory waterfowl, wading birds, and other migratory birds (Vermont Agency of Natural Resources 2020). The extent to which the wetland provides white-tailed deer wintering habitat, or habitat for black bear, bobcat, moose, muskrats, otter, mink, and beaver is also considered (Vermont Agency of Natural Resources 2020). Consideration is granted to habitat for species of amphibians and reptiles, including those amphibians which utilize vernal pools (Vermont Agency of Natural Resources 2020). Finally, certain landscape considerations are examined including evidence of use by wetland-dependent wildlife species, conservation-oriented management goals for a property, and various conditions indicative of wildlife habitat diversity (Vermont Agency of Natural Resources 2020). Under the Exemplary Wetland Natural Community criterion, wetlands that are identified as high-quality examples of a natural community type are evaluated based on their rarity and ecological features (Vermont Agency of Natural Resources 2020). Under the RTE Species Habitat criterion, wetlands are evaluated upon the existence of credible documentation of current or recent use of the habitat by a state or federal RTE species (Vermont Agency of Natural Resources 2020). When evaluating whether a wetland is a Class I or Class II wetland, the

Secretary considers the number of and/or extent to which protected functions and values are provided by a wetland (Vermont Agency of Natural Resources 2020).

DEC requires a permit for any construction or activity in a Class I or Class II wetland or its buffer zone unless the construction or activity is defined as an allowed use or if the wetland is exempted from regulation (10 V.S.A. § 913). There are several exemptions to the Rules related to agriculture, existing constructed features, and public highways. Areas used to “grow food or crops in connection with farming activities” are exempt from the Rules (10 V.S.A. § 905b(18)(C)). The Rules define farming activities as:

“...the cultivation or other use of land for growing food, fiber, Christmas trees, maple sap, or horticultural and orchard crops; and the growing of food and crops in connection with the raising, feeding, or management of livestock, poultry, equines, fish farms, or bees for profit” (Vermont Agency of Natural Resources 2020).

Existing constructed features exempt include: stormwater conveyance, wastewater treatment infrastructure, manure storage and treatment ponds, irrigation and active farming-related ponds, snowmaking ponds, and other similar constructed ponds in uplands (Vermont Agency of Natural Resources 2020). Finally, all public highways which have an Act 250 permit prior to February 23rd, 1990, are exempt (Vermont Agency of Natural Resources 2020).

The Rules list 25 allowed uses, including several related to forestry and agriculture (Vermont Agency of Natural Resources 2020). For example, silvicultural activities that restrict log landings to uplands or buffer zones are an allowed use (Vermont Agency of Natural Resources 2020). Additionally, silviculture activities in deer wintering yards that comply with VFWD and VDFPR standards are an allowed use

(Vermont Agency of Natural Resources 2020). Farming is allowed when threatened or endangered species are protected and when the growing of food or crops does not require vegetation clearing in a deer wintering area (Vermont Agency of Natural Resources 2020). Beaver dams may be removed in a significant wetland to prevent impairment of the use of existing logging roads or other silviculture activities (Vermont Agency of Natural Resources 2020). Wetland restoration or stream restoration projects, including dam removals are allowed (Vermont Agency of Natural Resources 2020). Many recreational activities including hunting, birdwatching, hiking, boating, trapping, fishing, horseback riding, swimming, snowshoeing, and skiing are allowed (Vermont Agency of Natural Resources 2020). If an activity in significant wetlands is not exempt or an allowed use, it must be authorized by a permit or a conditional use determination issued by the Secretary (Vermont Agency of Natural Resources 2020). While some of the exemptions and allowed uses may seem to run contrary to the stated goal of the Rules—achieving no net loss of significant wetlands and their functions—there are some boundaries in the language of the Rules and in implementing guidance related to these allowed uses and exemptions.

One limitation to the farming exemption is that the exemption only applies to areas used to grow food or crops in connection with farming activities including areas in ‘ordinary rotation’ (Vermont Agency of Natural Resources 2020). DEC guidance clarifies that the Rules apply to farming activities if a field is abandoned or out of rotation for more than 5 years (Vermont Department of Environmental Conservation n.d.). Thus, if an agricultural field is out of rotation for more than 5 years, then a permit would be required to use that land again to grow crops. While this is a limitation to an exemption

from the Rules, there are several examples of limitations to the implementation of the Rules.

Another frequently cited limitation is the VSWI maps. As described above, A Class I wetland is a wetland identified on the VSWI maps as a Class I wetland and a Class II wetland a wetland other than a Class I or Class III wetland that is a wetland identified on the VWSI maps (10 V.S.A. § 902). The Rules recognize that the VSWI maps describe the approximate location of significant wetlands (Vermont Agency of Natural Resources 2020). Further, the DEC website states that not all wetlands are mapped, and wetlands not mapped on the VSWI may still be considered significant (Vermont Agency of Natural Resources 2022). The accuracy of the VSWI maps is commonly referenced as a limit to the implementation of the Rules. Another limitation is the definition of ‘contiguous’ and its implementation in the Rules. A permit is required for any activity within a wetland that is contiguous to an area identified as a wetland on the VSWI maps (Vermont Agency of Natural Resources 2020). The Rules define contiguous as “sharing a boundary or touching”, which includes situations when a structure “divides a wetland and there is surface water connection over, through or under that structure” (Vermont Agency of Natural Resources 2020). Wetland contiguity must be confirmed in the field by ANR staff or a wetland scientist, however, ANR staff are prohibited from accessing private property to inspect contiguity without landowner permission (Vermont Agency of Natural Resources 2017). This may make it difficult to find and define contiguous wetlands. Additionally, historic land uses such as agriculture or silviculture may cause a determination of contiguity to be difficult. Another

meaningful limitation to the implementation of the Rules is the lack of designated Class I wetlands.

In 1988, ANR developed a list of approximately 150 wetlands that should be considered for Class I designation (Vermont Water Resources Board 2000). However, currently there are only 9 Class I wetlands: Beaver Meadows (66 acres), Chickering Fen (15 acres), Dennis Pond (370 acres), Dorset Marsh (200 acres), LaPlatte River Marsh (276 acres), Northshore Wetland (15 acres), Peacham Bog (300 acres), Sandbar Wetland Complex (1,400 acres), and Tinmouth Channel (1,473 acres) (Vermont Agency of Natural Resources 2022). The primary difference between a Class I and a Class II wetland is the size of the buffer zone. A default 100-foot buffer zone is established contiguous to the boundaries of a Class I wetland unless the Secretary designates otherwise, while the buffer zone for a Class II wetland is only 50 feet (Vermont Agency of Natural Resources 2020). There are likely many other wetlands in the state deserving of the highest level of protection, but administrative politics may discourage further Class I petitions to be brought by the ANR.

Commitment

As noted above, the VFWD has limited jurisdiction in wetland regulation, but the Department is the largest owner of wetlands in the state (Lazorchak 2020). Without regulatory oversight, the Department's primary method of contributing to wetland conservation is through wetland acquisition. VFWD owns several of the designated Class I wetlands in the state. In 2020, the Department announced a new wetland acquisition and restoration initiative aimed at purchasing marginal agricultural farmland in the Lake Champlain Basin (Lazorchak 2020). VFWD biologists and ecologists may also consult

with DEC or with private citizens petitioning for a wetland reclassification with regard to certain criteria including fish habitat, wildlife habitat, exemplary wetland natural communities, and RTE species. VFWD staff may be called upon to determine the presence or absence of certain species, habitats, or natural communities during the petition process or during the permitting process as DEC prepares a conditional use decision. Another way the VFWD has historically engaged in the Rules is through the development of mitigation guidelines.

While many of the mitigation guidance documents were developed for the Act 250 and Section 248 processes, several of these documents have been used in implementation of the Wetland Rules, and significant wetland habitat has the highest mitigation ratio of 10:1 (Vermont Fish and Wildlife Department 2006). For mitigation of impacts to white-tailed deer wintering areas, the Department has outlined a mitigation ratio of 2:1 (2 acres of deer wintering area protected for every 1 acre impacted) for on-site mitigation and 4:1 for off-site mitigation (Vermont Fish and Wildlife Department 1999). The Department has published similar guidance and mitigation ratios for impacts to significant black bear habitat, particularly focused on beech and oak stands (Vermont Fish and Wildlife Department 2006). Wetlands larger than one acre in size that exhibit historic or current use by black bears are considered necessary black bear habitat (Vermont Fish and Wildlife Department 2006). Bats, grassland birds, and great blue herons also have development review guidelines listed on the Department website. From mid-March until early August, Great Blue Heron's congregate in rookeries for courtship, nest-building, egg laying and incubation, and chick-rearing (Vermont Agency of Natural Resources 2002). To prevent impacts to rookeries, the Department recommends a three-

tiered buffer zone system, where during the nesting season the primary buffer zone requires no habitat modification or human activity, while the secondary and tertiary zones allow activities such as farming, recreation, and selective harvesting (Vermont Agency of Natural Resources 2002). The Department recommends that the primary buffer zone be within 300 feet of the rookery perimeter, and the secondary and tertiary buffer zones be between 300 and 1,300 feet from the rookery perimeter (Vermont Agency of Natural Resources 2002). Mitigation options for impacts to rookeries could include habitat management plans, conservation easements, or habitat compensation (Vermont Agency of Natural Resources 2002). The mitigation ratio for lost rookery habitat is 3:1, for every one nest/acre impacted directly, three nests/acres must be protected (Vermont Agency of Natural Resources 2002). Wetland mitigation is controversial, and the tradeoff which it allows is often questioned; some proponents of wetlands conservation suggest that the use of mitigation be curtailed.

While mitigation is often pivotal in the issuance of a conditional use decision, in one consolidated case before the former Vermont Water Resources Board (VWRB) in 2000, the VWRB ruled that planned mitigation was inadequate (Vermont Water Resources Board 2000). In *RE: Larry Westfall and RE: James and Catherine Gregory (Consolidated)*, as part of their mitigation plan the Westfall's proposed planting cedar trees to screen visibility of their home from the wetland to reduce impacts to wildlife using the wetland. The Board ruled that, the Westfall house and it's use "...constitute an undue adverse impact that cannot be mitigated through the planting of a cedar hedge" (Vermont Water Resources Board 2000). This case highlights the potential wildlife conservation impact of the Rules. Another case that highlights this potential conservation

impact is *In re: North Shore Wetland*, where in 2000 the Vermont Natural Resources Council (VNRC) petitioned the VWRB to reclassify a Burlington wetland from Class II to Class I (Vermont Water Resources Board 2000). The wetland provides significant habitat functions for waterfowl, wading birds, shore birds, and several mammals (Board 2000). The Board reclassified the wetland and extended the buffer to 300 feet to adequately protect wildlife and migratory bird habitat (Vermont Water Resources Board 2000). These are just a few examples of how the Wetland Rules may be used to strengthen wildlife and wildlife habitat protections.

Capacity

The VFWD spent a total of \$407,812, 7,980 hours, or the equivalent of 3.8 full time employees on regulatory review in 2020 (Porter 2021). These efforts were primarily focused on the Act 250 and Section 248 review processes, however some of these efforts likely contributed to DEC wetland conditional use determinations. Securing long-term, stable funding sources for the Department would likely improve the VFWD's engagement in the Wetland Rules.

In Fiscal Year (FY) 2019, DEC's Watershed Management Division (WSMD), who oversee wetland review, provided technical assistance or project review for over 4,600 projects and issued 1,717 permits (Walke 2021). In the five years prior to FY 2019, the WSMD protected more than 5,500 acres of surface waters using easements and designations (Walke 2021). While there were no wetland reclassifications in FY 2019, DEC lists "continuing to increase the number of wetlands designated as Class I under the Vermont Wetland Rules", as a strategy to better protect water resources (Walke 2021).

However, as mentioned above, the ANR is not the only authority able to bring forth a petition to reclassify a wetland.

Any person may petition the Secretary to classify any wetland as Class I, or to reclassify any Class I wetland to a lower class (Vermont Agency of Natural Resources 2020). Yet, bringing forth a petition can be costly and time consuming, thus creating a barrier to wetland conservation. Petitions require detailed maps of the wetland, a narrative describing the wetlands functions and values, and copies of all supporting documents used to prepare the petition (Vermont Agency of Natural Resources 2020). A petition must also include the names and complete mailing addresses of all persons owning property within or adjacent to the wetland area and buffer zone in question (Vermont Agency of Natural Resources 2020). Many citizens petitioning for a wetland reclassification do so as volunteers, using limited free time to gather the requisite information. Commonly, a third-party consultant must be hired to complete natural resources inventory, prepare maps, and draft the petition, which can be cost-prohibitive. Greater capacity would improve the VFWD's ability to prepare technical assistance in the preparation of petitions.

Coalitions

The primary beneficiaries from the VFWD's engagement in the Vermont Wetland Rules regulatory process are the wildlife species whose habitat is protected or mitigated through the review process. However, there are several other parties who reap direct and indirect benefits. Consulting firms who provide technical assistance to project applicants are one clear beneficiary of the policy. Yet there are likely detractors of this policy, and the regulated community bears financial impacts from the costs of review. While

foresters and farmers are able to avoid review except in narrow circumstances, the agricultural community often expresses concern over the regulation of wetlands (Vermont Agency of Natural Resources 2020).

Wetlands provide many benefits and protection of their functions and values can preserve and amplify these benefits. One acre of wetland can store about a million gallons of water (Trust for Public Land 2018). A 2016 study found that the Otter Creek wetland complex in Middlebury, Vermont reduced the potential damage from Tropical Storm Irene by 84-95% through floodwater mitigation (Watson et al. 2016). Further the researchers estimated that the annual value of flood mitigation services provided to Middlebury, VT, exceeds \$126,000 and may be as high as \$450,000 (Watson et al. 2016).

Act 171

Content

In 2016, Governor Shumlin signed forest omnibus bill H. 857 into law. Within the bill was a new requirement to the state's land use planning goals to manage Vermont's forestlands to maintain and improve forest blocks and habitat connectors (Vermont Center for Geographic Information 2018). Additionally, the law established new municipal and regional planning requirements related to forest integrity (Vermont Center for Geographic Information 2018). Referred to as Act 171, these new planning requirements are nonregulatory in nature and were born out of concerns about increased forest fragmentation and parcelization.

In 2014, in response to growing awareness of parcelization and forest fragmentation, the Vermont Legislature enacted Act 118 (S. 100), an Act Relating to Forest Integrity, calling for a report assessing the current and projected effects of fragmentation and recommendations for how best to protect Vermont's forestland (Fidel et al. 2018). The report emphasized the importance of large areas of contiguous forest for quality wildlife habitat and recognized that the division of forests into housing developments reduces their value as wildlife habitat (Fidel et al. 2018). From 2012 to 2017, Vermont lost an estimated 102,000 acres of forestland (Morin et al. 2017). Coupled with increases in the per-acre value of land and decreases in the amount of land in larger parcels across the state, it is clear that fragmentation is already occurring, and economic pressure may continue to drive fragmentation in the coming years (Fidel et al. 2018). Soaring residential property sales to out-of-state buyers during 2020, potentially as a

result of the Covid-19 pandemic, indicate continuing trends in parcelization and fragmentation (Vermont Center for Geographic Information 2021).

Act 171 amended the State Planning Goals at 24 V.S.A. § 4303(6)(C) by adding that Vermont's forestlands should be managed to maintain and improve forest blocks and habitat connectors. The Act requires that regional plans adopted after January 1st, 2018, must include a map and statement of current and future use of forest blocks and habitat connectors (Vermont Agency of Natural Resources 2018). Municipalities seeking regional planning commission approval of their town plans adopted after January 1st, 2018, must indicate areas that are important as forest blocks and habitat connectors, and plan for minimizing fragmentation (Vermont Agency of Natural Resources 2018). Additionally, the law added definitions of forest block, forest fragmentation, habitat connector, and recreational trail.

Context

The authority for planning comes under Title 24 Chapter 117 of the Vermont Statutes. Title 24 V.S.A. § 4325 grants municipal planning authority, § 4345 grants regional planning authority, § 4382 requires municipal plan consistency with the state planning goals (found at § 4302), and § 4384 requires regional plan consistency with state planning goals.

Vermont municipalities are not required to plan however, municipal plans may inform local regulatory policies such as subdivision regulations. Around 270 municipal governments in Vermont currently have the authority to regulate land use and development and as of 2010, 257 out of 269 municipalities have adopted a town plan (Vermont Natural Resources Council 2011). Municipal plans are typically prepared by a

planning commission and then adopted through a vote by the community during town meeting day. Municipalities may seek Regional Planning Commission approval of their plan under 24 V.S.A. § 4350 which grants them certain authorities such as the designation of a downtown development district (24 V.S.A. § 2793), designation of a new town center (24 V.S.A. § 2793b), designation of a growth center (24 V.S.A. § 2793c), designation of a Vermont neighborhood (24 V.S.A. § 2793d), and the authority to levy an impact fee (24 V.S.A. § 5203). The town plan assists in the development of municipal zoning maps and bylaws. 24 V.S.A. § 4401 requires that all regulatory and nonregulatory tools implemented by a municipality shall be in conformance with the plan. Fifty-one percent of Vermont municipalities have adopted subdivision regulations and 82% of Vermont municipalities have zoning regulations (Vermont Natural Resources Council 2011). When enacted, Act 250, included a requirement for the development of a statewide land use plan (10 V.S.A. § 6085a); however, this provision was later repealed, leaving planning to the regional and municipal levels.

In addition to town planning and zoning, policies from municipal plans are utilized in Act 250 and Section 248 proceedings (Vermont Agency of Natural Resources 2018). Act 250 Criterion 9 requires that projects are in conformance with the municipal capability and development plan, and land use plan when adopted, and Criterion 10 requires that projects be in conformance with any regional plan (10 V.S.A. § 6086). Within Section 248, 30 V.S.A. § 248(b)(1)(A) requires that any new natural gas transmission lines must be in conformance with relevant provisions of regional and municipal plans. Act 171, states that a municipal land use plan may include specific policies to encourage the active management of those areas for wildlife habitat, water

quality, timber production, recreation, or other values or functions identified by the municipality (24 V.S.A. § 4382(2)(D)). Act 171 defines a forest block as a contiguous area of forest in any stage of succession and not currently developed for nonforest use, and defines forest fragmentation as the division or conversion of a forest block by land development other than by a recreational trail or use exempt from regulation (24 V.S.A. § 4303(34)) (24 V.S.A. § 4303(35)). Habitat connector is defined as land or water, that links patches of wildlife habitat, allowing the movement, migration, and dispersal of animals and plants (24 V.S.A. § 4303(36)). Some experts may feel that a recreational trail has a fragmenting effect, and that the definition of fragmentation is too narrow. Another limitation to the implementation of Act 171 is the level of precision and definition required for plan policies to carry weight in Act 250 and Section 248 proceedings.

This limitation is a result of several Vermont Environmental and Supreme Court cases. In *In re Molgano* the Supreme Court of Vermont laid out a test to determine whether or not town plan provisions should be applied in an Act 250 case (Vermont Supreme Court 1994). When analyzing a town plan provision, it must first be determined whether the provisions at issue are ambiguous or specific (Vermont Supreme Court 1994). If the provisions are ambiguous, then the District Commission should examine relevant zoning by-laws for provisions which resolve the ambiguity; if provisions are specific and unambiguous, then they should be applied to project without reference to zoning by-laws (Vermont Supreme Court 1994). More recently in 2008, the Vermont Supreme Court struck down portions of a South Burlington zoning bylaw that required “protection” of “important natural resources” (Vermont Supreme Court 2008). These portions of the bylaw were struck down because the court felt that they lacked specific

standards that the conditions where ‘protection’ would apply (Vermont Supreme Court 2008). The Vermont Agency of Natural Resources (ANR) recommends using words such as ‘shall’, ‘must’, ‘maximize’, and ‘minimize’ to craft strong policies (Vermont Agency of Natural Resources 2018). Meanwhile, ANR points out that words and phrases such as ‘direct,’ ‘encourage,’ ‘promote,’ and ‘review,’ are often interpreted as non-mandatory (Vermont Agency of Natural Resources 2018). While many of the cases above highlight the limitations of the policy, a recent PUC order shows the potential conservation impact in §248 proceedings. In this 2017 case the PUC rejected the proposed construction of a Verizon Wireless cell tower due to the potential for disturbance to the Shutesville Hill wildlife corridor (Vermont Public Utility Commission 2017). The proposed development was rejected in part because the tower was not in keeping with the Waterbury town plan (Vermont Public Utility Commission 2017). The town of Waterbury recommended that the certificate of public good not be granted for the tower and the PUC found that:

“...[the town] has made a reasonable recommendation regarding the Project with respect to its town plan and zoning regulations and articulated a reasonable basis for that recommendation...In this case, Waterbury bases its recommendation on the goals of protecting a critical wildlife corridor and avoiding forest fragmentation in its town plan and zoning regulations.”

This order may set a precedent for the implications of municipal planning in §248 proceedings. While this order may signify the removal of a limitation, there are other boundaries beyond the case law that may limit implementation.

Other limitations include limited municipal resources. Not every municipality will have a planning expert who can craft effective land use policies. Act 171 requires that forest blocks and habitat connectors are identified on a map in the town plan, however many towns suffer from a lack of up-to-date mapping. As of 2010, 87% of all

municipalities recommend the protection of wildlife habitat in their town plans and 94% of plans identify at least one regulatory policy for the conservation of wildlife habitat (Vermont Natural Resources Council 2011). The local political process is often tenuous and hindered by frequent turnover, making the development of lasting and effective land use policies difficult. The historic settlement and land use patterns of Vermont also confine the opportunity for future land use and land use planning.

Commitment

Act 171 is primarily implemented by municipal governments, town planning commissions, and regional planning commissions. The VFWD and several non-profit organizations including the Vermont Natural Resources Council (VNRC) and the Vermont Association of Planning and Development Agencies (VAPDA) provide technical assistance to municipalities to support Act 171 implementation. The VNRC has created guidance materials, conducted municipal planning case studies, and tracked the implementation of Act 171. Within the VFWD, the Community Wildlife Program (CWP) is primarily responsible with providing technical assistance and currently has 1.6 equivalent full-time staff (Vermont Fish and Wildlife Department 2019). However, other VFWD staff work on private land conservation where Act 171 may apply. Every 10 years, the VFWD and VNRC publish the Wildlife Consideration in Local Planning Report which tracks municipal and regional planning efforts that impact wildlife conservation (Vermont Natural Resources Council 2011). This illustrative report can inform future investments in implementation capacity for Act 171.

Capacity

In 2020, the VFWD CWP served 124 towns totaling 602 hours of technical assistance, engaged 61 partner organizations, participated in 10 collaborative partnerships, offered 151 technical assistance events, and reached 1,164 Vermonter's (Vermont Fish and Wildlife Department 2021). Capacity at the local level is highly variable. All town plans must be renewed every 8 years (24 V.S.A. § 4387). Town plans often include infrastructure, transportation, housing, economic, and many other sections beyond natural resources. Many towns do not have conservation commissions which may support the development of Act 171 related policies in their municipal plan (the authority to establish conservation commissions is found at 24 V.S.A. § 4505). Additionally, not all regional planning commissions have natural resources staff, and their priorities are spread thin among other issues at the regional level.

Coalitions

The primary beneficiaries from the VFWD's efforts to provide Act 171 technical assistance are the wildlife species whose habitat is protected. Non-profit organizations and regional planning commissions who provide technical assistance to project applicants are another clear beneficiary of the policy. According to a 2015 report conducted by Responsive Management, there is strong support (75% strongly favor) for the provision of technical assistance as a strategy for protecting land for wildlife (Duda et al. 2015). Detractors of this policy may include the members of the development community who fear that strengthened municipal plan provisions focused on forest integrity may lead to more burdensome subdivision regulation and exclusive zoning policies.

There are several grant programs that can assist municipalities in building capacity for natural resources planning including the Municipal Planning Grant Program administered by the Vermont Agency of Commerce and Community Development and the Small Grants for Smart Growth Program administered by the VNRC. These are just a few examples of actions that strengthen implementation.

Current Use

Content

Vermont's Use Value Appraisal (UVA) or Current Use program is a tax equity program that enables landowners who practice long-term forest management to have their enrolled land appraised for property taxes based on its value for forestry rather than its fair market value (Vermont Department of Forests, Parks, and Recreation 2020). Among the stated purposes of the UVA program are to:

assist the maintenance of Vermont's productive forestland, to encourage and assist in their conservation and preservation for future productive use and for the protection of natural ecological systems, to prevent the accelerated conversion of these lands to more intensive use, and to encourage and assist in the preservation and enhancement of Vermont's scenic natural resources (32 V.S.A. §3751).

The program is administered cooperatively by the VDFPR and the Vermont Department of Taxes. In 2020, there were 16,000 parcels or 1.95 million acres of forestland enrolled in the program, and 190 parcels or 40,000 acres of conservation lands enrolled in the program (Vermont Department of Forests, Parks, and Recreation 2021). One frequent criticism of UVA programs is that out-of-state property owners benefit most; however, recent research shows that in 2016, Vermont residents owned the majority of land enrolled in UVA (59%) (Fidel et al. 2018).

Managed forestland is eligible for enrollment in UVA under several conditions. The enrolled land must be under a forest management plan or a conservation management plan that is approved by VDFPR (32 V.S.A. §3755(b)(1)). The land must meet the statutory definition of 'managed forestland' (32 V.S.A. §3755(b)(1)(b)).

Managed forestland is defined to mean land that is at least 25 acres that is "under active long-term forest management for the purpose of growing and harvesting repeated forest

crops” ((32 V.S.A. §3752(9)). Timber management must be practiced on at least 20 acres of an enrolled parcel (Vermont Department of Forests 2020). Managed forestland may also include ESTA’s ((32 V.S.A. §3752(9)). Land eligible as an ESTA does not require timber management to be the primary management objective (Vermont Department of Forests, Parks, and Recreation, 2021). Additionally, managed forestland includes land owned by a qualified 501(c)(3) nonprofit organization ((32 V.S.A. §3752(9)) (10 V.S.A. § 6301a(2)). Finally, managed forestland may include land under active conservation management in accord with standards established by the Commissioner of VDFPR (32 V.S.A. §3752(9)). When an application for UVA is approved, the State records a notice of contingent lien against the enrolled land in the land records of the municipality (32 V.S.A. § 3757(f)(1)(A)).

The Current Use Advisory Board is responsible for annually establishing values for use value appraisals for the current tax year (32 V.S.A. §3754). The Board consists of 12 members, including the Commissioner of Taxes; Director of the Division of Property Valuation and Review; Secretary of Agriculture, Food, and Markets; Commissioner of Forests, Parks and Recreation; and 8 members appointed by the Governor with relevant expertise (32 V.S.A. §3753). In 2021, the per acre assessed value of forestland in the UVA program was \$152 while the fair market value would be \$1,000 (Vermont Department of Forests, Parks, and Recreation, 2021). There are greater incentives to enroll forestland that is unfragmented, and the forestland use value in UVA for land more than 1 mile from a road in 2021 was \$114 (Vermont Department of Forests, Parks, and Recreation, 2021). While UVA uses a tax incentive program to encourage enrollment, it also uses a tax disincentive to discourage disenrollment of land from UVA.

Land classified as managed forestland is subject to a land use change tax upon the development of that land (32 V.S.A. § 3757). The land use change tax is levied at the rate of 10% of the full fair market value of the changed land determined without regard to the use value appraisal (32 V.S.A. § 3757). The tax is in addition to the annual property tax imposed upon the property (32 V.S.A. § 3757). As noted above, when an application for UVA is approved, the State shall record a notice of contingent lien against the enrolled land in the land records of the municipality, and this lien remains with the land until the land use change tax is paid (32 V.S.A. § 3757(f)(1)(A)) (Vermont Department of Forests, Parks, and Recreation 2020). Change of ownership or transfer of ownership to a state land management agency will not result in the land use change tax (32 V.S.A. § 3757). When an enrolled parcel is transferred to new ownership, and the new owner would like the parcel to remain in UVA, the new owner must submit an application to the Department of Taxes within 30 days of the transfer being recorded in the town land records (Vermont Department of Forests, Parks, and Recreation 2020). To withdraw a parcel from UVA a landowner must file a Notice of Withdrawal with the Department of Taxes (Vermont Department of Forests, Parks, and Recreation 2020). If only a portion of a parcel is withdrawn from UVA, a modified forest management plan must be filed with the County Forester (Vermont Department of Forests, Parks, and Recreation 2020).

Context

The forest management or conservation management plan for parcels enrolled in UVA must be designed for 10 years of management and must be resubmitted every 10 years (32 V.S.A. §3755(b)(1)). The forest management plan must include long-term management goals, describe forest conditions, include tree inventory data, describe forest

management treatments, and include a detailed map and schedule for forest management activities (Vermont Department of Forests, Parks, and Recreation 2020). Whenever the landowner undertakes a management activity, they must submit a management report Department of Taxes' Director of Property Valuation and Review on or before February 1 of the year following the year when the activity occurred (32 V.S.A. §3755(b)(2)). This report is referred to as an Forest Management Activity Report (Vermont Department of Forests, Parks, and Recreation 2020). At intervals no longer than 10 years, VDFPR must inspect each parcel of managed forestland qualified for UVA to verify the terms of the management plan have been carried out in a timely fashion (32 V.S.A. § 3755(c)). If VDFPR finds that the management of the tract is contrary to the conservation or forest management plan, or contrary to the minimum acceptable standards for conservation or forest management, VDFPR files an adverse inspection report (32 V.S.A. § 3755(c)). Land is no longer eligible for enrollment if an adverse inspection report is submitted by VDFPR to the Director of the Division of Property Valuation and Review (32 V.S.A. §3755(b)(3)).

The broad enrollment eligibility categories described in statute are discussed above, however eligibility and forestry requirements within each enrollment category is further described in the UVA Program Manual. There are several enrollment categories relevant to wildlife conservation objectives. One category is “Lands managed actively for timber but with latitude to be managed using guidelines other than USDA Forest Service Silvicultural Guides”, which includes the subcategories Significant Wildlife Habitat and Special Places and Sensitive Sites (Vermont Agency of Natural Resources 2010). Significant wildlife habitat is mapped and identified by the Vermont Fish and Wildlife

Department (VFWD) and may include: deer wintering areas, concentrated areas of certain mast producing trees, bat habitats, vernal pools, wildlife corridors, and heron rookeries (Vermont Agency of Natural Resources 2010).

Another category relevant to wildlife conservation objectives is “Lands not necessarily managed for timber (but requiring protective/conservation management) and totaling not more than 20% of enrolled site” which encompasses the ESTA’s (Vermont Agency of Natural Resources 2010). The ESTA subcategories are Natural Communities of Statewide Significance; RTE Species; Riparian Areas; Vernal Pools with Amphibian Breeding Habitat; Forested Wetlands; and Old Forests (Vermont Agency of Natural Resources 2010). For an ESTA to be enrolled for RTE species, the occurrence of an RTE species must be confirmed by the VFWD (Vermont Agency of Natural Resources 2010). The size of the ESTA to be enrolled to protect the RTE species is based on consultation with VFWD and shall be the minimum size necessary to protect the species (Vermont Agency of Natural Resources 2010). The VFWD deems certain vernal pools as state significant and a state-significant vernal pool, along with a 100-foot protective buffer, is eligible for enrollment (Vermont Agency of Natural Resources 2010). As of 2020, there were 11,151 acres of ESTA enrolled in the program and riparian areas and natural communities of statewide significance are the two highest enrolled ESTA categories (Vermont Department of Forests, Parks, and Recreation 2021). The old forest ESTA has been frequently identified as a potential limitation to the implementation of the program.

The 2010 Use Value Appraisal Manual defines old forests as “biologically mature forests, typically in late successional stages of development, having escaped stand-replacing disturbance for more than 100 years and exhibiting minimal evidence of

human-caused disturbance” (Vermont Department of Forests, Parks, and Recreation 2021). The manual also states that old forests may contain the following characteristics:

some trees exceeding 150 years old for most forest types (100 years old for balsam fir, 200 years old for Eastern hemlock); native tree species characteristic of the forest type present in multiple ages; and complex stand structures that include a broad distribution of tree diameters, multiple vertical vegetative layers, natural canopy gaps, abundant coarse woody debris (reflecting the diameters of the standing trees) in all stages of decay and numerous large standing dead trees (Use Value Appraisal 2021).

Some feel that these definitions are too narrow to reflect the reality of old forest conditions in Vermont. Detractors of the UVA program disagree with the mandate for timber management and would like to see enrollment categories expanded, particularly in relation to old forests. In the 2021 Legislative Session, multiple attempts were made to expand eligibility of private land subject to an easement held by a qualified organization principally engaged in the preservation of undeveloped land (Vermont Department of Forests, Parks, and Recreation 2021). Eligibility categories may serve as one limitation to the implementation of the policy, another statutory definition may also be a boundary to implementation.

Development serves as the trigger for disenrollment and levying of the land use change tax, disqualifying a parcel from UVA (32 V.S.A. § 3752(5)) (32 V.S.A. § 3755). Development is broadly defined to mean the construction of any building, road, or other structure, or any mining, excavation, or landfill activity (32 V.S.A. § 3752(5)). It is further qualified to mean:

“...the subdivision of a parcel of land into two or more parcels, regardless of whether a change in use actually occurs...the cutting of timber on property appraised under this chapter at use value in a manner contrary to a forest or conservation management plan...” (32 V.S.A. § 3752(5))

However, the statute clarifies that construction, reconstruction, or relocation of a logging road, and the development of a solar array on less than 0.1 acre are not considered development (32 V.S.A. § 3752(5)). These exemptions may run contrary to the stated purposes of the program such as protecting natural ecological systems, preventing the conversion of land to more intensive use, and preserving and enhancing of Vermont's scenic natural resources (32 V.S.A. §3751). Another limitation is the resources required for a private landowner to meet the requirements of the program. Most landowners contract with private licensed foresters to develop and implement their forest management plans (Vermont Department of Forests, Parks, and Recreation 2020). This may be a financial barrier to some landowners. Other limitations may exist, such as the capacity of the agencies administering the program.

Commitment

While the UVA program is primarily administered by VDFPR and the Vermont Department of Taxes, the VFWD engages in this nonregulatory program in several ways. VDFPR has the authority to inspect parcels and may bring any other staff from the Agency of Natural Resources that have the expertise to evaluate compliance with this chapter (32 V.S.A. § 3755(c)). VFWD may provide guidance to landowners for management activities to promote habitat prior to submission of their management plan (Vermont Agency of Natural Resources 2010). However, because county foresters and VFWD biologists administer the program, they do not write UVA forest management plans (Vermont Department of Forests, Parks, and Recreation 2020). The county foresters' role is to advise landowners and consultants, review and approve management

plans and to conduct on-site monitoring (Vermont Department of Forests, Parks, and Recreation 2020).

The VFWD is responsible for identifying and mapping significant wildlife habitat which can be enrolled in the “Lands managed actively for timber but with latitude to be managed using guidelines other than USDA Forest Service Silvicultural Guides” category of UVA (Vermont Agency of Natural Resources 2010). The VFWD also prepares standards for identifying and mapping: natural communities of state significance, RTE species, and vernal pools, which are all eligible under the “Lands not necessarily managed for timber (but requiring protective/conservation management) and totaling not more than 20% of enrolled site” category (Vermont Agency of Natural Resources 2010). Additionally, VFWD will consult with applicants to determine the size of an ESTA to protect an RTE species (Vermont Agency of Natural Resources 2010). For ESTA enrollment of a vernal pool, VFWD must confirm the vernal pools existence and statewide significance (Vermont Agency of Natural Resources 2010). These are just a few ways in which the VFWD engages in UVA.

Capacity

As of 2021, 56% of eligible, privately owned forestland is enrolled in UVA (FY 2022 Governor’s Recommended Budget for Vermont Department of Forests, Parks, and Recreation 2021). VDFPR hosted 68 educational programs promoting forest stewardship and engaged 2,500 forest landowners in education (Snyder 2021). In 2019, VDFPR reviewed 1,700 forest management plans in UVA and in 2020 reviewed 1,630 plans (Snyder 2021). In 2020, the Forestry Division, which is responsible for the administration of UVA, total expenses were \$6,875,745 and the Division supported 56 positions (Snyder

2021). Within the Division of Forestry, county foresters primarily bear the burden of implementing UVA. County foresters spend between 60-63% of their time on UVA, 21.7% of their time on UVA is spent renewing or approving UVA plans (Vermont Department of Forests, Parks, and Recreation 2016). An assessment found that county foresters reported that in order to satisfy all UVA tasks an additional 5.71 full time employees would be necessary to meet the needs of the UVA program administration (Vermont Department of Forests, Parks, and Recreation 2016). Between 2004 and 2016, UVA enrollment composition has shifted, and smaller parcels make up more of the parcels enrolled than larger parcels (Fidel et al. 2018). The increase in the number of smaller parcels enrolled could mean more administrative oversight is needed as more landowners enroll in the program (Fidel et al. 2018).

Coalitions

From 2003 to 2020, there has been an increase in forestland enrollment in UVA from 1.4 million acres to 2 million, or a 43% increase, and a 70% increase in the number of parcels enrolled (Vermont Department of Forests, Parks, and Recreation 2021). A 2014 study found that 73% of family forestland (62% of ownerships) with 25 or more acres are owned by people are enrolled in UVA (Butler et al. 2014). The researchers also found that family forest owners enrolled in UVA are more likely to be involved in other conservation programs, including cost-share and green certification programs, and have a conservation easement (Butler et al. 2014). Only 12% of those family forest owners not enrolled in UVA had a current management plan (Butler et al. 2014). Enrolled family forest owners received significantly more information or technical advice (76%) versus those not enrolled (24%) (Butler et al. 2014). A study from 2004 to 2016 found that

woodland parcels that were enrolled in UVA in 2004 were less likely to be converted to other uses during the study period compared to land that was not enrolled (Fidel et al. 2018). These findings all point to the success of the program, which is typically viewed favorably by the public as a nonregulatory conservation tool.

From 2012 to 2017, Vermont lost an estimated 102,000 acres of forestland (Morin et al. 2017). Land values for woodland have increased by 183% in the study period, pointing to another driver of development pressure (Fidel et al. 2018). Fragmentation is already occurring, and economic pressure may continue to drive fragmentation in the coming years (Fidel et al. 2018). The public agrees and according to a 2016 study, 61% of residents agree that “forest fragmentation and loss is a problem in Vermont” (Duda et al. 2015). UVA can be an important tool moving forward in addressing this imminent threat to wildlife.

Policy Review Summary

The policy review utilized caselaw research, existing reports from the Department, Department-issued guidance documents, and relevant peer-reviewed scientific literature to describe each of the six policies. Each of the state-level policies reviewed was developed to address different concerns and perceived problems, despite this, there is overlap across the policies in both their implementation and outcomes. Only one policy—Act 171—was enacted after 1990; however, there have been amendments made to several policies in the previous decades. The content, context, commitment, capacity, and coalitions of each policy are summarized below.

Act 250 is Vermont's land use and development law which requires that certain subdivision and development projects are reviewed by District Environmental Commissions for a variety of impacts. Act 250 Criterion 8A is aimed at preventing destruction or significant imperilment of necessary wildlife habitat or any endangered species habitat. The VFWD engagement with the Act 250 regulatory program is voluntary and the Department interfaces with the policy through predevelopment review, the publication of mitigation guidance, assisting District Commission's with the development of permit conditions and mitigation requirements, and through various other roles. As the Department's engagement with Act 250 has increased since the policy's enactment, there have been several recent efforts to modify the funding structure for the Department's engagement in these processes (Vermont Fish and Wildlife Department 2021). In addition to natural environments conserved through the regulatory program, natural resources consultants may benefit from the policy, while the regulated community bears financial costs from the permitting process.

Section 248 requires certain developments to obtain a CPG from the Vermont PUC for energy generation, energy storage, energy transmission, and telecommunication facilities. Issuance of a CPG requires that due consideration is given to certain Act 250 criteria, including Criterion 8A. Additionally, 30 V.S.A. § 248(p) requires that woody biomass energy generation facilities receiving a CPG must annually disclose timber harvest notifications to the ANR (and the VFWD, more specifically). The ANR is required to appear as a party under any Section 248 proceedings to provide evidence and offer recommendations with respect to effects on the natural environment. In addition to timber harvest notification review for two woody biomass energy generation facilities in the state, the VFWD engages in this program through the production and application of mitigation guidelines for several species. In 2020, the ANR received \$224,348 in total fees under 30 V.S.A. § 248b, however VFWD's engagement in the § 248 process is not supported by these fees (Coster 2021). Section 248 has a similar group of stakeholders as Act 250 who benefit from the policy and who may be negatively impacted by the policy, however, the regulated community who bear permitting impacts from Section 248 is much less broad.

The VESL authorizes the ANR to adopt a State endangered species list and a State threatened species list. The policy describes: a permitting program which allows for some authorized and incidental take of endangered and threatened species, a process for designating critical habitat for such species, and a recovery planning program for such species. Recovery planning and the designation of critical habitat are not required for every threatened and endangered species. The VNHI, within the VFWD Wildlife Diversity Program, primarily oversees the implementation of the VESL (Vermont Fish

and Wildlife Department 2022). The VNHI is often called upon to conduct rare, threatened, and endangered species inventories as a condition of permit approval for several other regulatory structures. The Vermont Nongame Wildlife Fund supports projects coordinated by the VNHI, including inventories and status assessments that may inform VESL listing decisions. The VESL has a similar group of stakeholders as Act 250 who benefit from the policy and who may be negatively impacted by the policy.

The Vermont Wetlands Rules authorizes the ANR and the Vermont DEC to designate certain wetlands as significant Class I or Class II wetlands, and to issue or deny permits for certain activities within wetlands. The Rules describe the functions and values which may contribute to a wetland's significance. Wildlife habitat and rare, threatened, and endangered species habitat are two of the criteria which may elevate a wetland's significance. The VFWD has limited jurisdiction in wetland regulation, however the Department is the largest owner of wetlands in the state (Lazorchak 2020). VFWD staff may be called upon to determine the presence or absence of certain species, habitats, or natural communities during the petition process or during the permitting process as DEC prepares a conditional use decision. In Fiscal Year (FY) 2019, DEC's Watershed Management Division (WSMD), who oversee wetland review, provided technical assistance or project review for over 4,600 projects and issued 1,717 permits (Walke 2021). The Rules have a similar group of stakeholders as Act 250 who benefit from the policy and who may be negatively impacted by the policy, however, agricultural landowners with marginal cropland in floodplains are frequent detractors of the policy.

Act 171 is a nonregulatory policy which added new requirements to the state's land use planning goals to manage Vermont's forestlands to maintain and improve forest

blocks and habitat connectors, and established new municipal and regional planning requirements related to forest integrity. Vermont municipalities are not required to plan; however, municipal plans may inform local regulatory policies such as subdivision regulations. Municipal plans must be consistent with state planning goals and there are incentives for municipalities to obtain Regional Planning Commission approval of their plan. Act 171 is primarily implemented by municipal governments, town planning commissions, and regional planning commissions. The VFWD and several non-profit organizations including the VNRC and VAPDA provide technical assistance to municipalities to support Act 171 implementation. In 2020, the VFWD CWP served 124 towns totaling 602 hours of technical assistance, offered 151 technical assistance events, and reached 1,164 Vermonter's (Vermont Fish and Wildlife Department 2021). The beneficiaries of this nonregulatory policy tool include non-profit organizations and regional planning commissions who provide technical assistance to project applicants as well as municipal planners. Detractors of this policy may include private property rights advocates who fear limitations imposed by subdivision regulations or zoning bylaws.

Vermont's UVA or Current Use program is a tax equity program that enables landowners who practice long-term forest management to have their enrolled land appraised for property taxes based on its value for forestry. The Current Use Program Manual describes several enrollment categories relevant to wildlife conservation objectives, including "Lands managed actively for timber but with latitude to be managed using guidelines other than USDA Forest Service Silvicultural Guides", which includes the subcategories Significant Wildlife Habitat and Special Places and Sensitive Sites (Vermont Agency of Natural Resources 2010). Additionally, the manual describes ESTA

subcategories, including: Natural Communities of Statewide Significance; RTE Species Habitat; Riparian Areas; Vernal Pools with Amphibian Breeding Habitat; Forested Wetlands; and Old Forests (Vermont Agency of Natural Resources 2010). While the UVA program is primarily administered by VDFPR and the Vermont Department of Taxes, the VFWD may provide guidance to landowners for management activities to promote habitat prior to submission of their management plan and help determine a landowner's eligibility for a certain enrollment category as a result of the presence or absence of certain ecological features (Vermont Agency of Natural Resources 2010). A 2016 assessment found that county foresters reported that in order to satisfy all UVA tasks an additional 5.71 full time employees would be necessary (Vermont Department of Forests, Parks, and Recreation 2016). In addition to the natural environments conserved through the nonregulatory program, forest landowners are one of the greatest beneficiaries of the policy. Detractors of the policy include those who believe that the enrollment categories are too narrow.

This review and summary provide an overview of the six policies. The review was not exhaustive, and various other state and federal policies which have implications for terrestrial wildlife conservation are briefly discussed above in the introduction. The review informed the development of the Vermont Wildlife Policy Gap Survey, which elicited feedback from conservation professionals on each of the six policies.

Chapter III. Methods

Vermont Wildlife Policy Gap Survey: Conservation Objectives

Matrix

Current environmental laws in Vermont only benefit a fraction of wildlife species in need of conservation and many of the current threats to wildlife and wildlife habitat are unaddressed in the current policy suite. A comprehensive survey of Vermont's wildlife policies across levels could inform current policy directions for wildlife and natural resource authorities. A survey will reveal gaps where environmental policies are less effective at maximizing wildlife conservation. By identifying these gaps, new priorities and policies can be proposed. The dynamic natural systems of the state need innovative policy solutions informed by the current gaps in the regulatory structure to address the imminent threats wildlife face in the future.

As a means of identifying the gaps in Vermont's current regulatory structure for the conservation of wildlife, a survey was designed employing an illustrative screening matrix similar to the framework described by Nilsson et al. (2012) that sought to understand policy coherence in the European Union (Nilsson et al. 2012). Nilsson et al. defined policy coherence as, "an attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives" (Nilsson et al. 2012). The study sought to investigate both vertical (level of government—local, state, national, international, etc.) and horizontal (across sectors—agricultural, forestry, industrial, etc.) coherence (Nilsson et al. 2012). The researchers designed an illustrative screening matrix as part of an in-person rapid assessment workshop for environmental experts (Nilsson et

al. 2012). Environmental experts were asked to score the interaction between sectoral activities and environmental objectives as either strong, weak, or neutral/unknown (Nilsson et al. 2012).

The Vermont Wildlife Policy Gap Survey has both vertical (most of the reviewed policies were at the state-level, although Act 171 is primarily implemented at the municipal and regional level) and horizontal (the primary sectors of the reviewed policies include environmental, forestry, and agriculture) policy coherence application. Utilizing information gathered during the review of each policy and through consultation with the graduate committee, 23 wildlife conservation-related objectives were drafted for the illustrative screening matrix ([Table 5. Conservation Objectives.](#)). The wildlife conservation-related objectives could be broadly grouped into the following categories: wildlife objectives; wetland habitat objectives; forest habitat objectives; rare, threatened, and endangered species objectives; and general objectives. Many of these objectives were drawn directly from language found within the statutes, rules, and guidance from each policy. The general objectives category included objectives related to climate change and landscape-level conservation. The conservation objectives matrix also drew upon the methodologies described in Hoberg et al. (2016), where a policy gap analysis compared various forest-related policies and assessed their consequences for a variety of criteria (Hoberg et al. 2016). In the conservation objectives matrix, respondents were asked to describe the relationship between the implementation of each policy and each wildlife conservation-related objective. Each section of the matrix was identical to provide consistent evaluation of each policy and each section included an attached file with a brief (3-6 sentence) description of the policy. Each section began by asking respondents

to describe their familiarity with the policy as: ‘not familiar at all,’ ‘slightly familiar,’ ‘moderately familiar,’ ‘very familiar,’ or ‘extremely familiar’. This question was included as a means of gauging respondents’ level of expertise for each policy and to identify any trends or patterns related to general professional understanding of each policy. Next, respondents worked through each of the 23 wildlife conservation-related objectives and were asked to describe the relationship between the implementation of the policy and each objective. The screening matrix was followed by a set of fill-in-the-blank questions where respondents had the opportunity to provide additional feedback on policy implementation capacity, inter-policy tradeoffs, policy gaps, and potential policy solutions to address those gaps. This extended response section of the survey is further described below.

The survey was developed using the Qualtrics XM web-based survey tool, and all survey methodologies were reviewed by the University of Vermont Research Protections Office Institutional Research Board (Study# CHRBS (Behavioral): STUDY00001752) ([Appendix III. University of Vermont Institutional Review Board Exemption Certification](#)). A list of 63 conservation professionals in Vermont was compiled to be contacted for survey completion. These potential respondents represented various professional backgrounds including environmental nonprofit organizations, academia, and state natural resource agencies, and were selected based on experience and qualifications. One potential respondent who shared similar expertise and qualification was added to this list after expressing interest in completing the survey. On October 19th, 2021, the survey was distributed the entire list of potential respondents ([Appendix IV. Vermont Wildlife Policy Gap Survey Information Sheet](#) [Appendix V. Vermont Wildlife](#)

[Policy Gap Survey Respondent Email](#)). Each potential respondent received an individualized survey link that was generated through, and exported from Qualtrics, to prevent respondents from sharing the link or completing the survey more than once. Respondents had 3 weeks to complete the survey and all potential respondents were sent 3 subsequent emails reminding them of the November 9th, 2021, deadline.

A total of 20 respondents (or 31.3%) completed the entire survey. Qualtrics XM recorded partial survey completions and showed a general trend of survey fatigue (see below) with 28 respondents completing the first section ([Figure 1. Survey Section Responses.](#)). Thirty-nine percent of the survey pool completed the Act 250 section, 34.4% of the survey pool completed the Section 248 and Vermont Endangered Species Law Sections, 32.8% completed the Vermont Wetland Rules Section, and 31.3% completed the Act 171 and Current Use sections. The average time of survey completion for the 20 respondents who finished the entire survey was 185.6 minutes, this time is reduced to 76.6 minutes when several outliers are removed (n=17). One outlier took nearly 1,800 minutes to complete the entire survey and this likely reflects the fact that the survey was designed to allow respondents to leave the survey and re-enter to finish it later, and that respondents had 48 hours to complete the survey once their individualized link was initially opened. Likely reflecting trends in the conservation field in Vermont, 71.4% of respondents identified as male and 92.9% of respondents identified as white (n=28). The age distribution of respondents reflected more diversity and is shown below ([Figure 2. Survey Respondent Age Distribution.](#)).

Vermont Wildlife Policy Gap Survey: Extended Response

Following the conservation objectives matrix, respondents were asked a series of four extended response questions where they could expand upon their multiple-choice answers in the matrix. Respondents were asked to: identify tradeoffs between each policy and other conservation policies in Vermont, identify policy gaps related to conservation objectives in each policy, offer solutions to address the policy gaps, and given the opportunity to elaborate through additional thoughts or comments. A total of 351 extended response answers were given by survey respondents, with an average of 58.5 responses given per policy, and Act 250 accumulating the highest total number of responses (76). In addition to providing an opportunity for respondents to elaborate on their matrix responses, the extended response section was also designed to bolster conclusions about the matrix results and to serve as a starting point for researching and developing potential policy solutions.

NVivo (Release 1.5.1 (4800)) (QSR International, Burlington, MA, USA) was used to organize and distill key themes from this large sample of qualitative data. Extended responses were organized using coding in the NVivo application. In vivo codes are a common first step in inductive or exploratory qualitative research projects. The purpose of coding is data reduction, data organization, and data exploration, analysis, and theory-building (Cope 2021). Responses were organized using descriptive codes which reflect themes or patterns that are obvious to the researcher or are stated directly by research subjects (Cope 2021). In vivo codes are descriptive codes that come directly from statements of subjects or are common phrases found in the texts under examination (Cope 2021).

Analysis in NVivo began with autocoding the entire extended response dataset to code to codes for selected columns. Two autocodes were run to isolate the policy gap and policy solution responses. Each autocode created six subcodes, one for each policy. These autocodes were then manually coded using descriptive codes selected by the researcher. These descriptive codes were selected utilizing the principal research questions, background literature review, and through progressing patterns, relationships, and differences in the responses (Cope 2021). The table below displays the codes for policy gaps and policy solutions ([Table 1. NVivo Policy Gap Codes](#)).

Chapter IV. Results and Discussion

Introduction

The Vermont Wildlife Policy Gap Survey asked conservation professionals to evaluate 23 wildlife conservation-related objectives, broadly grouped into the following categories: wildlife objectives; wetland habitat objectives; forest habitat objectives; RTE species objectives; and general objectives. The following section briefly discusses the results of the survey for each conservation objective category. The results for each policy are described separately, followed by succinct discussion of the results and their conservation and conservation policy implications. Policy gaps and key themes which emerged across the survey are discussed further in [Chapter V](#).

Act 250

Overview

Twenty-five respondents (or 39.1% of those contacted for the survey) completed the Act 250 section of the survey ([Figure 1. Survey Section Responses.](#)). There were 76 answers given for the 4 extended response questions by the 25 respondents, the highest total number of responses given for any section ([Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals.](#)). Ninety-six percent of respondents (24) are ‘moderately’, ‘very’, or ‘extremely familiar’ with the law, making Act 250 the most well understood policy in the survey ([Figure 4. Vermont Wildlife Policy Familiarity.](#)). Signed into law in 1970, Act 250 is the second oldest policy in the survey (second only to Section 248) and at the time of its enactment very few land use laws in the United States matched its comprehensive nature, likely explaining respondents high familiarity (Vermont Natural Resources Board n.d.). Further, Act 250 is one of the most frequently triggered regulatory programs. In Calendar Year 2020, 339 permit applications were filed to the NRB for Act 250 review, meanwhile the ANR only reviewed 51 Section 248 applications in Fiscal Year 2020 (Vermont Natural Resources Board 2021; Coster 2021).

Respondents frequently cited capacity as a gap related to VFWD engagement in Act 250. One respondent writes that, “The Agency of Natural Resources and Department of Fish and Wildlife need significantly greater resources to participate in the implementation of Act 250 in the form of staffing and funding...” Fifty-eight percent of respondents either strongly disagreed or disagreed with the statement: *The VFWD has the requisite capacity to meaningfully engage in the Act 250 regulatory process* ([Figure 5. Vermont Wildlife Policy Implementation Capacity.](#)). More respondents (5) strongly

disagreed with the statement for Act 250 than for any other policy and only Section 248 had a higher proportion (59.1%) of respondents who disagreed or strongly disagreed with the statement.

Overall staff costs for regulatory review work is ~\$400,000 each year for the Department and there have been recent legislative efforts to modify the funding structure for VFWD's engagement in these processes (Porter 2021). The ANR collects \$0.75 per each \$1,000 of a project for the first \$15M of cost to account for some of the costs associated with ANR involvement with Act 250 proceedings and review (Coster 2021). However, this funding stream goes to the ANR Central Office rather than directly to VFWD. The Department may see increased engagement in regulatory review as a result of increasing development pressure.

Wildlife Objectives

Respondents tallied more 'strong' or 'very strong' responses for Act 250 for each objective of the wildlife section of survey than any other policy except for Section 248 in *Preventing destruction or significant imperilment of significant white-tailed deer winter habitat* ([Figure 6. The Relationship Between the Implementation of Act 250 and the Wildlife Objectives.](#)).

Majority of respondents (52%, 13) indicated that the relationship between the implementation of Act 250 and protecting necessary wildlife habitat was 'strong' or 'very strong' ([Figure 8. Protection of Necessary Wildlife Habitat.](#)). Criterion 8A of Act 250 explicitly prohibits the granting of a permit if a development or subdivision will destroy or significantly imperil necessary wildlife habitat (10 V.S.A. §6086(8)(A)). Respondents felt that Act 250 was strongest of all policies in achieving this statutory mandate. A

plurality (40%, 10) of respondents indicated that the relationship between the implementation of Act 250 and protecting significant white-tailed deer habitat was ‘strong’ or ‘very strong’. This result is also well-supported by the Department’s recent engagement in these regulatory review processes. Since 2009, 31,000 acres of the total 60,000 acres protected has been white-tailed deer winter habitat (Vermont Fish and Wildlife Department 2021). Similarly, a majority of respondents (52%, 13) indicated that the relationship between the implementation of Act 250 and protecting significant bat habitat was ‘strong’ or ‘very strong’. The Department has published guidance for development review and mitigation regarding several of the species whom respondents feel Act 250 successfully protects, including white-tailed deer, black bears, and bats.

Wetland Habitat Objectives

A plurality (44%, 11) of respondents indicated that the relationship between the implementation Act 250 and protecting exemplary natural communities was ‘strong’ or ‘very strong’ ([Figure 9. The Relationship Between the Implementation of Act 250 and the Wetland Objectives.](#)). Majority of respondents (60%, 15) indicated that the relationship between the implementation Act 250 and protecting significant wetlands that serve as RTE habitat was ‘strong’ or ‘very strong’ ([Figure 10. Protection of Significant RTE Wetland Habitat.](#)). Only the Vermont Wetlands Rules receives a higher proportion of respondents (71.4%) who believed that the Rules were ‘strong’ or ‘very strong’ in achieving this objective.

The Department has developed guidelines for development review for several species that utilize wetland habitat including white-tailed deer, black bear, and Great Blue Herons. Significant black bear wetland habitat has one of the highest mitigation rates,

10:1, of any ratios described in the Departments guidance documents (Vermont Fish and Wildlife Department 2006). However, the protection of significant wetlands that serve as habitat for bobcat, moose, muskrat, otters, and/or mink have less conclusive responses.

Forest Habitat Objectives

Overall, respondents did not feel that Act 250 was strong in achieving the forest habitat objectives ([Figure 11. The Relationship Between the Implementation of Act 250 and the Forest Objectives.](#)). Sixty-four percent of respondents (16) indicated that the relationship between the implementation of Act 250 and minimizing forest fragmentation was ‘very weak’ or ‘weak’. Only the VESL receives a higher proportion of respondents (77.3%) who indicated that the VESL was weak in achieving this objective ([Figure 12. Very Weak or Weak Responses for the Minimizing Forest Fragmentation.](#)). Additionally, 68% of respondents (17) indicated that the relationship between the implementation of Act 250 and maintaining forestland wildlife habitat was ‘very weak’ or ‘weak’, and 64% of respondents (16) indicated that the relationship between the implementation of Act 250 and in maintaining and improving forest blocks and habitat connectors was ‘very weak’ or ‘weak’.

As previously stated, from 2012 to 2017, Vermont lost an estimated 102,000 acres of forestland (Morin et al. 2017). Despite recent legislative efforts to expand the law to address these threats, the current statutory language of Act 250 is relatively silent on impacts to forest blocks, wildlife corridors, and forest fragmentation. However, as noted in a previous section, a recent order issued by the PUC in a §248 case may set a precedent for conserving wildlife corridors that could have implications for the implementation of Act 250 (Vermont Public Utility Commission 2017). In this case, the

Shutesville Hill wildlife corridor was deemed a ‘rare and irreplaceable natural area’ and the PUC found that the project violates 10 V.S.A. § 6086(a)(8) because the fragmenting effects of the tower would result in an undue adverse impact to a rare and irreplaceable natural area and the natural environment (Vermont Public Utility Commission 2017).

Forest fragmentation is a consistent theme among extended response answers for the policy gap section of the survey. When asked *What are the greatest policy gaps related to wildlife conservation objectives in the Act 250 regulatory process* several respondents referenced forest fragmentation:

“To my knowledge, limited ability to mitigate fragmentation of forest habitat or preserve large, unbroken tracts.”

“Act 250 Criterion 8 does not include provisions for addressing forest block fragmentation and landscape connectivity.”

“Act 250 does not address fragmentation, ecological connectivity or climate change adaptation. In my view, these are the highest priority changes needed for Act 250 to better address the effects of development of fish, wildlife, habitats, natural communities and the health of Vermont's environment.”

“Addressing forest and habitat fragmentation, and the loss of viability of intact forest blocks and habitat connectivity areas.”

This is an area of the law deserving of further investigation and analysis.

Rare, Threatened, and Endangered Species Objectives

Overall, respondents feel Act 250 was strong in achieving RTE objectives. A majority of respondents (56%, 14) indicated that the relationship between the implementation of Act 250 and preventing destruction or significant imperilment of threatened or endangered species was ‘strong’ or ‘very strong’ ([Figure 13. The Relationship Between the Implementation of Act 250 and the RTE Objectives.](#)). Only the VESL receives a higher proportion of respondents (68.2%) who believed the policy was ‘strong’ or ‘very strong’ in achieving this objective ([Figure 14. Prevention of Destruction of Threatened and Endangered Species.](#)). Additionally, a plurality of respondents (48%,

12) indicated that the relationship between the implementation of Act 250 and preserving areas with RTE species was ‘strong’ or ‘very strong’. Only Section 248 has a higher proportion of respondents (54.5%) who believed the policy was ‘strong’ or ‘very strong’ in achieving this objective.

Criterion 8A of Act 250 explicitly prohibits granting a permit if a development or subdivision will destroy or significantly imperil any endangered species habitat (10 V.S.A. §6086(8)(A)). There is significant overlap between Act 250 and the VESL and this may explain why respondents indicated that Act 250 is strongest in preventing destruction or imperilment of threatened or endangered species and strong in achieving other RTE objectives. One example of the overlap between the policies is the role that the VFWD VNHI plays in Act 250 review. VNHI is often called upon to conduct rare, threatened, and endangered species inventories as a condition of permit approval for the regulatory program. In addition to other guidance related to regulatory review, the VFWD has issued guidance for rare, threatened, and endangered plant species inventories in the Section 248 process. This particular guidance is applicable to Act 250 because due consideration is granted to certain Act 250 criteria, including Criterion 8A, in the Section 248 process (Vermont Agency of Natural Resources 2016). These are just a few examples of the synergies between Act 250, the VESL, and Section 248.

General Objectives

Respondents indicated that Act 250 was weak in its contribution to climate-related objectives and in its support of landscape-level conservation goals ([Figure 15. The Relationship Between the Implementation of Act 250 and the General Objectives.](#)). A majority of respondents (64%, 16) indicated that the relationship between the

implementation of Act 250 and supporting landscape-level conservation goals beyond the project level scope was ‘very weak’ or ‘weak’. Only the VESL received a higher proportion of respondents (72.7%) who believed that the VESL was ‘very weak’ or ‘weak’ in achieving this objective ([Figure 16. Very Weak or Weak Responses for Supporting Landscape-level Goals.](#)). When asked *What are the greatest policy gaps related to wildlife conservation objectives in the Act 250 regulatory process* one respondent comments on landscape-level conservation within the context of recreational trail development stating:

“We also need to address trail development in a more consistent manner that takes a landscape scale view of the impacts. Decisions made on a parcel-by-parcel basis are insufficient. We need more areas of state land, especially forest blocks that are set aside as trailless areas.”

The regulation of recreation trail development in Act 250 was a frequently cited policy gap in the extended response section as well. Another respondent commented on the cumulative effects of development that result from land use regulation that lacks support for landscape-level conservation goals:

“Act 250 doesn't have good tools to address landscape scale features and address cumulative impact on habitat or forested habit that is not necessary for the survival of a specific species.”

A frequent criticism of Act 250 is that it allows the “death by a thousand cuts” by failing to consider incremental development beyond the scope of the project currently under review.

A majority of respondents (72%, 18) also indicated that the relationship between the implementation of Act 250 and contributing to climate change mitigation was ‘very weak’ or ‘weak’ ([Figure 17. Very Weak or Weak Responses for Supporting Climate Change Mitigation Goals.](#)). A greater proportion of respondents reached this conclusion

for Act 250 than for any other policy. Similarly, a majority of respondents also believed that the relationship between the implementation of Act 250 and contributing to climate change resilience was ‘very weak’ or ‘weak’ (72%, 18).

Climate change mitigation can help reduce greenhouse gas concentrations in the atmosphere through the capture and storage of carbon through regulating services (Reidmiller et al. 2018). The Vermont Global Warming Solutions Act defines mitigation to mean: “reduction of anthropogenic greenhouse gas emissions, and preservation and enhancement of natural systems to sequester and store carbon, in order to stabilize and reduce greenhouse gases in the atmosphere” (10 V.S.A. § 590(3)). There is considerable political interest in incorporating climate change-related goals into state laws in Vermont and recent legislative efforts sought to expand Act 250 to incorporate climate change mitigation and resilience. In 2018, Vermont’s forests stored over 1.7 billion metric tons of carbon dioxide emissions (Kosiba 2021). One survey respondent referenced the potential for climate mitigation when asked *What are the greatest policy gaps related to wildlife conservation objectives in the Act 250 regulatory process*, stating, “We also need to take forest carbon opportunities into consideration as a function of protecting large forest blocks.” Responses are less conclusive on the relationship between Act 250 and supporting land conservation measures in regional and/or municipal plans. For this objective, a plurality of respondents selected ‘neutral’ when describing the relationship between the objective and the implementation of Section 248.

Discussion

Act 250 is one of the most well-known state policies with implications for wildlife conservation in Vermont. Conservation professionals have a firm understanding

of the policy and its implementation. It is a strong tool that has been effective in the protection of habitat. Survey respondents agreed that the law is particularly effective in the protection of necessary wildlife habitat and RTE species habitat. Further, respondents believed that species for whom the Department has drafted mitigation and development review guidance for—such as bats, white-tailed deer and great blue herons—all receive benefits from the policy in the form of habitat conservation. However, respondents also agreed that the VFWD lacks the requisite capacity to fully engage in their regulatory review role in Act 250. Increasing development pressure will require more VFWD engagement in Act 250, raising the importance of securing long-term, stable funding sources for the Department.

There have been very few major amendments to Act 250 since its enactment in 1970, particularly related to the criteria. In both the conservation objective matrix and the extended response sections of the Vermont Wildlife Policy Gap Survey, respondents are clear in stating that they feel Act 250 is inadequate in preventing forest fragmentation. Similarly, climate change resilience and mitigation stand out as weaknesses to the current implementation of the law. An amendment or addition to the existing Act 250 criteria may be required to best address these issues which respondents identified. Respondents also indicated that the policy was weak in preventing the cumulative effects of development and lacks a landscape-level perspective beyond the project-level scope. Addressing the cumulative impacts of development is a chronic weakness for many regulatory review programs. This may be best addressed by an amendment to the jurisdiction of Act 250 or through the promulgation of new agency guidance regarding incremental loss of habitat. Further, the extended response section of the survey identified

several potential policy gaps that did not surface through the conservation objective matrix.

Two related themes that emerged in the extended response section as potential limitations to implementation were the burden of proof and the capacity of intervenors. Under criterion 8(A), the party opposing the applicant must demonstrate that the project will destroy or significantly imperil necessary wildlife habitat or any endangered species (10 V.S.A. § 6086(8)(A)). While many regulatory programs place the burden of proof on the applicant, Criterion 8A places the burden of proof on the opponent of the project. There may be significant financial costs associated with intervening in or opposing an Act 250 permit application. Often opponents must hire consultants to assist with natural resources inventory and they may hire legal experts to support their formal engagement in the review processes.

Another potential limitation that came to light in the extended response section was the use of mitigation. Some conservation professionals believe undue priority is placed on the use of mitigation in development review and question the effectiveness of mitigation efforts. The regulation of recreational trail development was also identified as a potential gap, one respondent wrote, “We...need to address trail development in a more consistent manner that takes a landscape view of the impacts”. Finally, several respondents recommended greater protections through Act 250 for river corridors and vernal pools. The potential gaps identified in the survey may serve as a starting point for further investigation, analysis, and opportunities for policy improvements.

Section 248

Overview

22 respondents (or 34.4% of those contacted for the survey) completed the Section 248 section of the survey ([Figure 1. Survey Section Responses.](#)). There were 60 answers given for the 4 extended response questions by the 22 respondents ([Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals.](#)). Seventy-seven percent of respondents (17) are ‘moderately’, ‘very’, or ‘extremely familiar’ with the law ([Figure 4. Vermont Wildlife Policy Familiarity.](#)). Signed into law in 1969, Section 248 is the oldest policy in the survey. Additionally, Section 248 review often requires engagement with other regulatory programs including Act 250 and the VESL, likely explaining respondents’ high familiarity. While Section 248 is more narrowly focused than Act 250, wildlife conservation impacts are frequently reviewed as part of the regulatory process and the ANR is required to appear as a party under any Section 248 proceedings (30 V.S.A. § 248(a)(4)(E)). In Fiscal Year 2020, the ANR reviewed 51 Section 248 applications (Coster 2021).

In addition to ANR’s service as a statutory party to all Section 248 proceedings, the VFWD engages in the regulatory review program through their review of woody biomass facility timber harvest notifications, their development of mitigation guidelines, preliminary wildlife inventories, occasional project monitoring for wildlife impacts, and through various other informal consultations (30 V.S.A. § 248(p)) (Vermont Public Utility Commission 2009). The VFWD’s capacity to fully engage in this regulatory process is one of the gaps survey respondents identified. When asked to what degree respondents agreed with the statement: *The VFWD has the requisite capacity to*

meaningfully engage in the Act 250 regulatory process, 59.1% of respondents either strongly disagreed or disagreed ([Figure 5. Vermont Wildlife Policy Implementation Capacity.](#)). This was the highest proportion of respondents who disagreed or strongly disagreed with that statement for any of the policies. In the extended response section for Section 248, one respondent wrote that, “One gap is the politics and limited capacity of the involved state agencies (ANR) to participate and formulate necessary habitat standards for a number of species”.

In 2020, the VFWD spent a total of \$407,812, 7,980 hours, or the equivalent of 3.8 full time employees on regulatory review for both Act 250 and Section 248 review (Porter 2021). In the same year, the ANR received \$224,348 in total fees under 30 V.S.A. § 248b (Coster 2021). These fees came from the review of 31 generation facilities, 14 telecommunication facilities, and 6 transmission facilities (Coster 2021). However, the VFWD’s engagement in the § 248 process is not supported by these fees and is largely supported by staff salaries which rely on Pittman-Robertson and state funds (Vermont Fish and Wildlife Department 2021; Coster 2021). As energy and telecommunications needs grow to support increased residential and commercial development, the Department may see increased engagement in this regulatory review program.

Wildlife Objectives

A majority of respondents (54.5%, 12) described the relationship between the implementation of Section 248 and protecting necessary wildlife habitat as ‘strong’ or ‘very strong’ ([Figure 18. The Relationship Between the Implementation of Section 248 and the Wildlife Objectives.](#)). A greater proportion of respondents reached this

conclusion for Section 248 than for any other policy ([Figure 8. Protection of Necessary Wildlife Habitat.](#)).

Issuance of a CPG under Section 248 requires that due consideration is given to certain Act 250 criteria, including Criterion 8A (30 V.S.A. § 248(b)(5)). Criterion 8A of Act 250 explicitly prohibits permitting a development or subdivision if it will destroy or significantly imperil necessary wildlife habitat (10 V.S.A. §6086(8)(A)). Respondents indicated that Section 248 was strong in achieving this statutory mandate. The synergies between the Section 248 and Act 250 processes likely explain respondents' similar conclusions for this section of the survey for each policy.

A plurality of respondents described the relationship between the implementation of Section 248 and protecting significant black bear habitat (40.9%, 9) and significant bat habitat (45.5%, 10) as 'strong' or 'very strong'. The Department has published guidance for development review regarding both bats and black bears. Additionally, Section 248 received the highest proportion of 'strong' or 'very strong' responses (45.5%, 10) when respondents were asked to describe the relationship between the implementation of the law and preventing destruction of significant white-tailed deer winter habitat. Similar to the Act 250 results, this result was also well supported by the Department's recent engagement in these regulatory review processes. Since 2009, 31,000 acres of the total 60,000 acres protected through the Department's recent engagement in both Act 250 and Section 248 review has been white-tailed deer winter habitat (Vermont Fish and Wildlife Department 2021).

Wetland Habitat Objectives

A majority of respondents (54.5%, 12) described the relationship between the implementation of Section 248 and protecting both exemplary wetland natural communities and significant wetlands that serve as rare, threatened, or endangered (RTE) wildlife habitat as ‘strong’ or ‘very strong’ ([Figure 19. The Relationship Between the Implementation of Section 248 and the Wetland Objectives.](#)). Only the Vermont Wetland Rules had a greater proportion of respondents who reached the same conclusion for protecting exemplary wetland natural communities ([Figure 20. Protection of Exemplary Wetland Natural Communities.](#)). Despite the importance of protecting significant wetlands that serve as RTE wildlife habitat in the implementation of the policy, the VESL (40.9%) received a lower proportion of respondents who described the relationship between the implementation of the VESL and the objective as ‘strong’ or ‘very strong’.

Criterion 8A prohibits the issuance of a permit if it is demonstrated by any party opposing the applicant that a development or subdivision will destroy or significantly imperil any endangered species habitat (10 V.S.A. §6086(8)(A)). Respondents indicated that Section 248 is strong in meeting part of this statutory mandate, protecting significant wetland RTE habitat. As noted in a previous section, the Department has developed guidelines for development review for several species that utilize wetland habitat including white-tailed deer, black bear, and great blue herons. This guidance may strengthen implementation of the law with regard to wetland habitat.

The regulatory review process described in the Burlington Electric Department (BED) and Ryegate Associates CPG’s directs the VFWD to review impacts to deer wintering areas, wetlands, or the habitat of threatened or endangered species (Vermont

Public Utility Commission 1983; Vermont Agency of Natural Resources 1992).

Responses indicate that this directive to review impacts on wetlands from biomass harvest for BED and Ryegate Associates may not be being met.

Forest Habitat Objectives

Overall, respondents did not believe that Section 248 was strong in achieving the forest habitat objectives ([Figure 21. The Relationship Between the Implementation of Section 248 and the Forest Objectives.](#)). Although, a higher proportion (31.8%, 7) of respondents described the relationship between the implementation of Section 248 and minimizing forest fragmentation as ‘strong’ or ‘very strong’ than in Act 250 (8%). A plurality of respondents (36.4%, 8) described the relationship between the implementation of Section 248 and maintaining and improving forestland wildlife habitat and forest blocks as ‘very weak’ or ‘weak’. Respondents were less conclusive on the relationship between the implementation of Section 248 and maintenance and improvement of habitat connectors.

The current statutory language of Act 250 Criterion 8(A), made relevant to Section 248 through 30 V.S.A. § 248(b)(5), is relatively silent on impacts to forest blocks, wildlife corridors, and forest fragmentation. However, as noted in a previous chapter, a recent order issued by the PUC may set a precedent for conserving wildlife corridors in Section 248 proceedings (Vermont Public Utility Commission 2017). In this case, the Shutesville Hill wildlife corridor was deemed a ‘rare and irreplaceable natural area’ and the PUC found that the project violates 10 V.S.A. § 6086(a)(8) because the fragmenting effects of the tower would result in an undue adverse impact to a rare and irreplaceable natural area and the natural environment (Vermont Public Utility

Commission 2017). Forest fragmentation was a frequent gap respondents identify in the extended response section of the survey. Respondents note that the linear nature of many Section 248 projects make avoidance of fragmentation challenging. Alongside Act 250, forest fragmentation is clearly an area of the law deserving of further investigation and analysis.

Rare, Threatened, and Endangered Species Objectives

Generally, respondents believed Section 248 was strong in achieving RTE objectives. A majority of respondents described the relationship between the implementation of Section 248 and each RTE objective as ‘strong’ or ‘very strong’ ([Figure 22. The Relationship Between the Implementation of Section 248 and the RTE Objectives.](#)). Fifty-four percent of respondents (12) described the relationship between the implementation of Section 248 and preventing destruction of endangered species and preserving areas with RTE species as strong. 50% of respondents (11) described the relationship between the implementation of Section 248 and preserving rare and irreplaceable natural areas and conserving designated critical habitat of threatened or endangered species as strong.

The respondents’ conclusions for RTE species-related objectives are well supported by the language of the statutes, agency guidance, and known VFWD engagement with the law. Criterion 8A of Act 250, made relevant to Section 248 through 30 V.S.A. § 248(b)(5), explicitly prohibits the granting of a permit if a development or subdivision will destroy or significantly imperil any endangered species habitat (10 V.S.A. §6086(8)(A)). Additionally, the review process described in the BED and Ryegate Associates CPG’s directs the VFWD to review impacts to the habitat of threatened or

endangered species. As previously noted, the VFWD has also issued guidance for rare, threatened, and endangered plant species inventories in the Section 248 process.

As discussed above, the Department has published guidance for development review regarding bats and several bat species are protected under both the federal Endangered Species Act and the VESL. In recent wind energy development cases referenced in a previous section, the VFWD was called upon to oversee mitigation and monitor impacts after project development. In the Deerfield wind case final order, the PUC noted that surveys in the project area documented several *Myotis* species, which could include species listed as threatened or endangered under the VESL including: the Eastern small-footed bat, the little brown bat, the Northern long-eared bat, the Indiana bat, and the tri-colored bat (Vermont Public Utility Commission 2009; Vermont Fish and Wildlife Department 2015). The amended CPG issued for this project in 2009 required several forms of monitoring (Vermont Public Utility Commission 2009). The developer was required to submit a post-construction bat mortality study to the PUC (Vermont Public Utility Commission 2009). Working with the VFWD, the developer will review the mortality study and if bat fatality estimates exceed established threshold ranges for mortality at wind projects, Deerfield must submit an adaptive management plan to ANR (Vermont Public Utility Commission 2009). This is just one example of how Section 248 may support the conservation of RTE species.

General Objectives

A plurality of respondents (11, 50%) described the relationship between the implementation of Section 248 and supporting landscape-level conservation goals beyond the project level scope as ‘very weak’ or ‘weak’ ([Figure 23. The Relationship Between](#)

[the Implementation of Section 248 and the General Objectives.](#)). A greater proportion of respondents (64%) reached the same conclusion for Act 250 as being ‘very weak’ or ‘weak’ in supporting landscape-level conservation goals. This disparity between respondents conclusions about each law may be due in part to the recent Shutesville Hill decision which incorporated landscape-level elements such as a wildlife corridor in a decision to deny a CPG (Vermont Public Utility Commission 2017). This disparity may also be due to a difference in statutory language between Act 250 and Section 248. In Section 248 proceedings, a proposed project cannot have an undue adverse effect on...*the natural environment*; meanwhile Act 250 is much narrower in requiring that projects not have an undue adverse effect on *the scenic or natural beauty of the area, aesthetics, historic sites, or rare and irreplaceable natural areas* (30 V.S.A. § 248(b)(5))(10 V.S.A. § 6086(8)(A)). When describing Section 248 in the extended response section of the survey, one respondent referenced this difference, stating that:

“Section 248, unlike Act 250, requires that the PUC consider the broader effects of projects subject to this regulatory authority on the natural environment. This approach allows for broader discretion and more flexibility to argue for the protection of fish, wildlife, habitats, natural communities and landscapes than Act 250.”

The broader language and scope of review granted under Section 248 may allow for a greater incorporation of landscape-level conservation goals.

Results for the climate-related objectives were less conclusive than they were for Act 250. The climate-related responses may be related to the role that Section 248 plays in siting renewable energy infrastructure. However, some respondents expressed concern over the growing renewable energy development and one respondent stated that Section 248 encourages, “...[the] promotion of renewables at the expense of forest cover.”

Responses were similarly inconclusive for the *Support land conservation measures in regional and/or municipal plans* objective with a plurality of respondents selecting ‘neutral’ when describing the relationship between the objective and the implementation of Section 248.

Discussion

While the regulatory focus of Section 248—energy and telecommunications infrastructure—is relatively narrow, this policy has significant overlap with several other environmental policies, including Act 250 and the VESL, that have implications for the conservation of wildlife. Despite its narrow focus, the statutory language of the law grants it a broad reach. Further, recent caselaw may establish strong precedence for the conservation of wildlife habitat through this regulatory review mechanism. Survey respondents agreed that the law is effective in preventing the destruction of wildlife habitat. Similar to the responses for Act 250, conservation professionals express that Section 248 is particularly strong in protecting necessary wildlife habitat and RTE habitat. As a statutory party to all Section 248 proceedings, the ANR frequently engages in this policy and the VFWD engages in a multitude of ways. Unfortunately, the majority of respondents believed that VFWD lacks the adequate capacity to meaningfully engage in the implementation of Section 248. Increasing pressure to deploy renewable energy infrastructure and expand broadband access in the state both raise the importance of securing long-term, stable funding sources for the Department.

Due to the statutory overlap between Act 250 and Section 248, legislative efforts to incorporate forest fragmentation-related criteria into Act 250 could have similarly sweeping impacts to the implementation of Section 248. However, respondents generally

believed that Section 248 was stronger in addressing forest fragmentation than Act 250. Similarly, respondents are less conclusive in their assessment of the relationship between the implementation of Section 248 and the climate change-related objectives. Act 250 reform could significantly alter the implementation of Section 248.

Similar to Act 250, supporting landscape-level conservation goals was another gap identified. As noted in the Act 250 discussion, addressing the cumulative impacts of development and taking a more coarse-scale view in a permitting decision is a chronic weakness for many regulatory review programs. When asked about policy gaps related to Section 248, one respondent wrote:

“Cumulative impact analysis is not a strength of the PUC or the Sec. 248 process. As more and more instate renewables are deployed, there needs to be a better way to track, assess and regulate the cumulative impact of energy infrastructure on conservation values.”

Another respondent described the Section 248 approach as “piecemeal”. This may be addressed through amendment to the statutory language of the policy or through the promulgation of new agency guidance regarding incremental loss of habitat. The potential gaps identified in the survey serve as a starting point for further investigation and analysis.

Vermont Endangered Species Law

Overview

Twenty-two respondents (or 34.4% of those contacted for the survey) completed the VESL section of the survey ([Figure 1. Survey Section Responses.](#)). There were 56 answers given for the 4 extended response questions by the 22 respondents ([Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals.](#)). The VESL was signed into law in the early 1970's, around the same time when the federal Endangered Species Act was enacted and is one of the older policies reviewed. 81.8% (18) respondents were 'moderately', 'very', or 'extremely familiar' with the law, making the VESL the second most well understood policy in the survey, only behind Act 250 (96%) ([Figure 4. Vermont Wildlife Policy Familiarity.](#)). The VESL shares significant overlap with almost every other policy reviewed, and its broad impact may explain the high level of professional familiarity with the law.

Although capacity is a clearly identified gap for both Act 250 and Section 248, respondents were not as decisive in their judgement of the VFWD's ability to engage in the VESL. While a plurality of respondents (45.5%, 10) disagreed that VFWD has the adequate capacity to engage in the policy, almost a third of respondents (27.3%, 6) were 'neutral' or unsure (responding 'unknown'). However, when asked to identify policy gaps in the extended response portion of this section, several respondents reference inadequate capacity. One respondent wrote:

“VFWD still lack[s] the stable funding to adequately survey for and evaluate populations of [several] species on the [threatened and endangered species] list. [The Department must rely] on grants to complete the work.”

Another respondent specifically identified recovery planning as an area in need of greater funding.

Work that is related to the VESL—such as inventories and status assessments that may inform VESL listing decisions—is funded in part by the Vermont Nongame Wildlife Fund (10 App. V.S.A. §25(d)(1)). In Fiscal Year 2020, the Nongame Wildlife Fund was valued at \$150,827 and the Threatened and Endangered Species Fund was valued at \$39,628 (Snyder 2021). In 2020, the Vermont Fish and Wildlife Department (VFWD) spent a total of \$407,812, 7,980 hours, or the equivalent of 3.8 full time employees on regulatory review for both Act 250 and Section 248 review which may have included VESL-related review (Porter 2021). The Department may see increased engagement in regulatory review that will require engagement with the VESL as a result of increasing development pressure.

Wildlife Objectives

Generally, respondents did not believe that the VESL is strong in achieving the wildlife objectives ([Figure 24. The Relationship Between the Implementation of the Vermont Endangered Species Law and the Wildlife Objectives.](#)). Particularly when compared to other regulatory mechanisms such as Act 250 and Section 248, the VESL performs poorly. This may be due in part to the scope of the wildlife objectives, which was broad and dealt primarily with game species. White-tailed deer and black bear are not state-listed endangered or threatened species, possibly justifying the responses for these objectives. Additionally, ‘necessary wildlife habitat’ is a statutory term from the language of both Act 250 and Section 248, while the VESL primarily protects critical habitat for threatened and endangered species (10 V.S.A. §5402a(a)).

A plurality of respondents (36%, 8) described the relationship between the implementation of the VESL and preventing destruction or significant imperilment of significant bat habitat as ‘strong’ or ‘very strong’. However, Act 250 (54%) and Section 248 (45%) both received a higher proportion of respondents who indicated each policy was ‘strong’ or ‘very strong’ in achieving this objective ([Figure 25. Strong or Very Responses for Preventing Destruction of Significant Bat Habitat.](#)). In light of recent conflict surrounding threatened and endangered bat species and possible harm from pesticide spraying, it is important to note that a plurality of respondents indicated that the VESL was strong in preventing destruction or significant imperilment of significant bat habitat (Gjessing 2021).

Wetland Habitat Objectives

Generally, respondents did not believe that the VESL was strong in achieving the wetlands objectives ([Figure 26. The Relationship Between the Implementation of the Vermont Endangered Species Law and the Wetland Objectives.](#)). A plurality of respondents (40.9%, 9) believed that the relationship between the implementation of the VESL and protecting significant wetlands that serve as RTE habitat was ‘strong’ or ‘very strong’ ([Figure 10. Protection of Significant RTE Wetland Habitat.](#)). However, Act 250 (60%), Section 248 (54.5%), and the Vermont Wetland Rules (71.4%) all received a higher proportion of respondents who believed each policy was ‘strong’ or ‘very strong’ in achieving this objective.

Functional Criteria 5.6 of the Vermont Wetland Rules: Rare, Threatened, and Endangered Species Habitat requires engagement with the VESL, likely explaining the

plurality of respondents who indicated the policy is strong in protecting significant RTE wetland habitat (Vermont Agency of Natural Resources 2020).

Forest Habitat Objectives

Respondents did not believe that the VESL was strong in achieving the forest objectives ([Figure 27. The Relationship Between the Implementation of the Vermont Endangered Species Law and the Forest Objectives.](#)). A majority of respondents (77.3%, 17) describe the relationship between the implementation of the VESL and minimizing forest fragmentation as ‘very weak’ or ‘weak’. A greater proportion of respondents reached this conclusion for the VESL than for any other policy. Additionally, 77.3% of respondents felt that the relationship between the implementation of the VESL and maintaining and improving habitat connectors was ‘very weak’ or ‘weak’. Eighty-one percent of respondents (18) described the relationship between the implementation of the VESL and maintaining and improving forest blocks and forestland wildlife habitat as ‘very weak’ or ‘weak’.

The VESL is a fine-filter conservation strategy that focuses on meeting the conservation needs of individual species (Tingley et al. 2014). In contrast, coarse-filter strategies focus on conserving aggregations of species or environmental units (Tingley et al. 2014). Coarse-filter strategies are often more focused on preserving habitat broadly, while fine-filter strategies only focus on preserving the habitat of one species. Because forests provide habitat for a multitude of species, forest conservation may be best achieved through coarse-filter conservation strategies. Respondents’ conclusion that the VESL—a fine-filter strategy—does not achieve these forest conservation-related objectives is well supported. However, forest fragmentation is listed as a threat to the

continued survival in the recovery plans for both the state-listed endangered timber rattlesnake (*Crotalus horridus*) and spruce grouse (*Falcapennis canadensis*) (Alexander and Parren 2012; Blodgett 2015). Greater incorporation of coarse-filter strategies such as maintaining and improving forestland wildlife habitat could have positive implications for several threatened and endangered species.

Rare, Threatened, and Endangered Species Objectives

Generally, respondents believed that the VESL is strong in achieving the RTE objectives. A majority of respondents (68.2%, 15) described the relationship between the implementation of the VESL and preventing the destruction or significant imperilment of endangered species as ‘strong’ or ‘very strong’ ([Figure 28. The Relationship Between the Implementation of the Vermont Endangered Species Law and the RTE Objectives.](#)). A greater proportion of respondents reached this conclusion for the VESL than for any other policy ([Figure 12. Prevention of Destruction of Threatened and Endangered Species.](#)). Act 250 (56%) and Section 248 received (54.5%) were the next highest. It is illegal to take, possess, or transport wildlife that are members of a threatened or endangered species (10 V.S.A. §5403(a)(1)). ‘Take’ or ‘taking’ could be interpreted to mean destruction or significant imperilment. The statute defines ‘take’ or ‘taking’ as:

pursuing, shooting, hunting, killing, capturing, trapping, harming, snaring, or netting wildlife; or an act that creates a risk of injury to wildlife, whether or not the injury occurs, including harassing, wounding, or placing, setting, drawing, or using any net or other device used to take animals (10 VS.A. §5401(18)(a)).

Respondents indicated that the VESL is achieving this strict statutory prohibition.

Conversely, there is no language in the statute that directly relates to the preservation of rare or irreplaceable natural areas. Majority of respondents (54.5%, 12) felt that the relationship between the implementation of the VESL and preserving rare or

irreplaceable natural areas is ‘very weak’ or ‘weak’. A higher proportion of respondents reach this conclusion for the VESL than for any other policy ([Figure 27. Very Weak or Weak Responses for Preserving Rare/Irreplaceable Natural Areas.](#)). As discussed above, the VESL is a fine-filter conservation strategy, and it is likely that a coarse-filter conservation strategy may be more successful in achieving a habitat conservation-related objective such as preserving rare or irreplaceable natural areas.

However, one aspect of the VESL may employ a coarse-filter approach through the designation of critical habitat. The authority to designate critical habitat was added the VESL in 2016 and the lack of critical habitat designation is often cited as a hindrance to full implementation of the law (Representative Deen 2016). When asked to describe policy gaps in the extended response portion of this section, several respondents allude to the difficulty of designating critical habitat and the lack of critical habitat designations.

Two respondents wrote:

“I’m unaware of much of this critical habitat being mapped or designated, and if it is, the maps are outdated.”

“The designation of ‘critical habitat’ is too burdensome and restricted in scope to provide necessary protection for most threatened and endangered species, and will only become a more politically-charged and bureaucratic process as climate change and land-use changes create more stresses on these species, their habitats, and landscape connectivity.”

Yet, in the conservation objective matrix section of the Vermont Wildlife Policy Gap Survey, a majority of respondents (54.5%, 12) felt that the relationship between the implementation of the VESL and conserving designated critical habitat of threatened or endangered species is ‘strong’ or ‘very strong’. The contrasting results in the conservation objective matrix section and the extended response section of the survey could be related to the wording of the objective. If the objective was rewritten

‘designation of critical habitat’ rather than ‘conservation of designated critical habitat’, respondents may describe a different relationship between the law and this objective. Additionally, respondents may have read the objective to refer only to the conservation of currently existing critical habitat.

General Objectives

Respondents did not feel that the VESL is strong in achieving the general objectives ([Figure 28. The Relationship Between the Implementation of the Vermont Endangered Species Law and the General Objectives.](#)). A majority of respondents describe the relationship between the implementation of the VESL and the following objectives as ‘very weak’ or ‘weak’: supporting land conservation measures in regional and/or municipal plans in (54.5%, 12), supporting landscape-level conservation goals beyond the project-level scope (72.7%, 16), contributing to climate change resiliency (63.6%, 14), and in contributing to climate change mitigation (68.2%, 15). A higher proportion of respondents reached this conclusion for supporting landscape-level goals for the VESL than for any other policy.

The general objectives would likely best be addressed through a coarse-level conservation strategy unlike the VESL. Species-specific conservation may not have landscape-level implications and may not contribute to broader goals such as climate change resilience or climate change mitigation. However, climate change is listed as a threat to the continued survival in the recovery plans for both the state-listed endangered spruce grouse and spotted turtle (*Clemmys guttata*) (Alexander and Parren 2012; Parren et al. 2019). Greater consideration of resilience to climate change when planning for the

recovery of a threatened or endangered species could have positive conservation implications.

Discussion

The VESL has been responsible for the recovery of several species of wildlife, including iconic species such as the Peregrine falcon, common loon, and the osprey (Vermont Fish and Wildlife Department 2015). Survey respondents indicated that the law was strong in achieving the RTE objectives and the conservation of endangered species is highly regarded in the state (Duda et al. 2015). Although the prohibition against ‘take’ and the permitting programs represent regulatory policies, the voluntary nature of recovery planning and critical habitat designations may contribute to the positive public perception of this law. Beyond the RTE objectives and other objectives related to RTE species (such as preserving wetland RTE habitat), respondents did not believe that the VESL is strong in achieving many of the other conservation objectives, likely in part due to its fine-filter approach.

Implementation of this law may be strengthened by greater capacity for recovery planning and further designation of critical habitat. There are currently recovery plans for 14 species of wildlife in Vermont (Vermont Agency of Natural Resources 2022). Three of these species with recovery plans, the Peregrine falcon, the common loon, and the osprey, were all recently delisted (Vermont Fish and wildlife Department 2015). Additionally, another species with a recovery plan, the bald eagle, was recently removed from the list (Vermont Agency of Natural Resources 2022). In October 2021, the Department proposed to designate critical habitat for the common tern, bat hibernaculum, and spiny softshell turtles (Vermont Agency of Natural Resources 2021). Green

Mountain Audubon, The Nature Conservancy, and the state of Vermont own 7 out of the 8 sites proposed for critical habitat designation (Vermont Agency of Natural Resources 2021). There is some concern that critical habitat designations may be limited to cases where the habitat is already owned by the state of Vermont or a conservation organization. Offering incentives to private landowners for critical habitat designations on their property may be one way to increase the designation of critical habitat. For example, private landowners in Montana have recently signed conservation agreements with conservation organizations who offer financial incentives for maintaining elk habitat (Property and Environment Research Center 2021). A similar model could be adopted in Vermont to allow nongovernmental organizations the opportunity to contribute towards endangered species conservation without the use of an easement. Both recovery planning and further critical habitat designations would likely be supported by greater capacity for the VFWD's efforts to implement the VESL. A plurality of respondents (45.5%, 10) disagreed that VFWD has the adequate capacity to engage in the policy and several respondents referenced inadequate capacity in their extended response answers.

As previously noted, the VESL performed poorly for several habitat-related conservation objectives ([Figure 31. Relationship Between the Implementation of the Vermont Endangered Species Law and the Selected Habitat-related Objectives.](#)). This is likely due to the species-specific or fine-filter approach that the law employs. It is unclear how coarse-filter conservation strategies such as preventing forest fragmentation, supporting landscape-level conservation goals, and protecting habitat more broadly could be achieved within the scope of a species-specific endangered species law. It would be interesting to quantify how threatened and endangered species in Vermont currently

benefit from coarse-filter conservation policies and how common species currently benefit from the VESL. Historically, coarse-filter approaches have served as robust methods for conserving the factors that promote biodiversity; however the general public still cares more about specific species than biodiversity (Tingley et al. 2014). The targeted approach of the VESL lacks coherence with the other policies reviewed in the survey, however when fine-filter approaches are viewed in tandem with coarse-filter approaches, they may serve a complementary role (Tingley et al. 2014). Conservation professionals believed that the VESL is strong in achieving its primary function, the protection of RTE species, however there are certainly areas where the law could work more cooperatively with other coarse-filter conservation policies to further support biodiversity in Vermont.

While this did not surface in the conservation objective matrix, one potential gap respondents identified in the extended response section was the role of politics. One respondent wrote that "...[all decision-making] goes to the Secretary of ANR, who is a political appointment." The Secretary has discretion in threatened and endangered species decision-making under the VESL. While the Secretary is advised by the ESC, the Secretary is not bound by their recommendations (10 V.S.A. § 5404). The Secretary must use the best scientific, commercial, and other data available when determining whether a species is threatened or endangered, but this requirement could be broadly interpreted (10 V.S.A. §5402(e)(1)). The Secretary is a political appointee who serves at the pleasure of the Governor and the ESC is made up entirely of cabinet-level administrative appointees or other gubernatorial appointed members (10 V.S.A. §5404(a)). Political priorities

change between administrations and some conservation professionals may be concerned about political influence in the implementation of the VESL.

Vermont Wetlands Rules

Overview

Twenty-one respondents (or 32.8% of those contacted for the survey) completed the Vermont Wetland Rules (VWR) section of the survey ([Figure 1. Survey Section Responses.](#)). There were 54 answers given for the 4 extended response questions by the 21 respondents ([Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals.](#)). Seventy-one percent of respondents (15) were ‘moderately’, ‘very’, or ‘extremely familiar’ with the law ([Figure 4. Vermont Wildlife Policy Familiarity.](#)). Signed into law in 1990, the VWR are the 2nd newest policy reviewed and they receive the 2nd lowest proportion of respondents who were ‘moderately’, ‘very’, or ‘extremely familiar’ with the law. The VWR are a regulatory program primarily administered by the DEC. Despite relatively lower familiarity with the VWR, in Fiscal Year (FY) 2019, DEC’s WSMD, who oversee VWR review, provided technical assistance or project review for over 4,600 projects and issued 1,717 permits (Walke 2021). In the five years prior to FY 2019, the WSMD protected more than 5,500 acres of surface waters using easements and designations (Walke 2021).

When asked to what degree respondents agreed with the statement: *The VFWD has the requisite capacity to meaningfully engage in the Act 250 regulatory process*, 28.6% of respondents (6) either strongly disagreed or disagreed, while 23.8% of respondents (5) either agreed or strongly agreed, and a plurality of respondents answer ‘neutral’ or ‘unknown’ (47.6%, 10) ([Figure 5. Vermont Wildlife Policy Implementation Capacity.](#)). With the DEC administering the VWR, the VFWD has limited jurisdiction in wetland regulation. This may explain the plurality of ‘neutral’ or ‘unknown’ responses.

Wildlife Objectives

Generally, respondents did not believe that the VWR are strong in achieving the wildlife objectives ([Figure 32. Relationship Between the Implementation of the Vermont Wetlands Rules and the Wildlife Objectives.](#)). A plurality of respondents (42.6%, 9) described the relationship between the implementation of the VWR and preventing destruction or significant imperilment of significant white-tailed deer winter habitat as ‘very weak’ or ‘weak’. Similarly, a plurality of respondents (38.1%, 8) described the relationship between the implementation of the VWR and preventing destruction or significant imperilment of significant black bear habitat as ‘very weak’ or ‘weak’. Wildlife Habitat is one of the ten functional criteria which the Secretary uses to evaluate a wetlands significance when making a determination of wetland classification (Vermont Agency of Natural Resources 2020). Under the wildlife habitat criterion, consideration is given to the extent to which the wetland provides white-tailed deer wintering habitat or habitat for black bear (Vermont Agency of Natural Resources 2020). Respondents are less conclusive when evaluating how well the law achieves prevention of destruction of significant wildlife habitat. The VWR make no mention of ‘significant wildlife habitat’, the term is primarily limited to Act 250 and Section 248 so this objective may lack some relevance for the VWR.

A plurality of respondents (47.6%, 10) felt that the relationship between the implementation of the VWR and preventing destruction or significant imperilment of significant bat habitat is ‘very weak’ or ‘weak’. A greater proportion of respondents reach this conclusion for the VWR than for any other policy, and only Act 171 has a lower proportion of respondents who believed that the policy is ‘strong’ or ‘very strong’ in

achieving this objective ([Figure 25. Strong or Very Responses for Preventing Destruction of Significant Bat Habitat.](#)). Recent conflict surrounding threatened and endangered bat species and possible harm from pesticide spraying near the Otter Creek Wetland complex, may inform respondents conclusions (Parsons 2020).

Wetland Habitat Objectives

Respondents believed that the VWR are strong in achieving the wetland objectives. A majority of respondents described the relationship between the implementation of the VWR, and the waterfowl (66.7%, 14) and migratory bird habitat (57.1%, 12) objectives as ‘strong’ or ‘very strong’ ([Figure 33. Relationship Between the Implementation of the Vermont Wetlands Rules and the Wetland Objectives.](#)).

Respondents believed the VWR were slightly stronger in protecting waterfowl habitat than migratory nongame habitat. State fish and wildlife agencies are often criticized for expending more resources on the conservation of game species (Vermont Fish and Wildlife Department 2021; Nie 2004; Decker et al. 1996; Henderson et al. 2021). A smaller proportion of respondents described the relationship between the implementation of the VWR and protecting significant wetlands that serve as habitat for white-tailed deer, black bear, bobcat, moose, muskrat, otters, and/or mink as ‘strong’ or ‘very strong’ (42.9%, 9). While still a plurality, this slightly lower proportion of respondents may be bolstered by the responses in the wildlife objectives section where a plurality of respondents felt that the VWR is ‘very weak’ or ‘weak’ in preventing destruction or significant imperilment of significant white-tailed deer winter habitat and of significant black bear habitat. A majority of respondents (66.7%, 14) described the relationship between the implementation of Rules and protecting exemplary wetland natural

communities as ‘strong’ or ‘very strong’. A greater proportion of respondents reached this conclusion for the VWR than for any other policy.

The VWR specifies that the State of Vermont is to identify and protect significant wetlands and the values and functions which they serve in such a manner that the goal of no net loss of such wetlands and their functions is achieved (Vermont Agency of Natural Resources 2020). Some wetland conservationists believe that a goal of no net loss of wetlands and wetland functions is inadequate and believe that the goal should be strengthened to *prevent* the net loss of wetlands. A majority of respondents (52.4%, 11) felt that the relationship between the implementation of the VWR and preventing the net loss of wetlands is ‘strong’ or ‘very strong’. This proportion was higher for the VWR than for any other policy ([Figure 34. Prevent Net Loss of Wetlands.](#)). While the Rules are not currently written to prevent net loss of wetlands, respondents indicated that they may already be achieving this objective.

A majority of respondents (71.4%, 15) believed that the relationship between the implementation of VWR and in protecting significant wetlands that serve as rare, threatened, or endangered (RTE) wildlife habitat was ‘strong’ or ‘very strong’ ([Figure 35. Strong or Very Responses for Protection of Significant RTE Wetland Habitat.](#)). A greater proportion of respondents reached this conclusion for the VWR than for any other policy. As noted in a previous section, RTE Habitat is one of the ten functional criteria which the Secretary uses to evaluate a wetlands significance when making a determination of wetland classification (Vermont Agency of Natural Resources 2020). Respondents indicated that the VWR are currently serving this functional criterion well.

Forest Habitat Objectives

A majority of respondents felt that the VWR is ‘very weak’ or ‘weak’ in achieving each of the forest objectives ([Figure 36. Relationship Between the Implementation of the Vermont Wetlands Rules and the Forest Objectives.](#)). One of the ten functional criteria used to evaluate a wetlands significance when making a determination of wetland classification, exemplary wetland natural community, states that, “...larger wetlands in undisturbed condition and in *unfragmented* landscapes are ranked as [better examples of exemplary wetland natural communities]” (Vermont Agency of Natural Resources 2020). Under this same functional criterion, forested wetlands with old growth trees are also to be considered exemplary wetland natural communities (Vermont Agency of Natural Resources 2020). Many of the wetlands identified as Vermont Natural Community Types are forested including those under the hardwood and softwood swamp categories (Sorenson and Zaino 2019). Further, many bogs and peatlands are associated with unique forest types (Sorenson and Zaino 2019).

Despite the importance of forested wetlands, the Rules are relatively silent on the prevention of forest fragmentation. Sixty-one percent of respondents (13) described the relationship between the implementation of the VWR and minimizing forest fragmentation as ‘very weak’ or ‘weak’ ([Figure 37. Minimize Forest Fragmentation.](#)). The VESL and Act 250 both received a higher proportion of respondents who reach this conclusion (80.9% and 64%, respectively).

Rare, Threatened, and Endangered Species Objectives

Overall, respondents indicated that the Rules were strong in achieving the RTE objectives. A majority of respondents (52.4%, 11) believed that the relationship between

the implementation of the VWR and preventing destruction or significant imperilment of endangered species ‘strong’ or ‘very strong’ ([Figure 38. Relationship Between the Implementation of the Vermont Wetlands Rules and the RTE Objectives.](#)). Similarly, a majority of respondents (57.1%, 12) felt that the relationship between the implementation of the Rules and preserving areas with RTE species is ‘strong’ or ‘very strong’. A plurality of respondents (47.6%, 10) described the relationship between the implementation of the Vermont Wetland Rules and conserving designated critical habitat of threatened or endangered species as ‘strong’ or ‘very strong’. As noted above, RTE Habitat is one of the ten functional criterion used evaluate a wetlands significance when making a determination of wetland classification (Vermont Agency of Natural Resources 2020). Respondents indicated the VWR is strong in supporting this functional criterion.

Additionally, a plurality of respondents (38.1%, 8) described the relationship between the implementation of the VWR and preserving rare and irreplaceable natural areas as ‘strong’ or ‘very strong’. Only Section 248 (50%) received a higher proportion for this objective ([Figure 39. Strong or Very Responses for Preserving Rare/Irreplaceable Natural Areas.](#)).

General Objectives

A plurality of respondents (42.9%, 9) described the relationship between the implementation of the Rules and supporting landscape-level conservation goals beyond the project scope level as ‘very weak’ or ‘weak’ ([Figure 40. Relationship Between the Implementation of the Vermont Wetlands Rules and the General Objectives.](#)). The Rules are limited in their landscape-level impact. As noted above, the Vermont Wetland Rules do not include any forest fragmentation elements and lack incorporation of language

related to wildlife connectivity or corridors within the functional criteria. Additionally, there are currently only 9 Class I wetlands, limiting the landscape-level impact of the law (Vermont Agency of Natural Resources 2022).

A plurality of respondents (47.6%, 10) felt that the VWR was ‘strong’ or ‘very strong’ in contributing to climate change resilience. Only Current Use received a higher proportion of respondents who felt that the policy is strong in achieving this objective ([Figure 41. Climate Change Resilience.](#)). ‘Green infrastructure’ or a network of functioning ecosystems, is increasingly sited as a method of building resilience to climate change (Watson et al. 2016). A recent study in Vermont estimated that the annual rate of flood mitigation services that the Otter Creek wetland complex provides to Middlebury, Vermont is between \$126,000-\$450,000 (Watson et al. 2016). Similarly, a plurality of respondents described that the relationship between the implementation of the VWR and contributing to climate change mitigation as ‘strong’ or ‘very strong’.

Discussion

Although not administered by the VFWD, the Vermont Wetland Rules have various impacts on the conservation of wildlife in Vermont. Conservation professionals firmly understand the policy and its implementation by the DEC. Unfortunately, respondents did not feel that the Rules are particularly strong in supporting the wildlife objectives of the survey. Respondents felt that the Rules are particularly weak in preventing destruction of significant bat habitat. Recent conflict surrounding threatened and endangered bat species and possible harm from pesticide spraying near the Otter Creek Wetland complex underscore this potential policy gap (Parsons 2020). However, survey responses suggest that the policy is a strong tool for the conservation and recovery

of RTE species. Additionally, respondents identified several habitats that the VWR are effective at protecting including habitat for migratory waterfowl, nongame migratory songbirds, and RTE species. Similarly, respondents indicated that the Rules are relatively effective at protecting exemplary wetland natural communities and rare and irreplaceable natural areas. Respondents also felt that the Rules were generally effective in preventing the net loss of wetlands and achieving other wetland-related objectives. This suggests that the policy is an effective tool for wetland conservation.

While the Rules support the conservation of several habitat types, the reach of the law is generally limited to the project-level scope and by the finite number of designated Class I wetlands. Forested wetlands provide important wildlife habitat and make up several of the rare natural communities in the state, however, the functional criterion used to evaluate wetlands include no reference to forest fragmentation. The addition of forest fragmentation and wildlife connectivity elements to the wildlife habitat criterion could expand the impact of the Rules. Another means of improving forest wetland conservation through the Rules is by the adjustment of buffer zones. The Secretary has the authority to adjust buffer zones beyond the default 50 feet for a Class II wetland or 100 feet for a Class I wetland (10 V.S.A. §§914-915). Several respondents referenced this authority in the extended response section, stating how it could be further utilized, one respondent stated:

“The standard 50-foot upland buffer is typically all that is applied during the review process. There are provisions in the Wetland Rules to allow the Secretary to impose larger buffers to protect specific functions, but this provision is rarely used and wildlife habitat is the function most often degraded by loss of adequate buffers.”

Utilizing the authority to expand a buffer zone to protect wildlife habitat could enhance the functions and values of a wetland. By expanding the reach of the Rules either through greater implementation of wetland-specific buffer sizes or by incorporating forest fragmentation elements, we may also see increased climate resilience benefits (Watson et al. 2016). Wetlands will be a critical tool in buffering the impacts of a changing climate, including increased flood risk (Watson et al. 2016). Conserving ‘green infrastructure’ has multiple benefits, and this is one area where wildlife could significantly benefit.

Another theme that emerges in the extended response section as a potential limit to implementation is the wetlands maps. A Class I wetland is a wetland identified on the VSWI maps as a Class I wetland and a Class II wetland is a wetland other than a Class I or Class III wetland that is a wetland identified on the VSWI maps protection (10 V.S.A. § 902). However, the VSWI maps describe the approximate location of significant wetlands (Vermont Agency of Natural Resources 2020). The accuracy of the VSWI maps is commonly referenced as a limitation of the Rules and because of the jurisdictional power of the maps, this limit could be significant. Several respondents commented on the mapping limitation when asked *What are the greatest policy gaps related to wildlife conservation objectives in the Vermont Wetland Rules regulatory process:*

“State mapping of wetlands dates back to 1960s in some areas and technologies in remote sensing have drastically improved.”

“We don't know where all wetlands are, so they can be protected.”

“The VT Wetland Rules need a more clearly outlined policy to proactively outline wetlands prior to development activities that can be easily viewed and understood by the public than a reactive approach whenever a development project is already underway for planning.”

“...significant gaps in wetlands maps used as part of the regulatory process...”

Technology and mapping capability have immensely improved since the VWR were enacted in 1990. Launching a review of the current wetland maps using modern mapping

technology to update the maps may result in a more accurate reflection of the wetlands under jurisdiction of the Vermont Wetland Rules in the state. This could have positive impacts on wildlife conservation in Vermont.

Act 171

Overview

20 respondents (or 31.3% of those contacted for the survey) completed the Act 171 section of the survey ([Figure 1. Survey Section Responses.](#)). There were 43 responses given for the 4 extended response questions by the 20 respondents, the lowest total number of responses given for any section as shown in the figure below ([Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals.](#)). Fifty-five percent of respondents (11) were ‘moderately’, ‘very’, or ‘extremely familiar’ with the policy, making Act 171 the least well understood policy in the survey as shown in the figure below ([Figure 4. Vermont Wildlife Policy Familiarity.](#)). Act 171 was signed into law in 2016 by Governor Shumlin, making it the most recently enacted policy reviewed in this research (Vermont Center for Geographic Information 2018). This relative novelty may account for the lack of professional familiarity with the policy. Further, because the policy is non-regulatory in nature—it amended the state’s land use planning goals and requirements for regional and municipal planning—fewer professionals may engage with the policy on a regular basis than they engage with the regulatory programs (Vermont Agency of Natural Resources 2018).

Currently, the program is primarily implemented by the VFWD CWP, Regional Planning Commissions, municipal planning bodies, and nonprofit organizations involved in outreach and the administration of technical guidance such as the VNRC and the VAPDA. In 2020, the VFWD CWP served 124 towns totaling 602 hours of technical assistance, engaged 61 partner organizations, participated in 10 collaborative partnerships, offered 151 technical assistance events, and reached 1,164 Vermonter's

(Vermont Fish and Wildlife Department 2021). This small group of experts carries a tall burden in the implementation of this policy. When asked to what degree respondents agree with the statement: *The VFWD has the requisite capacity to meaningfully engage in the Act 250 regulatory process*, 25% of respondents (5) disagreed and 25% of respondents (5) agreed. Fifty percent of respondents (10) responded ‘neutral’ or ‘unknown’. The lack of familiarity with this policy may contribute to the uncertainty around the current capacity. Land use planning can be an effective conservation tool and broadening the understanding of this policy may promote its successful implementation.

Wildlife Objectives

Respondents did not feel that Act 171 was strong in achieving the wildlife objectives. A plurality of respondents (45%, 9) described the relationship between the implementation of Act 171 and the achievement of each wildlife objective as ‘very weak’ or ‘weak’ ([Figure 42. Relationship Between the Implementation of Act 171 and the Wildlife Objectives.](#)). Only the Vermont Endangered Species Law (VESL), received a higher proportion of respondents who describe the relationship between the implementation of the policy and preventing destruction of significant imperilment of necessary wildlife habitat as ‘very weak’ or ‘weak’ (66.7%).

The conclusive responses for the section of the survey may be due to the nonregulatory nature of the policy. The policy is meant to guide municipal and regional planning, and while this guidance is often used in the formulation of regulatory tools—such as zoning and subdivision regulation—the policy must be directly referenced within a municipal plan for another regulatory review program such as Act 250 or Section 248 to prevent destruction or significant imperilment of a certain habitat type. The policy is

limited by the level of precision and definition required for plan policies to carry weight in these regulatory proceedings (Vermont Supreme Court 2008). In the extended response section of the survey, when asked *What are the greatest policy gaps related to wildlife conservation objectives in the Act 250 regulatory process*, one respondent referenced this limitation stating:

“Unless plans are very...specific about what it is they intend to protect and are very...specific to the site, it is pretty easy for those ideals to be overridden.”

The Vermont ANR recommends using words such as ‘shall’, ‘must’, ‘maximize’, and ‘minimize’ to craft strong policies (Vermont Agency of Natural Resources 2018). Use of these words and phrases can strengthen implementation of the policy and its conservation impact. Increased outreach efforts particularly focused on these details could also expand the policy’s conservation impact.

Wetland Habitat Objectives

Similar to the wildlife objectives, respondents did not feel that Act 171 was strong in achieving the wetland objectives. A majority of respondents (55-60%, 11-12), described the relationship between the implementation of Act 171 and the achievement of each wetland objective as ‘very weak’ or ‘weak’ ([Figure 43. Relationship Between the Implementation of Act 171 and the Wetland Objectives.](#)). A higher proportion of respondents (60%, 12) described the relationship between the implementation of Act 171 and protecting significant wetlands that serve as RTE wildlife habitat as ‘very weak’ or ‘weak’ than for any other policy. Only the VESL received a higher proportion of respondents (63.6%) who believed the policy was ‘very weak’ or ‘weak’ in protecting significant wetlands that serve as habitat for white-tailed deer, black bear, bobcat, moose, muskrat, otters, and/or mink.

The justification for these responses may be two-fold. As discussed above, the nonregulatory nature of Act 171 and the boundaries to implementation related to the language specificity of limit the scope of the policy. Additionally, wetlands are referenced minimally in the language of the statute. There is no mention of wetlands in the amended state planning goals, the amended requirements for regional plans, or the amended requirements for municipal plans (24 V.S.A. § 4302)(24 V.S.A. § 4348)(24 V.S.A. § 4382). However, the new statutory definition of ‘forest block’ as applied in Act 171, states that a forest block “...may include...wetlands,” and each relevant section includes new language that references forest blocks (24 V.S.A. § 4303)(24 V.S.A. § 4302)(24 V.S.A. § 4348)(24 V.S.A. § 4382). While the statutory authority exists to require planning for the maintenance of wetlands within forest blocks, perhaps the nuance of recognizing wetlands as part of a forest block makes the achievement of this objective difficult. Greater outreach on this nuanced authority could improve conservation outcomes for wetlands in the implementation of Act 171.

Forest Habitat Objectives

Overall, respondents indicated that Act 171 was relatively strong in achieving the forest objectives. 35% of respondents (7) described the relationship between the implementation of Act 171 and each objective in this section as ‘strong’ or ‘very strong’ ([Figure 44. Relationship Between the Implementation of Act 171 and the Forest Objectives.](#)). However, a majority of respondents (55%, 11) answered ‘neutral’ or ‘unknown’ when describing the relationship between the implementation of Act 171 and maintaining and improving forest blocks and habitat connectors. Additionally, a plurality of respondents (50%, 10) answered ‘neutral’ or ‘unknown’ when describing the

relationship between the implementation of Act 171 and minimizing forest fragmentation and maintaining and improving forestland wildlife habitat. These mixed responses may be due to the lack of familiarity with the policy. As noted above, 55% of respondents (11) were ‘moderately’, ‘very’, or ‘extremely familiar’ with the policy, making Act 171 the least well understood policy in the survey ([Table 2. Familiarity and Capacity](#)).

However, Current Use, received a higher proportion of respondents (65%) who describe the relationship between the implementation of the policy and minimizing forest fragmentation as ‘strong’ or ‘very strong’ ([Figure 37. Minimize Forest Fragmentation.](#)). As noted in Appendix VI ([Table 5. Conservation Objectives.](#)), the forest objectives were drafted primarily using the statutory language from Act 171. Respondents seem to think that the policy could be stronger in achieving these statutory objectives. However, the lack of familiarity and the lack of regulatory force of the policy may explain the varied response. Referencing the lack of regulatory force of the policy in the extended response section of the survey, one respondent wrote:

“...[there is] very little tooth to the policy. [There is a] disconnect between getting [Act 171] applied to town [and] regional plans, and actually implementing the forest integrity provisions”.

Despite the statutory and caselaw limitations to the implementation of this policy, improving technical guidance and the delivery of technical support to municipalities and regional planning commissions may significantly improve the effect of this law for the forest objectives. This would likely be implemented by the VFWD CWP and delivery of technical support could be improved by increasing capacity for the Program. The 2020 Wildlife Considerations in Local Planning report, which is currently nearing publication,

will further inform this guidance and outreach by analyzing current statewide Act 171 implementation.

Rare, Threatened, and Endangered Species Objectives

Similar to the wildlife and wetland objectives, respondents did not feel that Act 171 was strong in achieving the rare, threatened, and endangered (RTE) species objectives ([Figure 45. Relationship Between the Implementation of Act 171 and the RTE Objectives.](#)). Similar to the forest objectives, this section of the survey is also likely impacted by a lack of familiarity with the policy which could come as a result of the relative novelty of the policy. A majority of respondents (55%, 11), answered ‘neutral’ or ‘unknown’ when asked to describe the relationship between the implementation of Act 171 and preventing destruction or significant imperilment of endangered species and preserving areas with RTE species. A plurality of respondents (50%, 10), answered ‘neutral’ or ‘unknown’ when asked to describe the relationship between the implementation of Act 171 and preserving rare and irreplaceable natural areas and conserving designated critical habitat of threatened or endangered species. Forty-five percent of respondents (9) described the relationship between the implementation of Act 171 and preventing destruction or significant imperilment of endangered species as ‘very weak’ or ‘weak’ in, which was the highest proportion of respondents to reach this conclusion for any policy.

There is no mention of RTE species in the amended state planning goals, the amended requirements for regional plans, or the amended requirements for municipal plans (24 V.S.A. § 4302) (24 V.S.A. § 4348) (24 V.S.A. § 4382). The amended statutes speak more generally about ‘wildlife habitat’ and ‘habitat connectors’, which should

theoretically encompass RTE species habitat and RTE species habitat connectors. Additionally, as previously noted, the policy lacks regulatory force and does not have the ability to directly prevent the destruction or significant imperilment of any wildlife species. Direct reference to RTE species habitat and RTE species habitat connectors in the statute if the statute is amended may increase the conservation impact of this policy for RTE species.

General Objectives

Respondents felt that Act 171 is fairly strong in achieving the general objectives ([Figure 46. Relationship Between the Implementation of Act 171 and the General Objectives.](#)). A plurality of respondents (50%, 10), described the relationship between the implementation of Act 171 and supporting land conservation measures in regional and/or municipal plans as ‘strong; or ‘very strong’. A greater proportion of respondents reached this conclusion for Act 171 than for any other policy. Act 171 is a nonregulatory policy which amended the state planning statutes and primarily impacts municipal and regional planning, and respondents believed that Act 171 is strong in meeting these statutory goals. Finding further synergies between planning policies such as Act 171 and regulatory programs such as Act 250 or Section 248 may improve conservation outcomes.

Similarly, a plurality of respondents (50%, 10), described the relationship between the implementation of Act 171 and supporting landscape-level conservation goals beyond the project-level scope as ‘strong’ or ‘very strong’. A greater proportion of respondents reached this conclusion for Act 171 than for any other policy ([Figure 47. Landscape-level Conservation.](#)). It may be more difficult for regulatory programs to take

a landscape-level perspective as they are primarily implemented on a project-by-project review level. However, nonregulatory planning statutes may be able to take a broader perspective that more effectively incorporates long-term and cumulative impacts.

A plurality of respondents (40%, 8) described the relationship between the implementation of Act 171 and contributing to climate change mitigation and resilience as ‘strong’ or ‘very strong’. This may also be due in part to the ability of nonregulatory planning statutes to take a broader perspective more effectively incorporating long-term and cumulative impacts. Additionally, as noted in a previous section, some conservation professionals believed that the prevention of forest fragmentation can contribute to climate change mitigation through the sequestration of carbon. In 2018, Vermont’s forests stored over 1.7 billion metric tons of carbon dioxide emissions (Kosiba 2021). Along these lines, one survey respondent referenced the potential for climate mitigation when asked *What are the greatest policy gaps related to wildlife conservation objectives in the Act 250 regulatory process*:

“We also need to take forest carbon opportunities into consideration as a function of protecting large forest blocks.”

Although this response was in relation to Act 250, it is also applicable to Act 171 and its goal of preventing forest fragmentation. Although the statute does not directly refer to climate change mitigation, the ANR Act 171 Guidance, notes that climate change mitigation is one benefit of preventing forest fragmentation (Vermont Agency of Natural Resources 2018). With increased legislative interest in addressing the threat of climate change, Act 171 may be one tool that can be strengthened to build further resilience to a changing climate.

Discussion

Despite being the most recently enacted policy reviewed, conservation professionals see Act 171 as a relatively strong tool for reducing forest fragmentation through improved municipal and regional planning. Although the policy is nonregulatory, when properly implemented, it can strengthen the conservation impact of other regulatory programs such as Act 250 or Section 248. Act 171 can also reach beyond these regulatory programs and account for a broader, landscape-level perspective by assisting regional planning commissions and municipalities as they plan for the future under a drastically altered climate regime. However, Act 171 is the least well understood policy in the survey and it is primarily implemented by a small group of VFWD staff, planners, and nonprofit environmental organizations. Capacity to implement this policy at the local level is highly variable. All town plans must be renewed every 8 years and town plans are comprehensive documents which must address a plethora of other needs and sectors beyond natural resources (24 V.S.A. § 4387). Many towns do not have conservation commissions which may support the development of Act 171 related policies in their municipal plan. In the extended response section of the survey, one respondent remarked that Act 171 "...requires good thoughtful planning to be effective and its success depends on the respective towns' willingness to apply this law". Additionally, not all regional planning commissions have natural resources staff, and their priorities are spread thin among other issues at the regional level. While it is difficult to change the realities of local planning capacity, improving capacity at the VFWD may improve the implementation of this law. Increased capacity for the VFWD could result in increased technical assistance events and further engagement partner organizations. Increased

technical assistance could help towns meet the specificity required for the policy to carry weight in Act 250 and Section 248, because as one survey respondent noted, "...if municipalities do not identify areas, or implement recommended policies, there may be no positive effect from the planning". This may also improve the general familiarity of the policy amongst Vermont conservation professionals.

There are other ways in which the implementation of Act 171 may be strengthened. Through building synergies and coherence with other policies such as the Vermont Wetland Rules and the VESL, the impact of the policy may be expanded by planning for important, connected landscape features and habitats. Without needing an amendment to the existing statutes, technical guidance could be improved by emphasizing that wetlands are considered part of a forest block and that any Act 171-related language incorporated in new regional or municipal plans should also address conservation of wetland habitats (24 V.S.A. § 4303). To improve conservation outcomes for threatened and endangered species, the policy could be amended to directly reference RTE habitat when discussing 'wildlife habitat' and 'habitat connectors'. These are just a few ways in which the conservation impact of the policy may be broadened.

Current Use

Overview

Twenty respondents (or 31.3% of those contacted for the survey) completed the Current Use section of the survey ([Figure 1. Vermont Wildlife Policy Gap Survey Section Response Totals.](#)). There were 62 answers given for the 4 extended response questions by the 20 respondents, the second highest total number of responses given for any section as shown in the figure below ([Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals.](#)). Seventy-five percent of respondents (15) are ‘moderately’, ‘very’, or ‘extremely familiar’ with the law ([Figure 4. Vermont Wildlife Policy Familiarity.](#)). Signed into law in 1978 in Vermont, several other New England states have similar nonregulatory tax incentive programs for forestland including New Hampshire, Massachusetts, Connecticut, and Rhode Island (Vermont Agency of Natural Resources 2010; Fidel 2021). The program enjoys a generally positive public perception and as of 2021, 56% of eligible, privately owned forestland is enrolled in UVA (Snyder 2021). High enrollment likely contributes to high familiarity with the policy among Vermont conservation professionals.

While the UVA program is primarily administered by the VDFPR and the Vermont Department of Taxes, the VFWD engages in the program in several ways. When asked to what degree respondents agreed with the statement: *The VFWD has the requisite capacity to meaningfully engage in the Current Use regulatory process*, 35% of respondents either strongly disagreed or disagreed ([Figure 5. Vermont Wildlife Policy Implementation Capacity.](#)). However, a majority of respondents (55%, 11) either respond with ‘unknown’ or ‘neutral’. These responses may reflect respondents limited

understanding of the VFWD's engagement in the UVA program or may reflect the limited role that the VFWD plays in the administration of the UVA program.

Wildlife Objectives

A plurality of respondents (50%, 10) responded with 'neutral' or 'unknown' when asked to describe the relationship between the implementation of UVA and each of the wildlife objectives ([Figure 48. Relationship Between the Implementation of UVA and the Forest Objectives.](#)). Thirty-five percent of respondents (7) described the relationship between the implementation of UVA and preventing destruction or significant imperilment of necessary wildlife habitat, significant black bear habitat, and significant bat habitat as 'very weak' or 'weak'. Thirty percent of respondents (6) described the relationship between the implementation of UVA and preventing destruction or significant imperilment of significant white tailed deer habitat as 'very weak' or 'weak'. Despite high overall familiarity with UVA (75%), respondents struggled to link implementation of the law with the wildlife objectives, as noted by the high proportion of respondents who selected 'neutral' or 'unknown'. This may be due in part to the limited role of VFWD in the policy's administration.

One of the UVA forestland enrollment categories is "Lands managed actively for timber but with latitude to be managed using guidelines other than USDA Forest Service Silvicultural Guides", which includes the subcategory Significant Wildlife Habitat (Vermont Agency of Natural Resources 2010). However, respondents did not feel that the policy was strong in supporting enrollment in this category. Significant wildlife habitat is mapped and identified by the VFWD and may include deer wintering areas, concentrated areas of certain mast producing trees which may be important to black bears, and bat

habitats (Vermont Agency of Natural Resources 2010). This enrollment category is clearly described in the UVA Program Manual, perhaps outreach could further emphasize the enrollment of these habitat types and outreach to conservation professionals could be improved to implement UVA more fully as a conservation tool. The ANR may also consider hiring consultants to support outreach and increase enrollment in this category.

Wetland Habitat Objectives

Overall, respondents did not feel that UVA is strong in achieving the wetland habitat objectives ([Figure 49. Relationship Between the Implementation of UVA and the Wetland Objectives.](#)). A plurality of respondents (50%, 10) described the relationship between the implementation of UVA and preventing a net loss of wetlands as ‘very weak’ or ‘weak’. Only the VESL and Act 171 receive a higher proportion of respondents who reached the same conclusion ([Figure 34. Prevent Net Loss of Wetlands.](#)). Similarly, a plurality of respondents (50%, 10) described the relationship between the implementation of UVA and protecting significant wetlands that serve as habitat for white tailed deer, black bear, bobcat, moose, muskrat, otters, and/or mink as ‘very weak’ or ‘weak’.

One of the categories of UVA forestland enrollment is “Lands not necessarily managed for timber (but requiring protective/conservation management) and totaling not more than 20% of enrolled site” which encompasses the ecologically significant treatment areas (ESTA’s) (Vermont Agency of Natural Resources 2010). One ESTA subcategory is Forested Wetlands, which applies to forested wetlands which are ecologically sensitive to timber harvest and also includes forested wetlands that are state-significant natural communities (Vermont Agency of Natural Resources 2010). However,

respondents did not feel that the policy was strong in supporting enrollment in this category. Similar to the Significant Wildlife Habitat enrollment category discussed above forested wetland category is clearly described in the UVA Program Manual, and perhaps outreach could further emphasize the enrollment of these habitat types. Outreach to conservation professionals may be improved to implement UVA more fully as a conservation tool.

Forest Habitat Objectives

Generally, respondents believed that UVA is stronger in achieving the forest objectives than any of the other policies reviewed. A majority of respondents indicated that UVA is strong in achieving each forest objective except maintaining and improving habitat connectors ([Figure 50. Relationship Between the Implementation of UVA and the Forest Objectives.](#)). A higher proportion of respondents (65%, 13) described the relationship between the implementation of UVA and minimizing forest fragmentation as ‘strong’ or ‘very strong’ than for any other policy ([Figure 37. Minimize Forest Fragmentation.](#)). A higher proportion of respondents (55%, 11) also described the relationship between the implementation of UVA and maintaining and improving forestland wildlife habitat as ‘strong’ or ‘very strong’ than for any other policy. Similarly, a higher proportion of respondents (75%, 15) described the relationship between the implementation of UVA and maintaining and improving forest blocks as ‘strong’ or ‘very strong’ than for any other policy.

Among the stated purposes of the UVA program are to: assist the maintenance of productive forestland, to encourage their conservation for future productive use and the protection of natural ecological systems, and to prevent the accelerated conversion of

forestlands to more intensive use (32 V.S.A. §3751). Respondents believed that UVA was strong in achieving the forest related objectives and many of these objects are central to the goal and purpose of the UVA program.

Rare, Threatened, and Endangered Species Objectives

A plurality of respondents (50%, 10) responded with ‘neutral’ or ‘unknown’ when describing the relationship between the implementation of UVA and preventing destruction or significant imperilment of endangered species ([Figure 51. Relationship Between the Implementation of UVA and the RTE Objectives.](#)). A majority of respondents (55%, 11) responded with ‘neutral’ or ‘unknown’ when describing the relationship between the implementation of UVA and preserving areas with RTE species. Similarly, a majority of respondents (65%, 13) responded with ‘neutral’ or ‘unknown’ when describing the relationship between the implementation of UVA and conserving designated critical habitat of threatened or endangered species. Forty percent of respondents (8) described the relationship between the implementation of UVA and preserving rare and irreplaceable natural areas as ‘very weak’ or ‘weak’ and only the VESL had a higher proportion of respondents reach the same conclusion.

One of the ESTA subcategories is RTE Species and for an ESTA to be enrolled for RTE species, the occurrence of an RTE species must be confirmed by the VFWD (Vermont Agency of Natural Resources 2010). While UVA is a nonregulatory, tax-incentive program and could not prevent the destruction or significant imperilment of an endangered species, respondents did not feel the program was stronger in preserving areas with RTE species and threatened or endangered species habitat.

General Objectives

A plurality of respondents (45%, 9) responded with ‘neutral’ or ‘unknown’ when describing the relationship between the implementation of UVA and supporting land conservation measures in regional and/or municipal plans ([Figure 52. Relationship Between the Implementation of UVA and the General Objectives.](#)). However, 2010 report found that overwhelmingly municipal plans recommend UVA for the conservation of the working landscape (Vermont Natural Resources Council 2011). This response in the survey is likely due to a general lack of understanding of the interface between UVA and local and regional planning. While many town and regional plans recommend enrollment in UVA, the link between planning and a tax equity program isn’t explicit (Vermont Natural Resources Council 2011). A plurality of respondents (45%, 9) described the relationship between the implementation of UVA and supporting landscape level conservation goals beyond the project-level scope as ‘strong’ or ‘very strong’. The vast majority of Vermont’s forestland (~80%) is held by private landowners, and as noted above as of 2021, 56% of eligible, privately owned forestland is enrolled in UVA (Snyder 2021; Vermont Department of Forests, Parks, and Recreation 2015). This voluntary program can have a much broader reach than most of the regulatory programs discussed which operate on a project-by-project basis.

A plurality of respondents (50%, 10) also described the relationship between the implementation of UVA and contributing to climate change resilience and mitigation as ‘strong’ or ‘very strong’. As noted in several previous sections, some conservation professionals believe that the prevention of forest fragmentation can contribute to climate change mitigation through the sequestration of carbon and in 2018, Vermont’s forests

stored over 1.7 billion metric tons of carbon dioxide emissions (Kosiba 2021). There is no reference to climate change in the UVA program manual or in the statute, thus, this may be an area where the law could be expanded to encourage greater enrollment.

Discussion

For the first time since Vermont began restoring its forests from unsustainable land use practices in the 20th century, the state is now losing forestland (Morin et al. 2017). Increases in the per-acre value of land and decreases in the amount of land in larger parcels across the state, further suggest that fragmentation is already occurring, and economic pressure may continue to drive fragmentation in the coming years (Fidel et al. 2018). According to a 2016 study, 61% of residents agree that “forest fragmentation and loss is a problem in Vermont” (Duda et al. 2015). The same study found that Vermont residents most favor the provision of tax incentives for protecting land for wildlife (Duda et al. 2015). Vermont’s UVA enjoys a favorable public perception and high familiarity amongst the conservation community. UVA received the most favorable responses of any policy for achieving the forest objectives and it will be a key tool moving into the future as the state addresses the forest fragmentation problem. Despite high levels of enrollment and favorable public opinion, the survey identified several potential gaps.

Despite the existence of the Significant Wildlife Habitat, the Forested Wetlands and the RTE Species subcategories within the ESTA enrollment category, respondents did not feel that UVA was strong in achieving conservation objectives related to these categories. As noted, this could be due in part to a lack of professional familiarity with these nuanced subcategories. However, as of 2020, there were 11,151 acres of ESTA enrolled in the program and riparian areas and natural communities of statewide

significance are the two highest enrolled ESTA categories (Vermont Department of Forests, Parks, and Recreation 2021). This was out of a total of 1,950,000 acres (or less than 1% of enrolled acres). Although capacity for implementation was not identified as a major gap by survey respondents, a 2016 report found that county foresters spend between 60-63% of their time on UVA and 21.7% of their time on UVA is spent renewing or approving UVA plans (Vermont Department of Forests, Parks, and Recreation 2016). Greater capacity may allow county foresters to increase outreach and public engagement efforts to encourage further enrollment in ESTA categories. Increased engagement by the VFWD in ESTA-related outreach and UVA plan approval may also reduce some of the burden shouldered by the VDFPR. Previously described capacity limitations related to regulatory review would likely require that the VFWD identify a new funding stream if it's engagement in UVA were to increase. Further, UVA enrollment composition has shifted, and smaller parcels make up more of the parcels enrolled than larger parcels (Fidel et al. 2018). The increase in the number of smaller parcels enrolled could mean more administrative oversight is needed as more landowners enroll in the program, a further justification for increased capacity for the VDFPR (Fidel et al. 2018).

There is considerable political interest in incorporating climate change-related goals into state laws in Vermont. Although survey respondents generally believed that UVA was strong in achieving the climate-related objectives, this is one area where the policy could be expanded. The ESTA enrollment category may be one area that could incorporate climate-related incentives. There is increased scientific interest in the relationship between older forest conditions and climate change resilience and mitigation

(Dominik Thom 2019). One of the ESTA subcategories is Old Forests, and the UVA Program Manual defines old forests as “biologically mature forests, typically in late successional stages of development, having escaped stand-replacing disturbance for more than 100 years and exhibiting minimal evidence of human-caused disturbance” (Vermont Agency of Natural Resources 2010). There has been recent legislative attention on this enrollment category and in the 2021 Legislative Session, multiple attempts were made to expand eligibility of private land subject to an easement held by a qualified organization principally engaged in the preservation of undeveloped land (Vermont Department of Forests, Parks, and Recreation 2021). One respondent referenced this recent point of tension in the extended response section:

“Wild forests that are intended to be conserved cannot be enrolled unless they are owned by a qualified non-profit. This limits enrollment of important wildlife habitat and leaves some important lands out of the program, subjecting landowners to a higher carrying cost.”

Many who criticize limits to enrollment in the Old Forest category, also criticize the forest management mandate associated with other enrollment categories. When asked *What are the greatest policy gaps related to wildlife conservation objectives in the UVA process* several respondents referenced these themes:

“The Use Value Appraisal law specifically calls for protecting productive forests and ecological values, but implementation strongly favors forest management for products. Provisions to allow for passive management of forests for their ecological functions has been slow in coming. The result is that harvesting forests for products...is always viewed positively, while leaving forests in their natural state and under the influence of natural processes is only allowed under certain conditions.”

“It doesn't allow no cutting as a management strategy beyond sites that qualify as ESTAs.”

“[UVA] need[s] provisions that provide incentives to manage open land for climate benefits, wildlife and non-consumptive uses [unlike forest management].”

Some advocates seek modification of the “Lands not necessarily managed for timber (but requiring protective/conservation management) and totaling not more than 20% of enrolled site” enrollment category more broadly (Vermont Agency of Natural Resources 2010).

One final potential gap that arose in the extended response section of the survey, which did not surface in the conservation objective matrix, was the minimum lot size. When asked *What are the greatest policy gaps related to wildlife conservation objectives in the UVA process*, one respondent wrote, “Minimum lot size. As subdividing becomes more profitable or necessary (financially) lot sizes are becoming smaller.” To meet the qualifications for enrollment land must be at least 25 acres in size and timber management must be practiced on at least 20 acres of an enrolled parcel (32 V.S.A. §3752(9)) (Vermont Department of Forests, Parks, and Recreation 2020). As we see decreases in the amount of land in larger parcels across the state, the minimum lot size requirement may make enrollment increasingly difficult (Fidel et al. 2018). One way to address this potential limitation is by reducing the minimum number of acres required for enrollment. Another way might be to allow the aggregation of parcels amongst multiple property owners for enrollment. Aggregation may cause significant administrative difficulties; however, it may allow for a more consistent management effort across larger forest blocks. The potential gaps identified in the survey may serve as a starting point for further investigation and analysis.

Figures and Tables

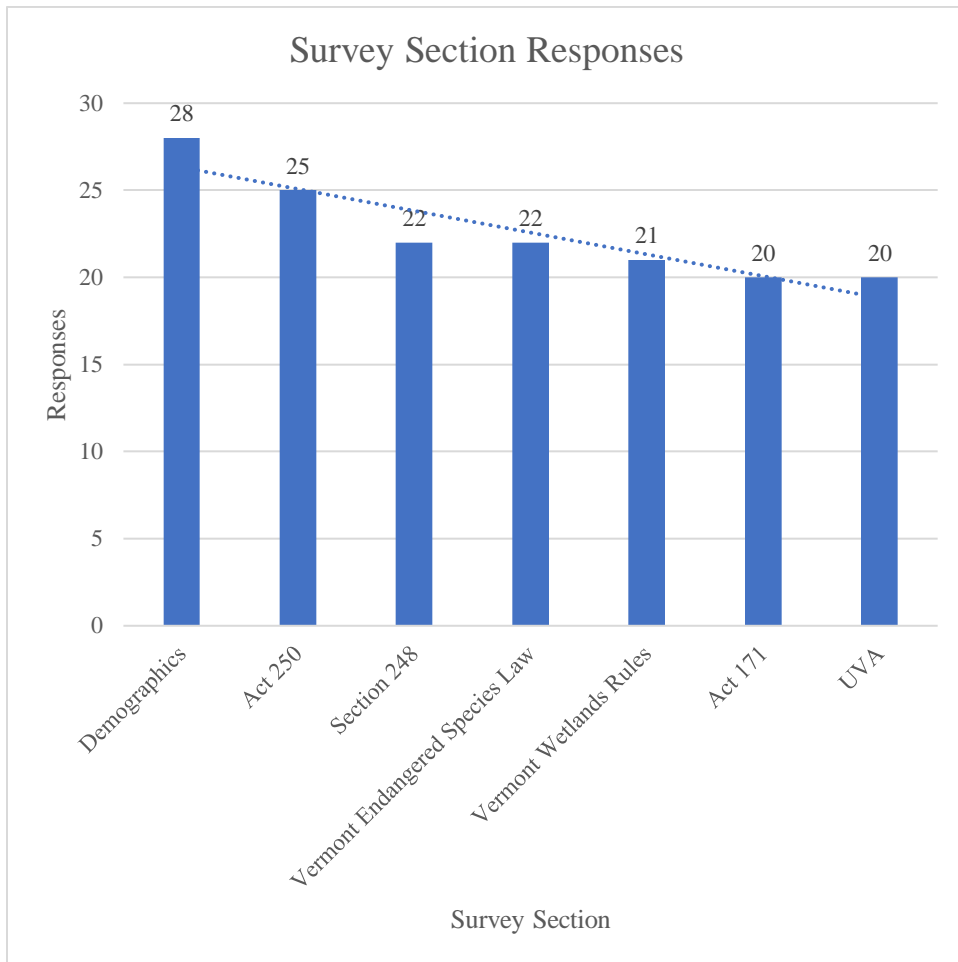


Figure 1. Survey Section Responses.

The figure displays the total number of survey respondents to complete each section of the Vermont Wildlife Policy Gap Survey. The survey was distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%).

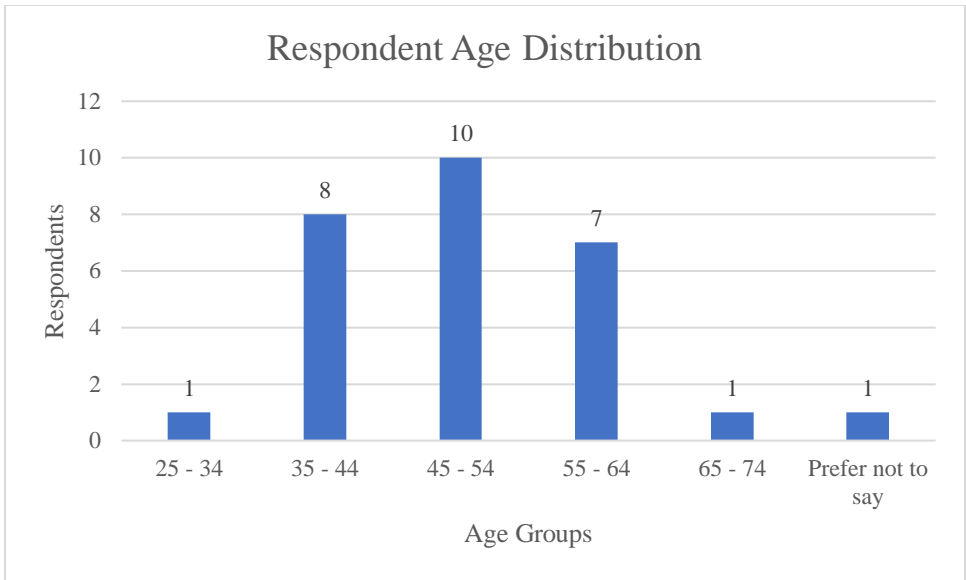


Figure 2. Survey Respondent Age Distribution.

The figure displays sum of the Vermont Wildlife Policy Gap Survey respondents between ages 25-34, 35-44, 45-54, 55-64, 65-74 years old and those who preferred not to record their age. The survey was distributed to 63 conservation professionals in Vermont in 2021 (response rate for demographic section = 44.4%).

Table 1. NVivo Policy Gap Codes

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). The table displays the list of researcher-generated codes for the Vermont Wildlife Policy Gap Survey extended response section. The frequency of each codes reference in the extended responses is given on the right side of the table.

Extended Responses: Policy Gaps		
Policy	Codes	References/Code
Act 171	Capacity	1
	Lack of Implementation	4
	Non-regulatory or Enforcement	9
	Other	1
	Specificity of Language	3
Act 250	Burden of Proof	1
	Capacity	1
	Climate Change	4
	Consistent Application	1
	Cumulative Impacts	6
	Fragmentation	10
	Jurisdiction	8
	Landscape-Level	2
	Mitigation	1
	Necessary Wildlife Habitat	4
	Other	1
	Planning	2
	Recreation	3
	River Corridors	3
	RTE Species	1
Vernal Pools	1	
Wetlands	1	
Current Use	Allowed Uses—Agriculture	1
	Climate Change	2
	Eligibility	6
	ESTA's	4
	Fragmentation	2
	Land Use Change Tax	1
	Landscape-Level	2
	Other	2
	Silviculture Focus	6
	Temporary Protection	1
	Vernal Pools	1
§248	Burden of Proof	1
	Capacity	2
	Criteria	3
	Cumulative Impacts	4
	Fragmentation	4
	Jurisdiction	3

	Landscape-Level	4
	Necessary Wildlife Habitat	6
	Politics	1
	Renewable Energy	5
	Vernal Pools	1
VESL	Capacity	3
	Critical Habitat	10
	Cumulative Impacts	1
	Enforceability	3
	Exemptions	1
	Jurisdiction	1
	Other	1
	Politics	2
	Species Specific	1
VWR	Allowed Uses—Agriculture	2
	Allowed Uses—Other	1
	Buffers	4
	Capacity	3
	Criteria	1
	Cumulative Impacts	2
	Implementation	2
	In-Lieu Fee	1
	Jurisdiction	6
	Mapping	6
	Mitigation	3
	Other	2
	Upland Habitats	1
	Vernal Pools	1

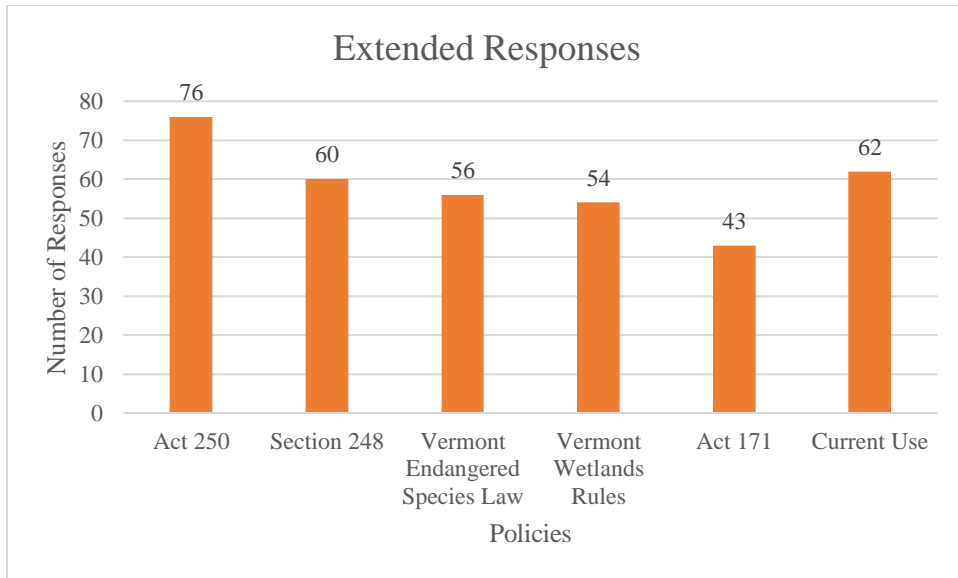


Figure 3. Vermont Wildlife Policy Gap Survey Extended Response Totals. Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). The total number of responses for the extended response section of each policy. The number of responses per policy is listed above the corresponding bar column. The extended response section was comprised of a set of fill-in-the-blank questions where respondents had the opportunity to provide additional feedback on policy implementation capacity, inter-policy tradeoffs, policy gaps, and potential policy solutions to address those gaps.

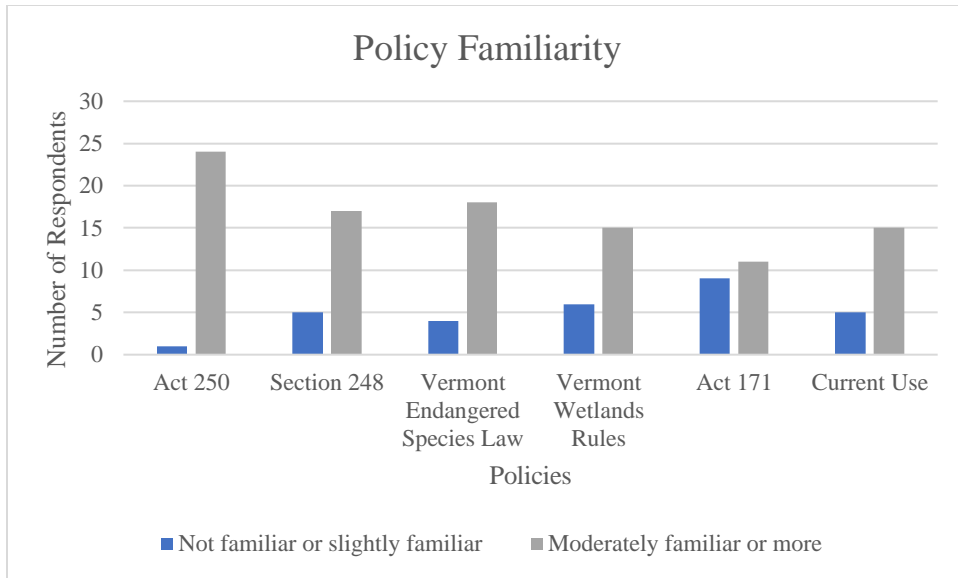


Figure 4. Vermont Wildlife Policy Familiarity.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe their familiarity with the policy as: ‘not familiar at all’, ‘slightly familiar’, ‘moderately familiar’, ‘very familiar’, or ‘extremely familiar’. The figure displays the sum of respondents who are ‘not familiar at all’ or ‘slightly familiar’ and the sum of the number of respondents who are ‘moderately familiar’, ‘very familiar’, or ‘extremely familiar’ with each policy.

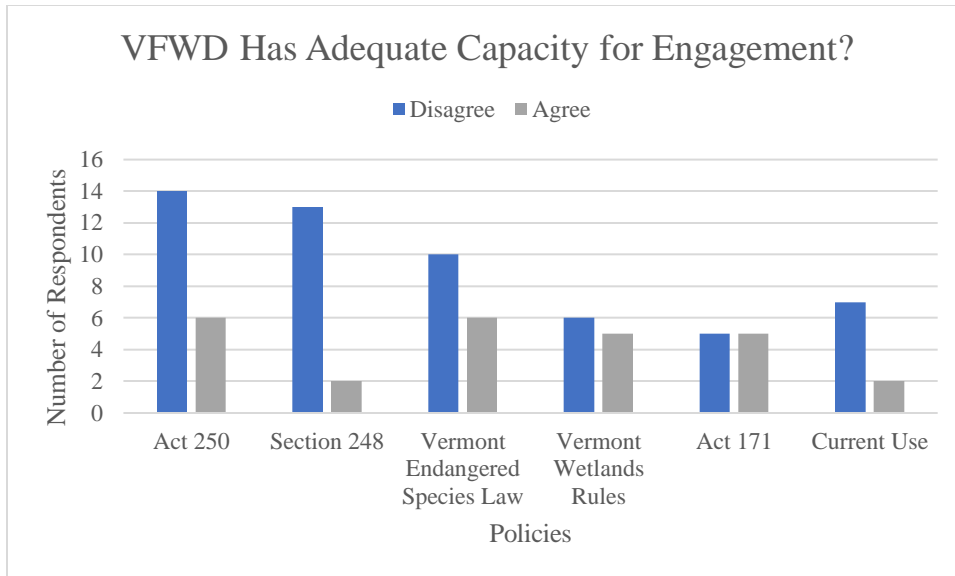


Figure 5. Vermont Wildlife Policy Implementation Capacity.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the degree to which they agree or disagree with the following statement: *The VFWD has the requisite capacity to meaningfully engage in the Act 250 regulatory process.* Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of respondents who ‘strongly disagree’ or ‘disagree’ and the sum of the number of respondents who answered ‘agree’ or ‘strongly agree’.

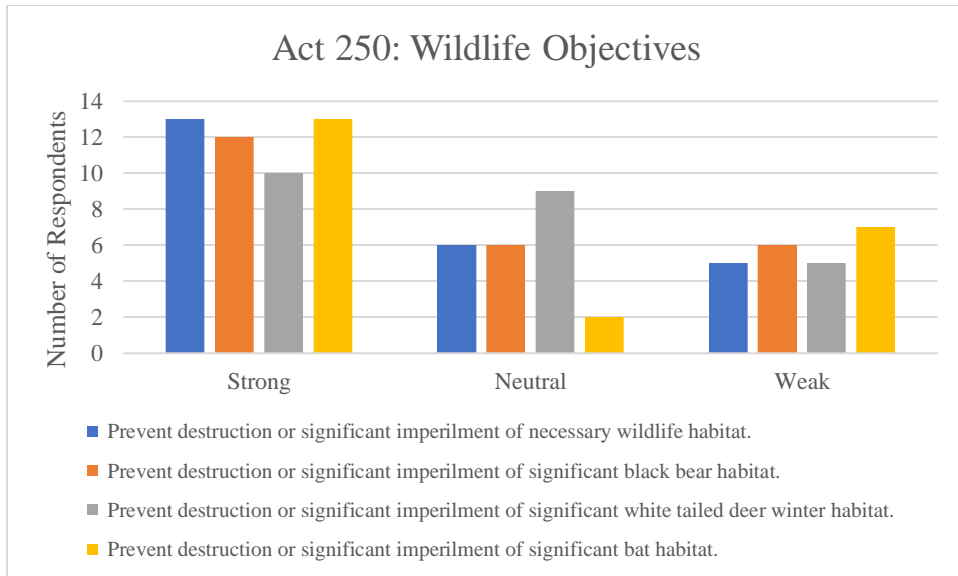


Figure 6. The Relationship Between the Implementation of Act 250 and the Wildlife Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 39.1%). Survey respondents were asked to describe the relationship between the implementation of Act 250 and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each objective.

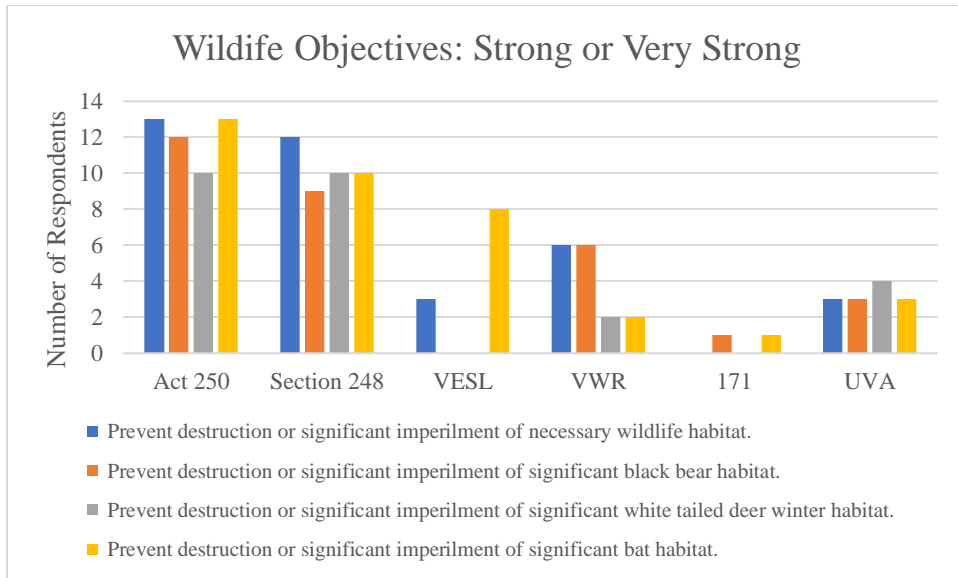


Figure 7. Strong or Very Strong Responses for the Wildlife Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’ responses for each policy and each wildlife objective.

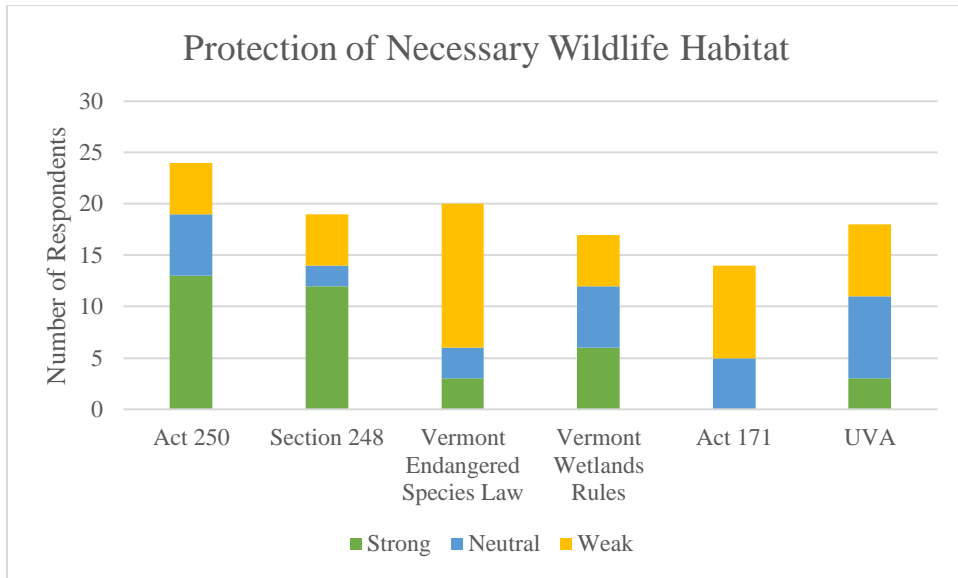


Figure 8. Protection of Necessary Wildlife Habitat.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the protection of necessary wildlife habitat. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the protection of necessary wildlife habitat objective for each policy.

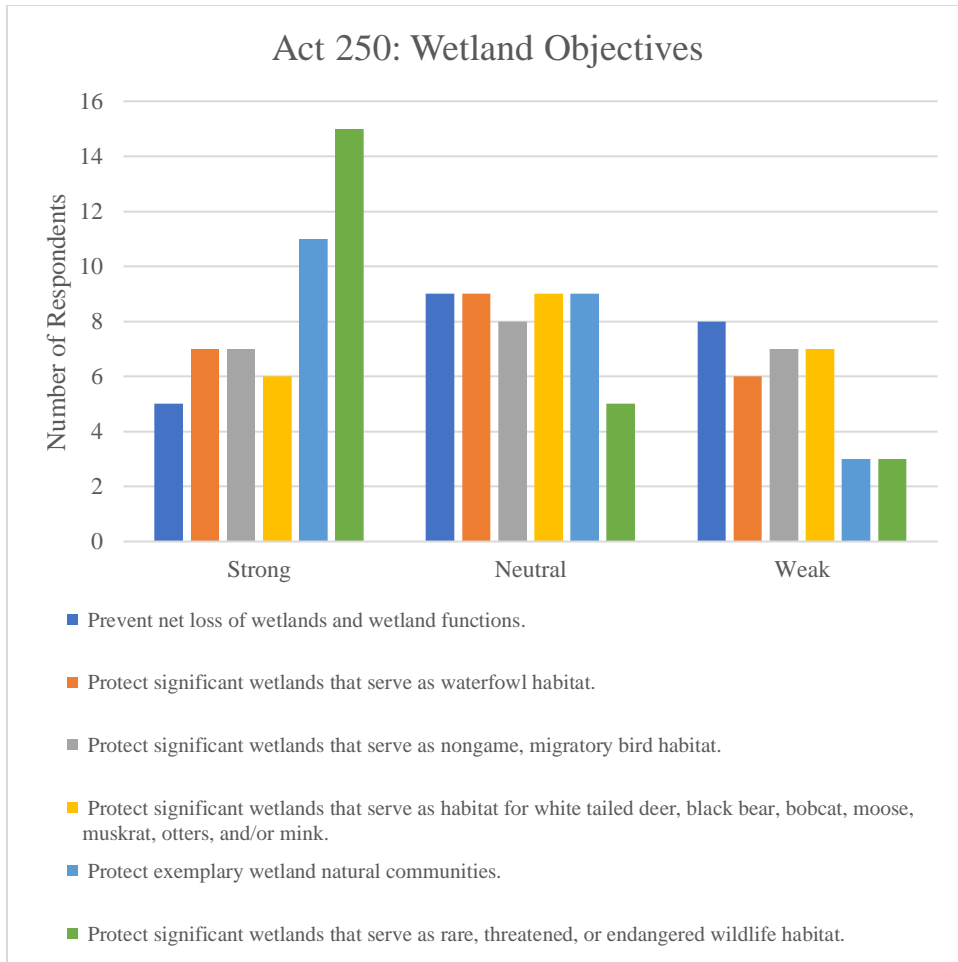


Figure 9. The Relationship Between the Implementation of Act 250 and the Wetland Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 39.1%). Survey respondents were asked to describe the relationship between the implementation of Act 250 and each wetland objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wetland objective.

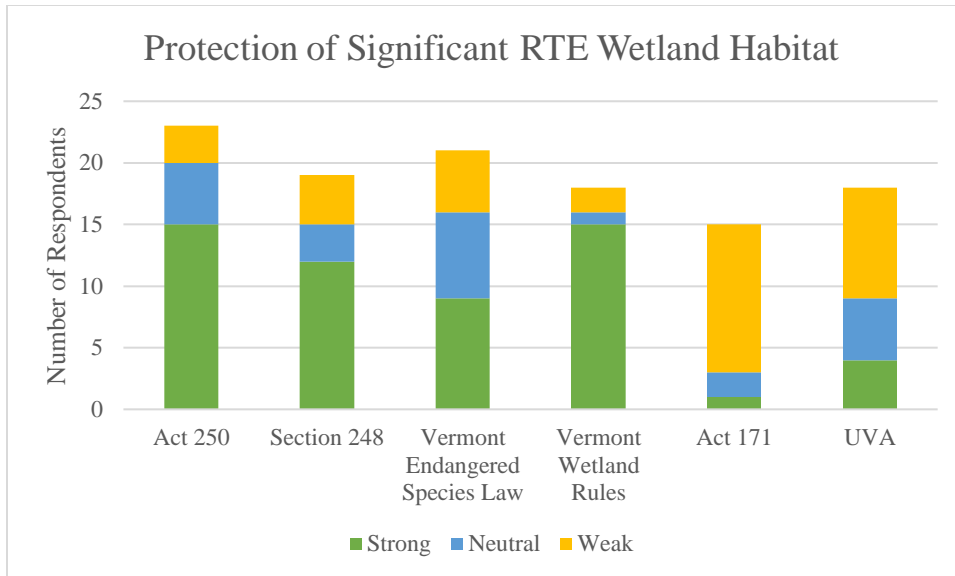


Figure 10. Protection of Significant RTE Wetland Habitat.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the protection of significant RTE wetland habitat. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the protection of significant RTE wetland habitat for each policy.

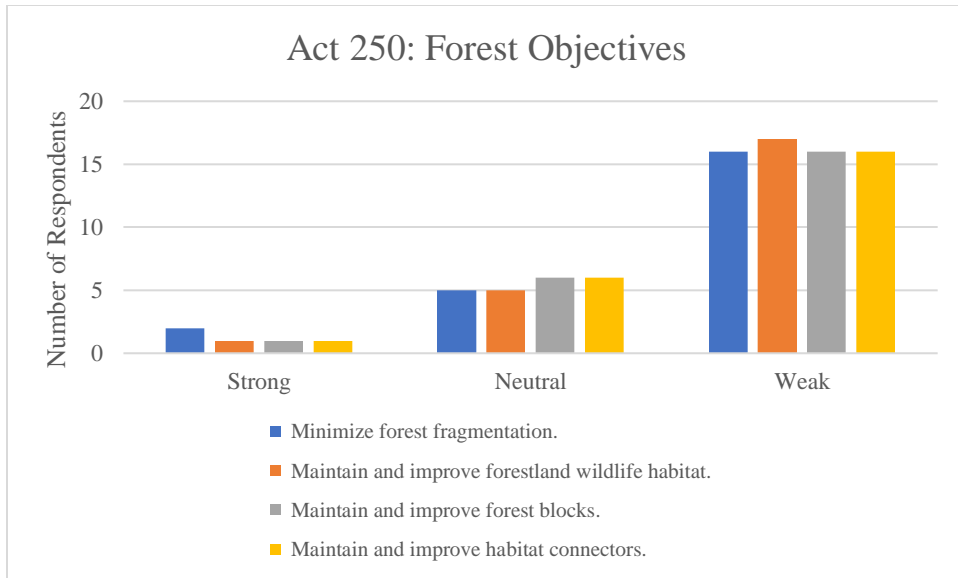


Figure 11. The Relationship Between the Implementation of Act 250 and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 39.1%). Survey respondents were asked to describe the relationship between the implementation of Act 250 and each forest objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each forest objective.

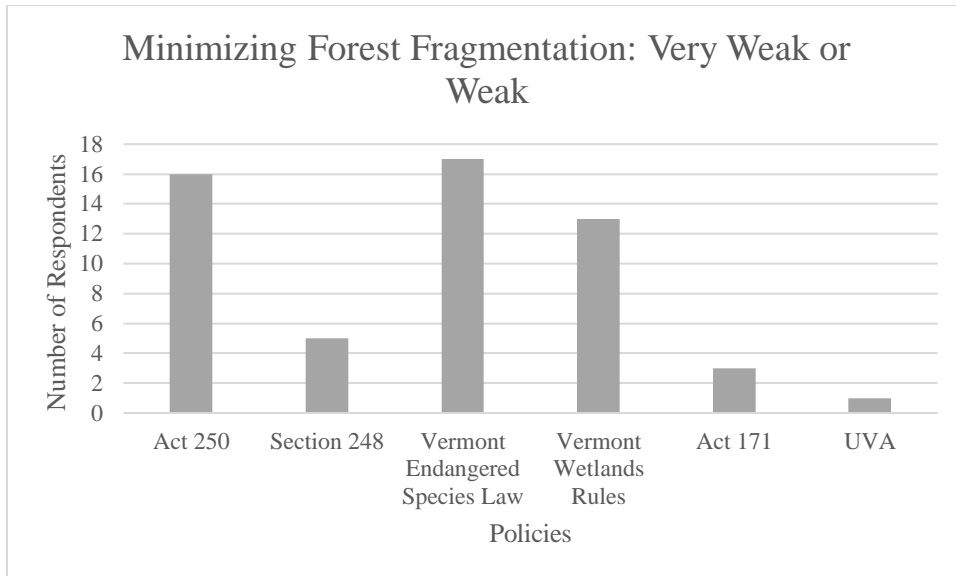


Figure 12. Very Weak or Weak Responses for the Minimizing Forest Fragmentation.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘very weak’ or ‘weak’ responses for the minimizing forest fragmentation objective for each policy.

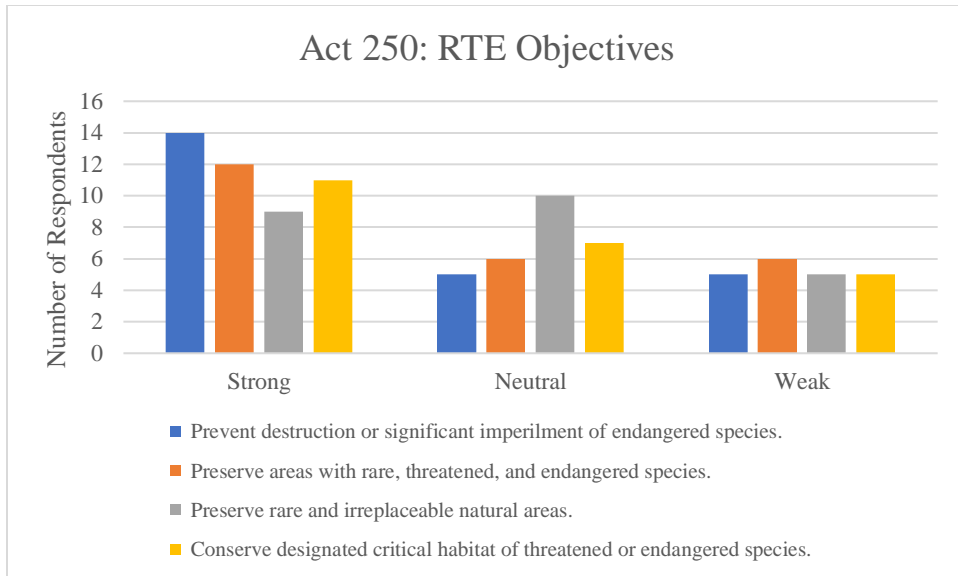


Figure 13. The Relationship Between the Implementation of Act 250 and the RTE Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 39.1%). Survey respondents were asked to describe the relationship between the implementation of Act 250 and each RTE objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each RTE objective.

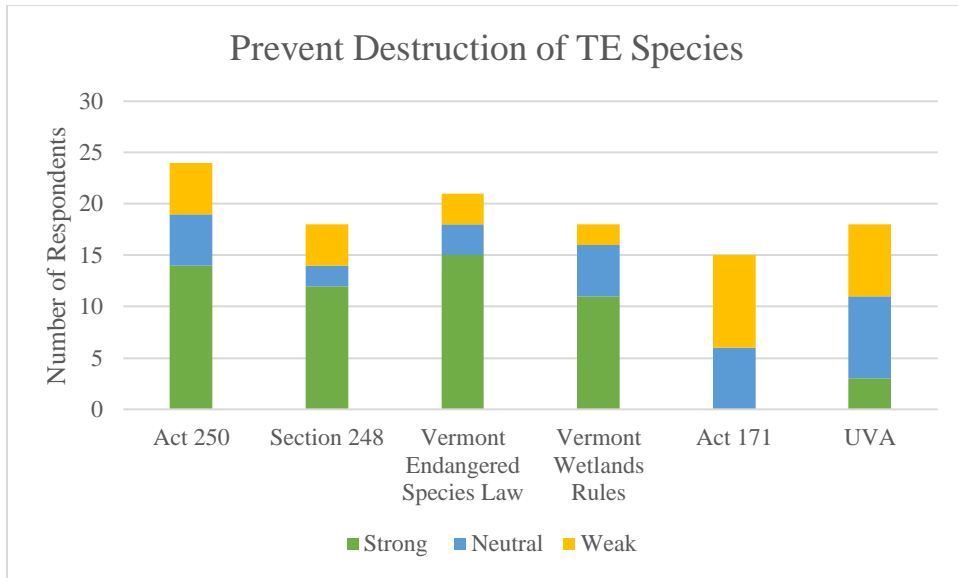


Figure 14. Prevention of Destruction of Threatened and Endangered Species. Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the protection of significant RTE wetland habitat. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the prevent destruction of TE species objective for each policy.

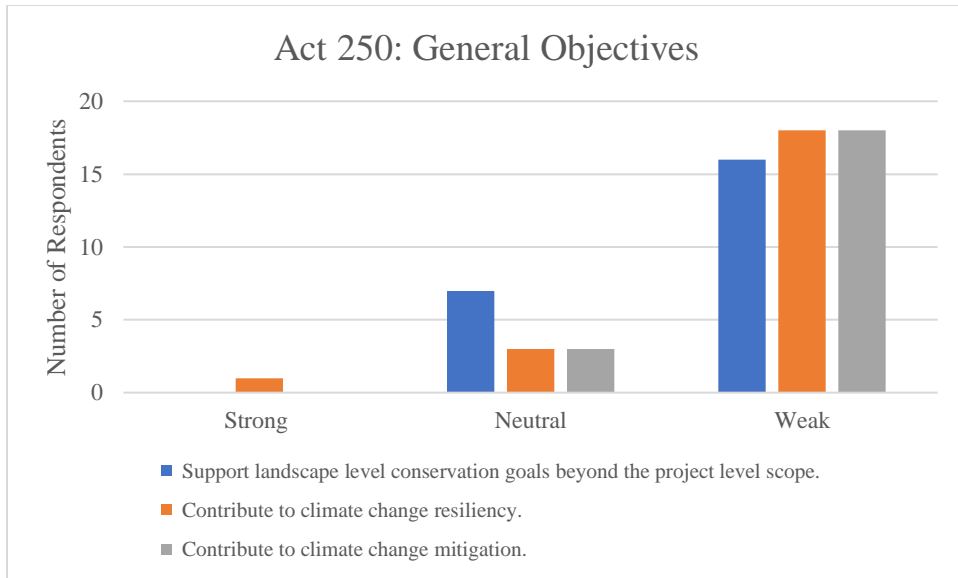


Figure 15. The Relationship Between the Implementation of Act 250 and the General Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 39.1%). Survey respondents were asked to describe the relationship between the implementation of Act 250 and each general objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each general objective.

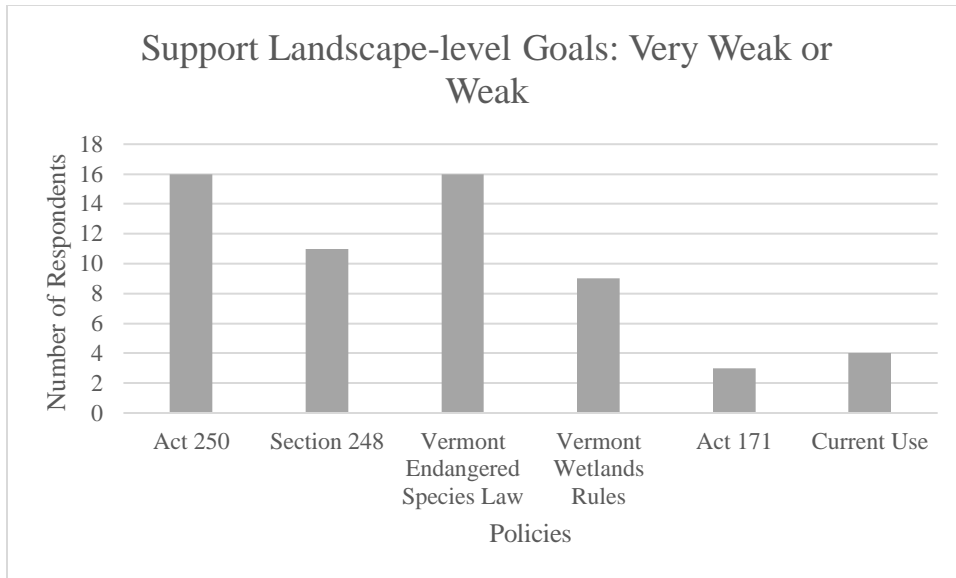


Figure 16. Very Weak or Weak Responses for Supporting Landscape-level Goals. Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the supporting landscape-level goals beyond the project-level scope objective. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘very weak’ or ‘weak’ responses for the minimizing forest fragmentation objective for each policy.

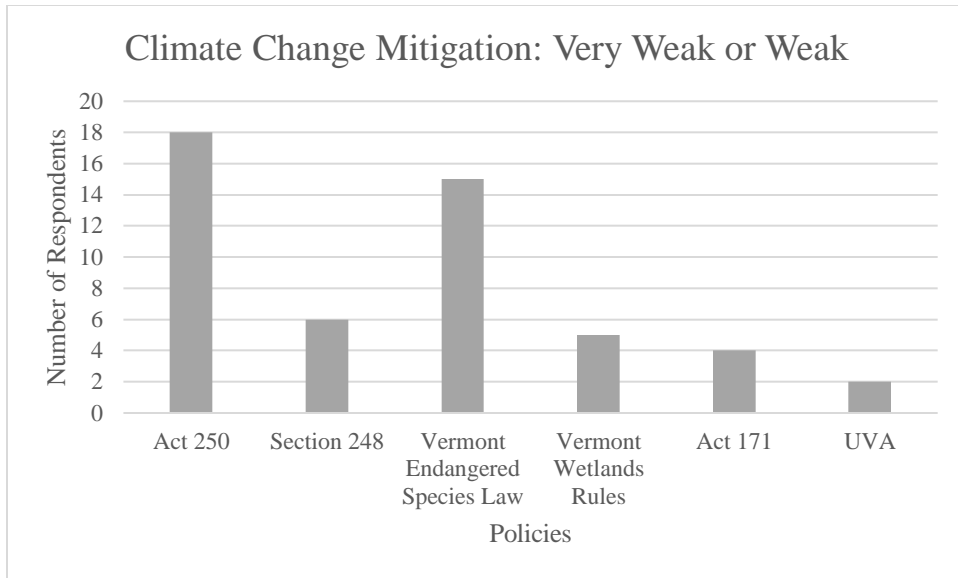


Figure 17. Very Weak or Weak Responses for Supporting Climate Change Mitigation Goals.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the supporting climate change mitigation goals objective. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘very weak’ or ‘weak’ responses for the supporting climate change mitigation goals objective for each policy.

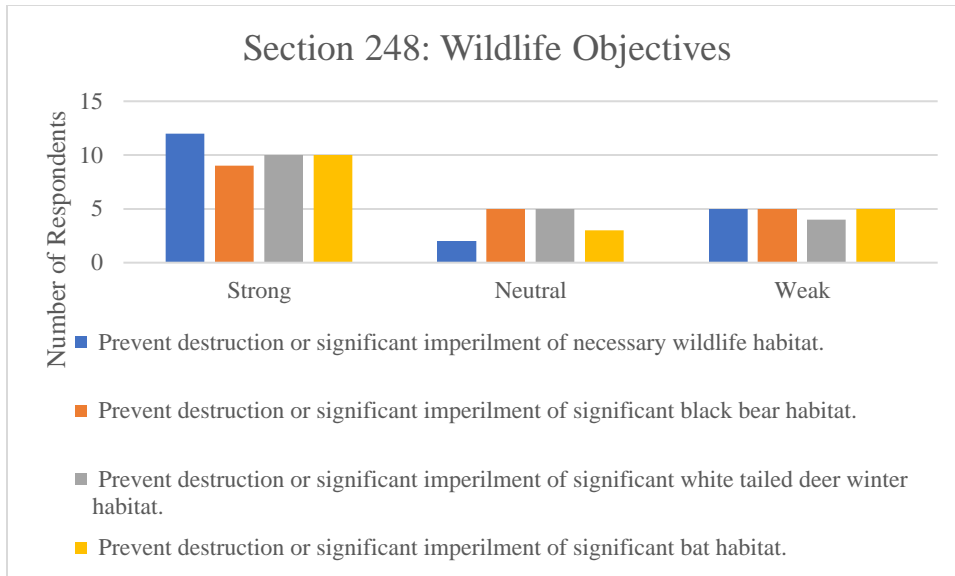


Figure 18. The Relationship Between the Implementation of Section 248 and the Wildlife Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of Section 248 and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wildlife objective.

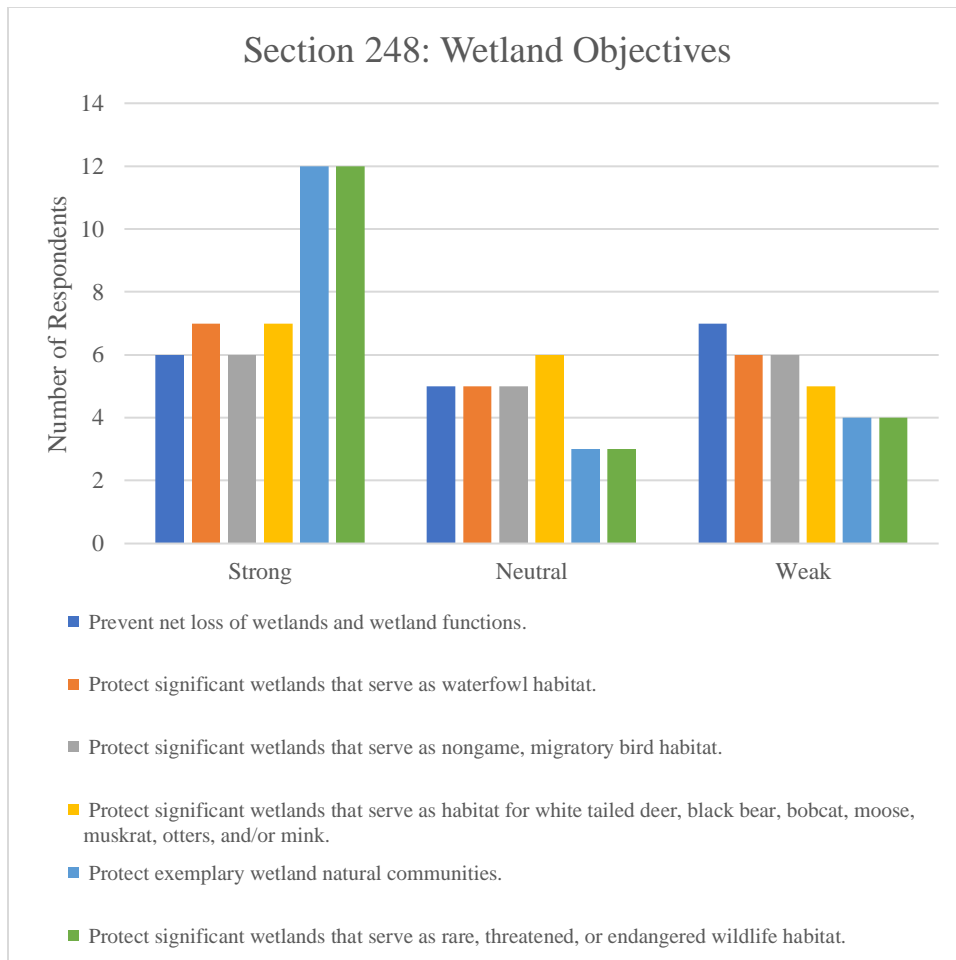


Figure 19. The Relationship Between the Implementation of Section 248 and the Wetland Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of Section 248 and each wetland objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wetland objective.

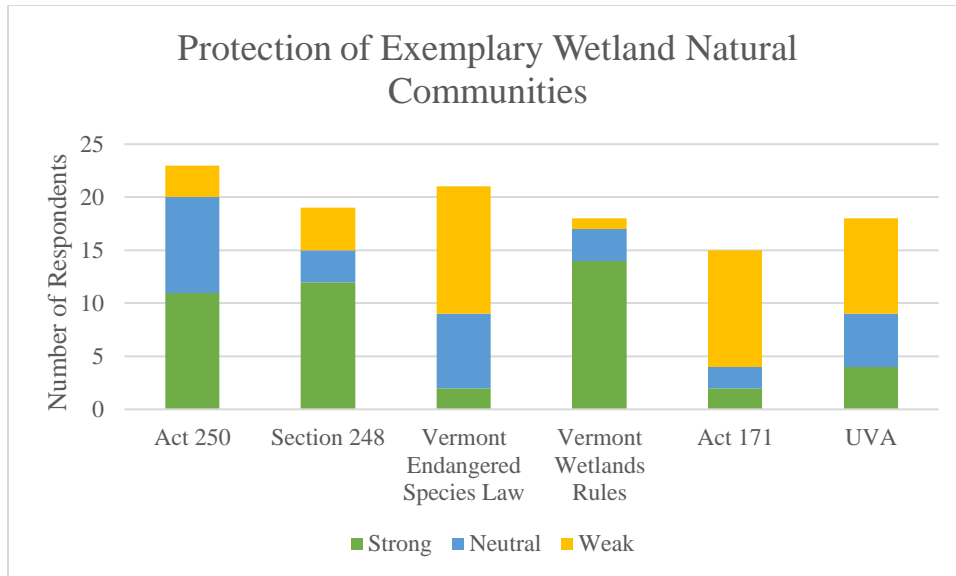


Figure 20. Protection of Exemplary Wetland Natural Communities.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the protection of exemplary wetland natural communities' objective for each policy. Respondents had the opportunity to respond with 'strongly disagree', 'disagree', 'neutral', 'unknown', 'agree', or 'strongly agree'. The figure displays the sum of the 'strong' or 'very strong', 'neutral', and 'very weak' or 'weak' responses for the protection of exemplary wetland natural communities' objective for each policy.

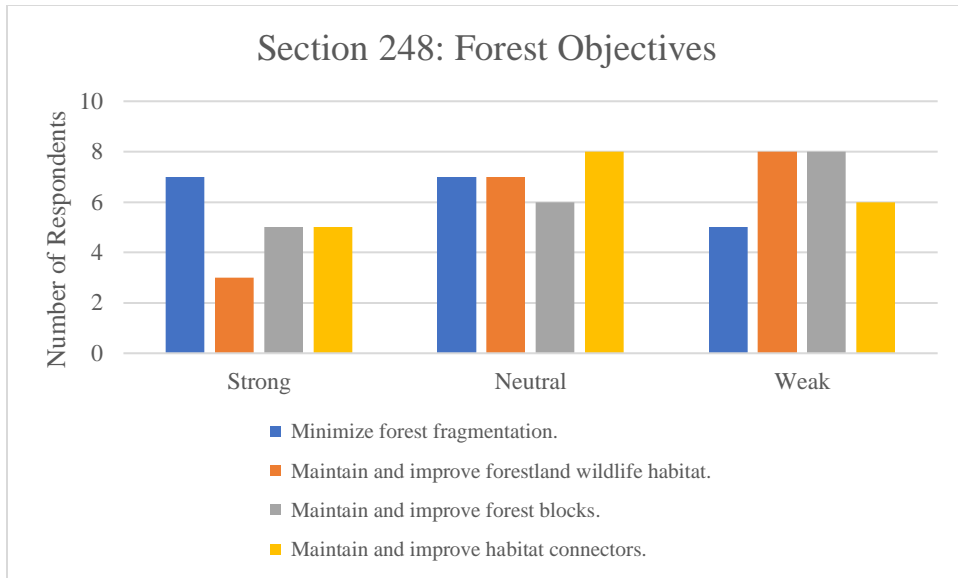


Figure 21. The Relationship Between the Implementation of Section 248 and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of Section 248 and each forest objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each forest objective.

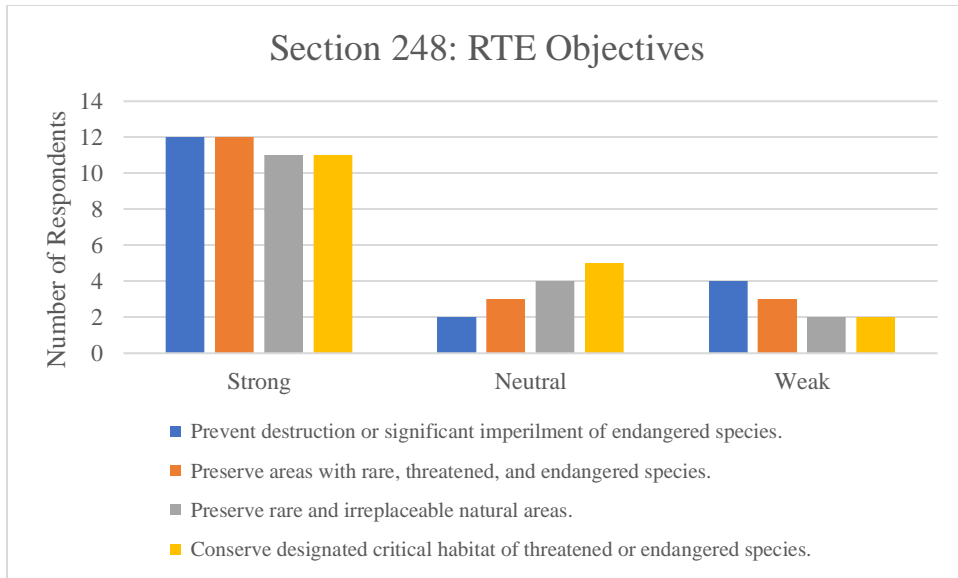


Figure 22. The Relationship Between the Implementation of Section 248 and the RTE Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of Section 248 and each RTE objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each RTE objective.

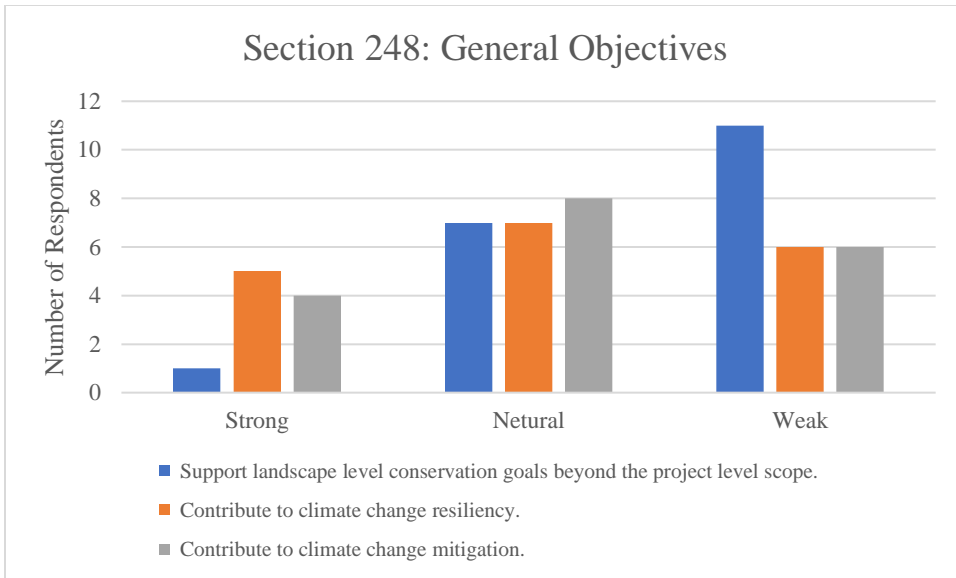


Figure 23. The Relationship Between the Implementation of Section 248 and the General Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of Section 248 and selected general objectives (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for selected general objectives.

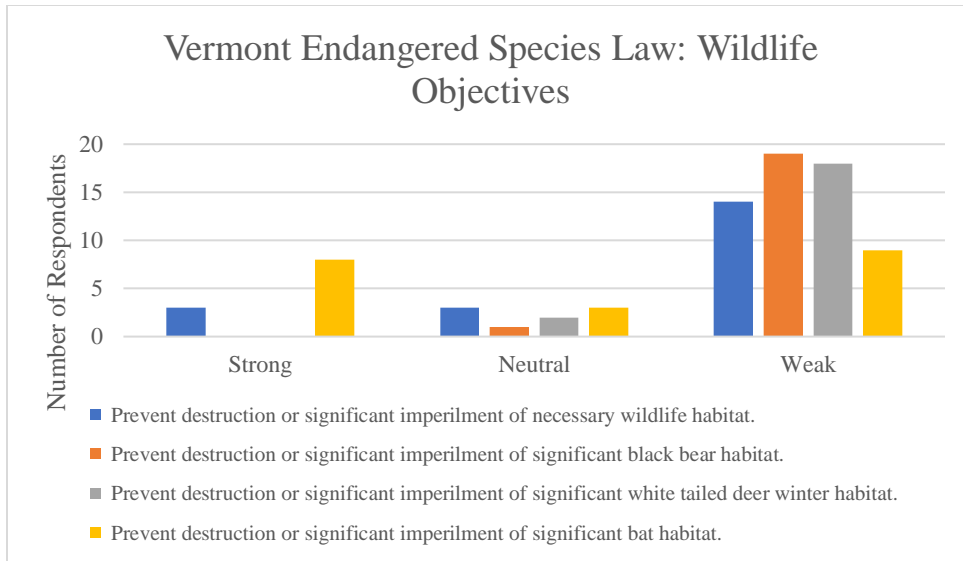


Figure 24. The Relationship Between the Implementation of the Vermont Endangered Species Law and the Wildlife Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of the VESL and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wildlife objective.

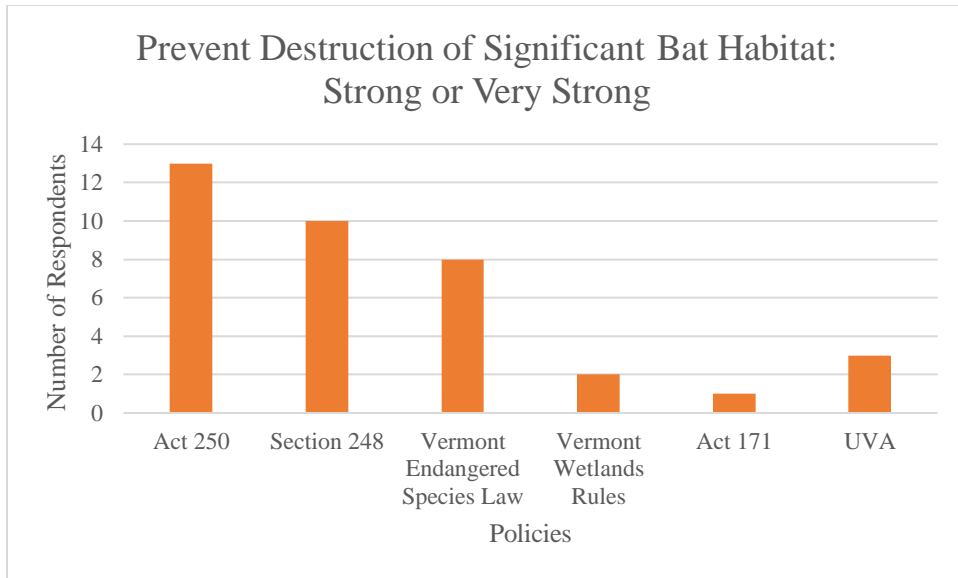


Figure 25. Strong or Very Responses for Preventing Destruction of Significant Bat Habitat.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the prevent destruction of significant bat habitat objective for each policy. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’ responses for the prevent destruction of significant bat habitat objective for each policy

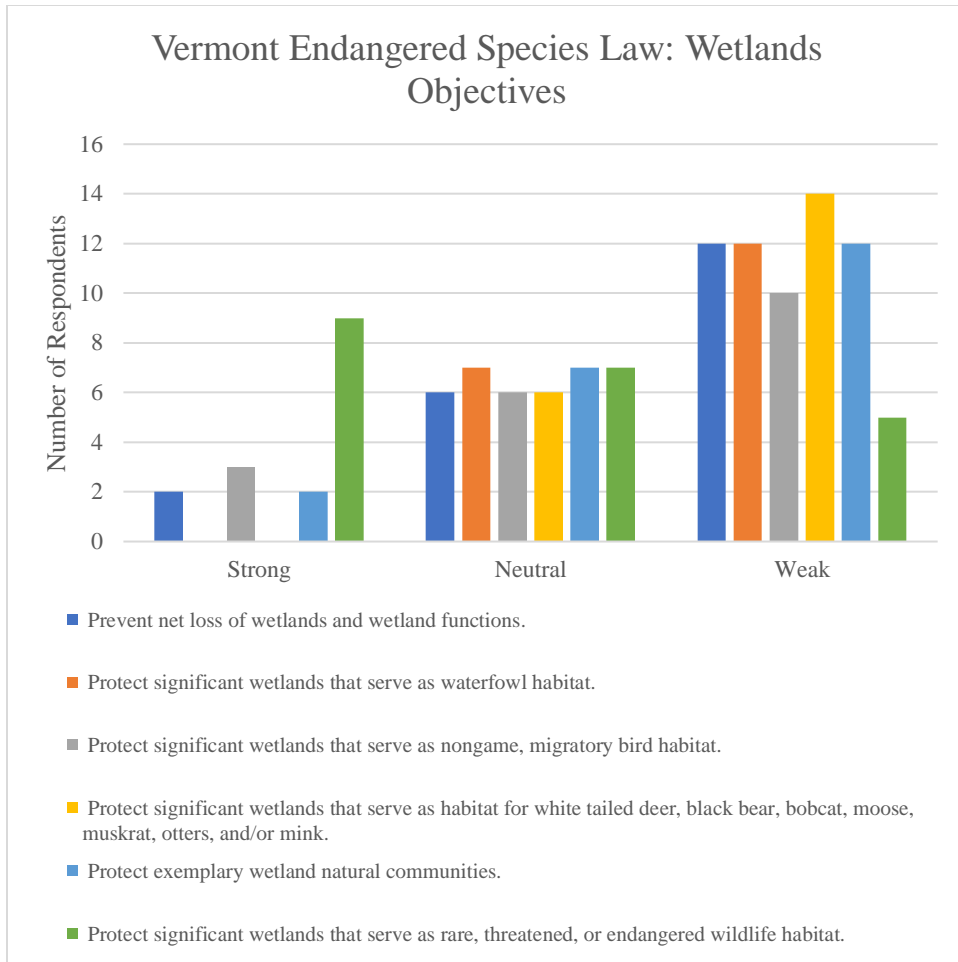


Figure 26. The Relationship Between the Implementation of the Vermont Endangered Species Law and the Wetland Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of the VESL and each wetland objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wetland objective.

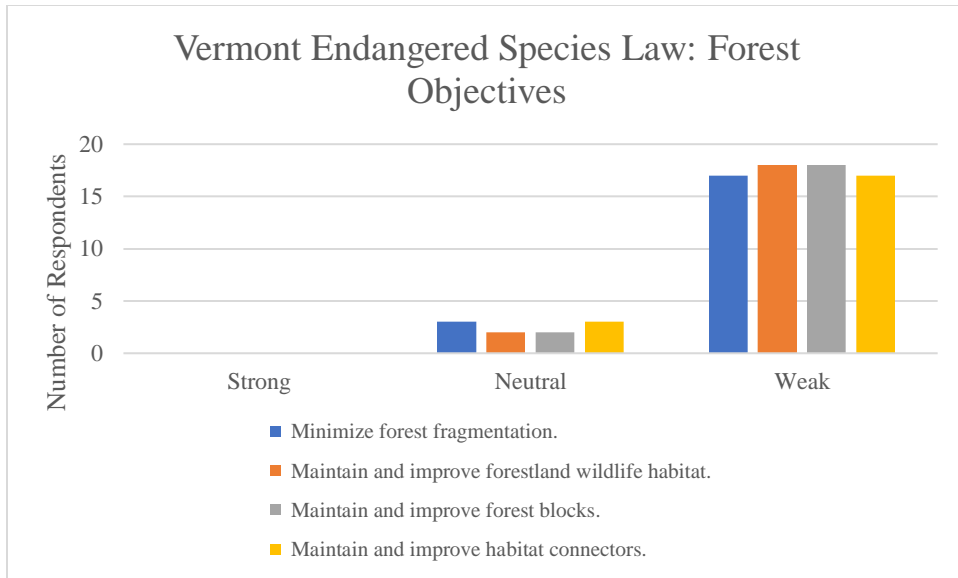


Figure 27. The Relationship Between the Implementation of the Vermont Endangered Species Law and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of the VESL and each forest objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each forest objective.

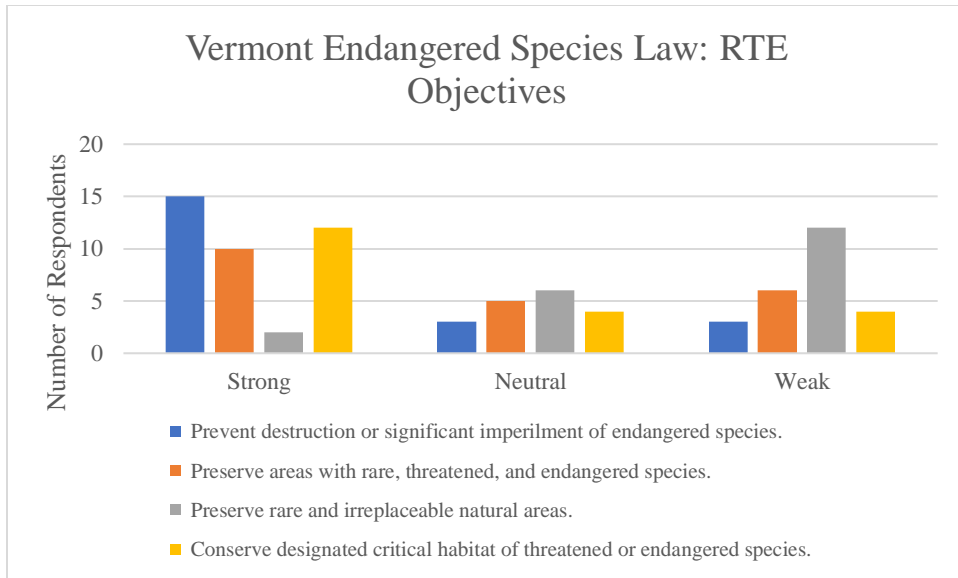


Figure 28. The Relationship Between the Implementation of the Vermont Endangered Species Law and the RTE Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of the VESL and each RTE objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each RTE objective.

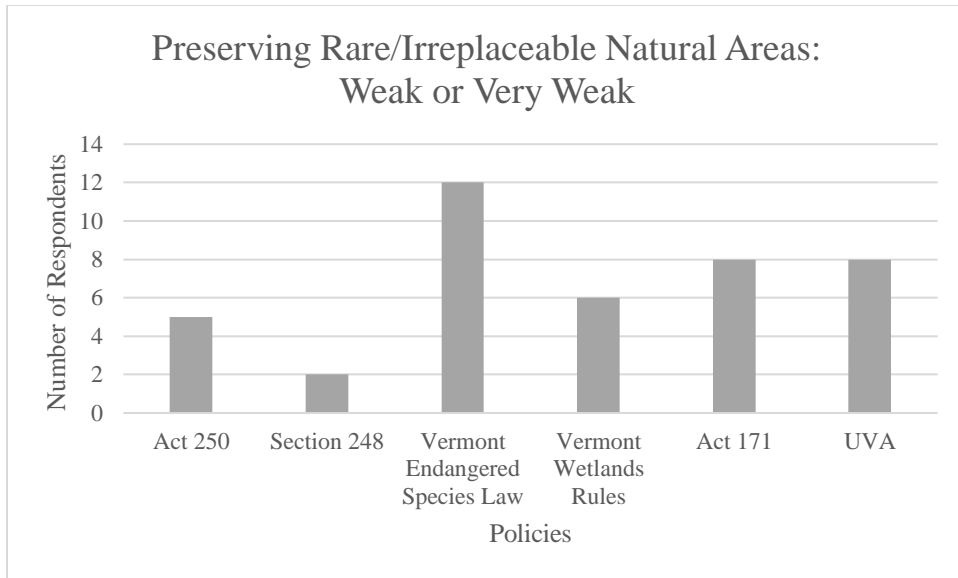


Figure 29. Very Weak or Weak Responses for Preserving Rare/Irreplaceable Natural Areas.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the preserving rare/irreplaceable natural areas objective for each policy. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘very weak’ or ‘weak’ responses for the preserving rare/irreplaceable natural areas objective for each policy.

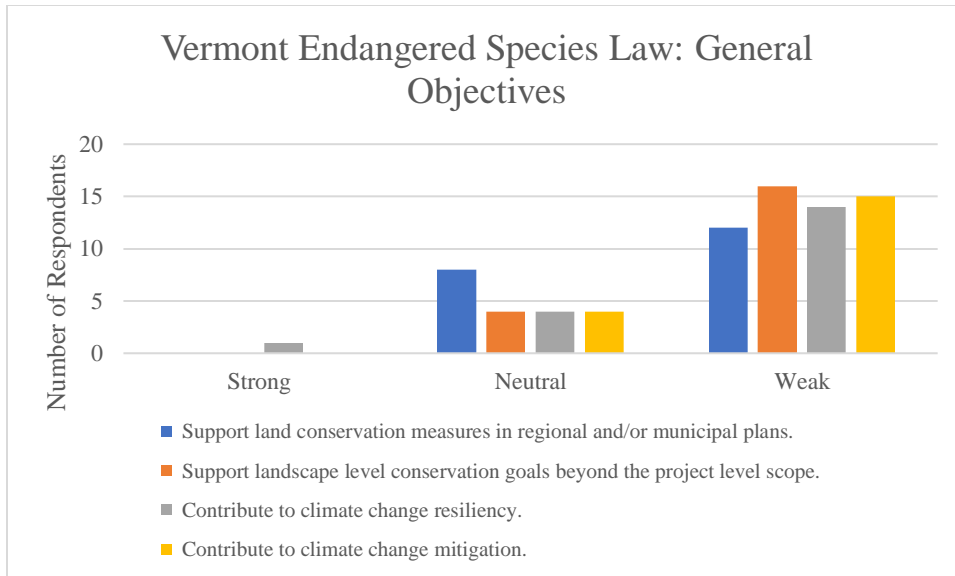


Figure 30. The Relationship Between the Implementation of the Vermont Endangered Species Law and the General Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of the VESL and selected general objectives (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for selected general objectives.

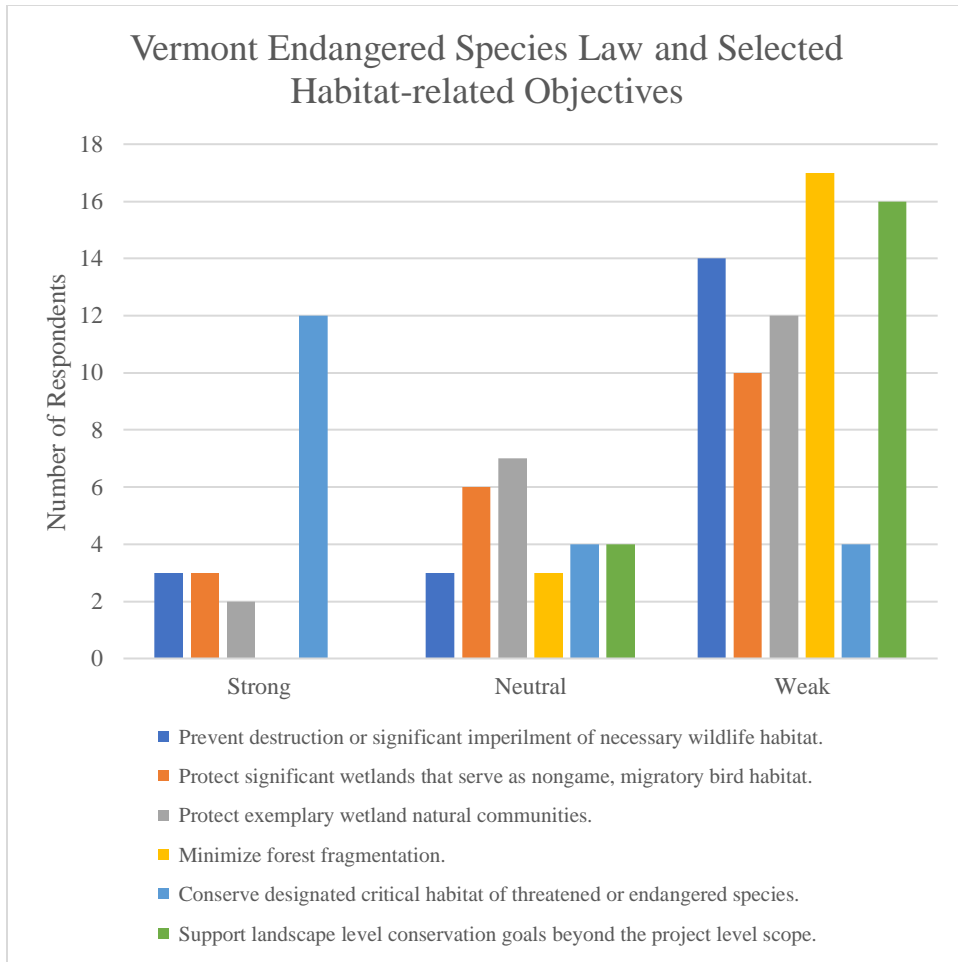


Figure 31. Relationship Between the Implementation of the Vermont Endangered Species Law and the Selected Habitat-related Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 34.4%). Survey respondents were asked to describe the relationship between the implementation of the VESL and selected habitat-related objectives (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for selected habitat-related objectives.

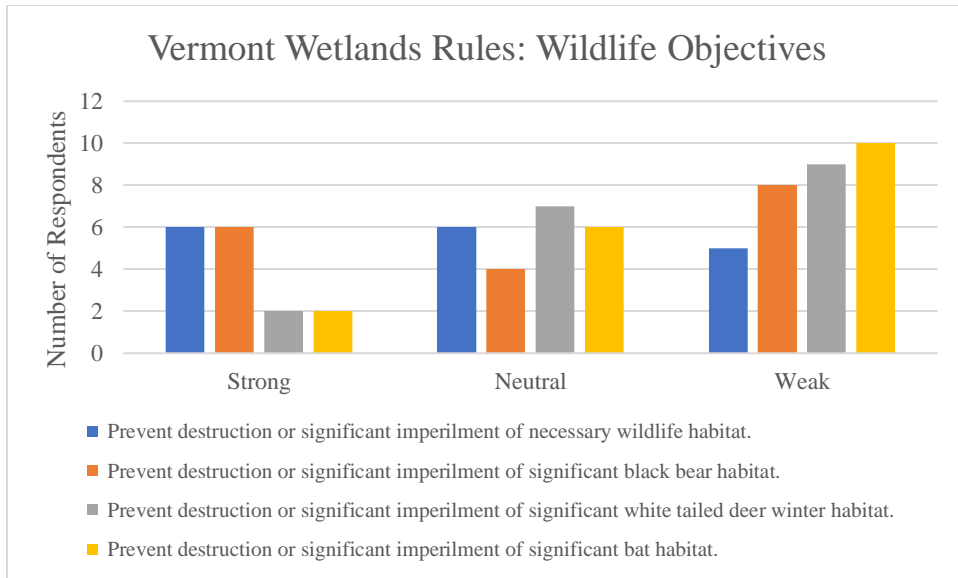


Figure 32. Relationship Between the Implementation of the Vermont Wetlands Rules and the Wildlife Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 32.8%). Survey respondents were asked to describe the relationship between the implementation of the Vermont Wetland Rules and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wildlife objective.

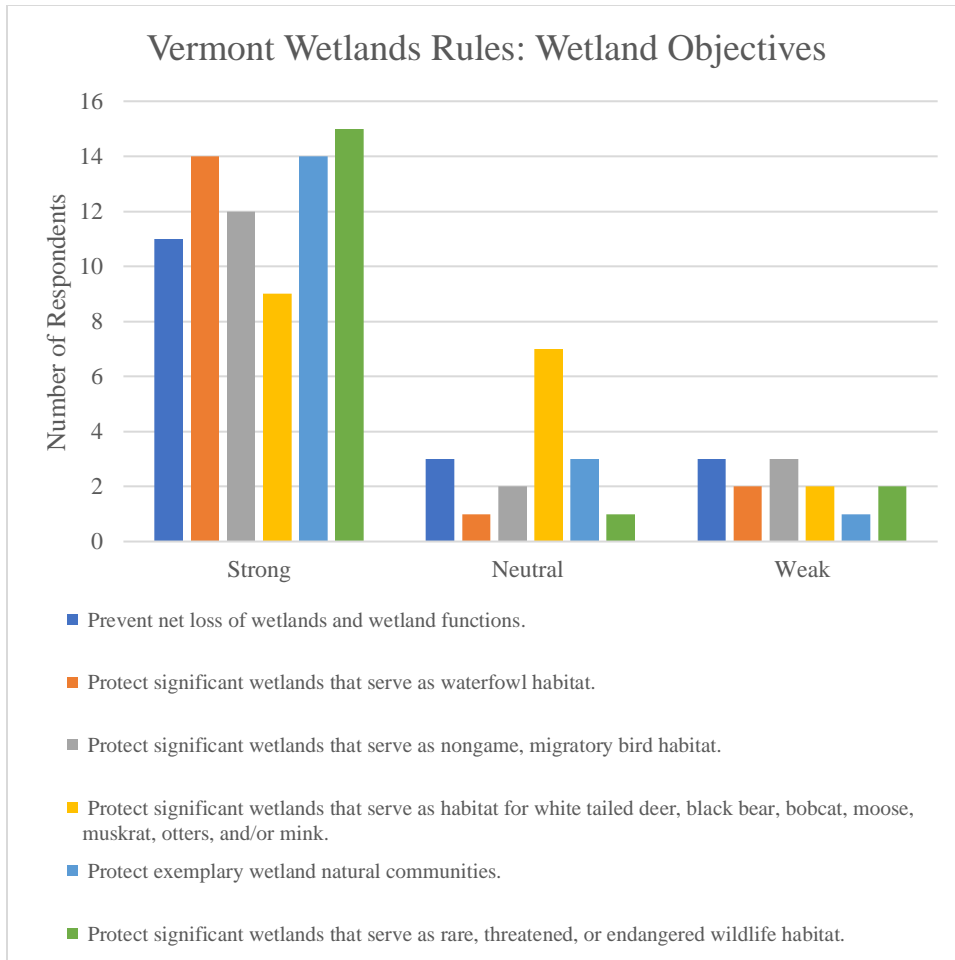


Figure 33. Relationship Between the Implementation of the Vermont Wetlands Rules and the Wetland Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 32.8%). Survey respondents were asked to describe the relationship between the implementation of the Vermont Wetland Rules and each wetland objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wetland objective.

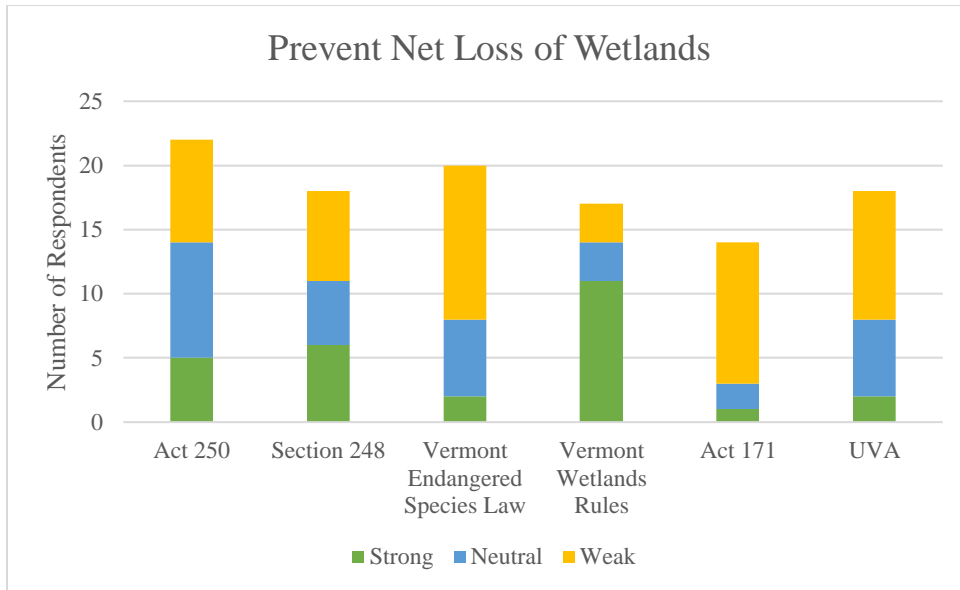


Figure 34. Prevent Net Loss of Wetlands.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the prevent net loss of wetlands objective for each policy. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the prevent net loss of wetlands objective for each policy.

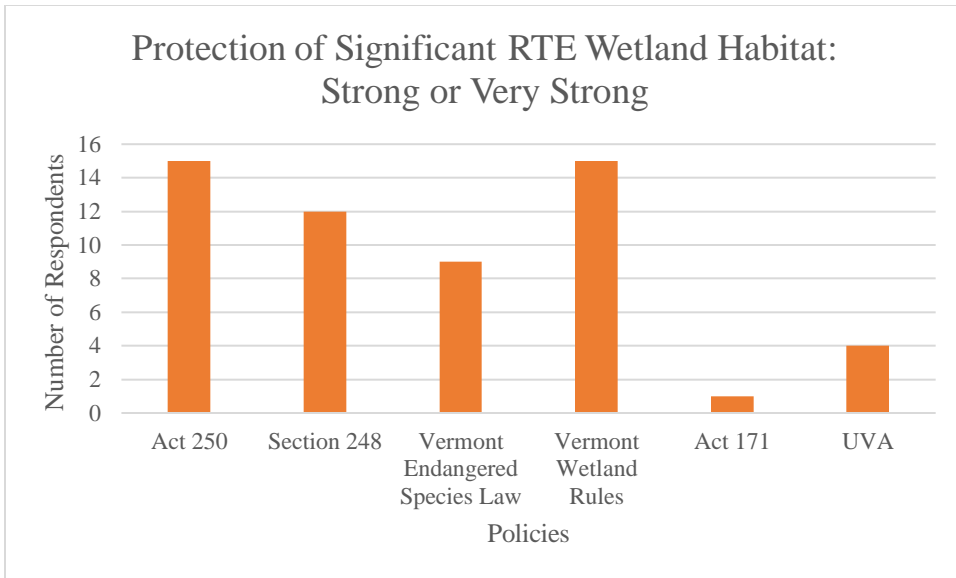


Figure 35. Strong or Very Responses for Protection of Significant RTE Wetland Habitat.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the protection of significant RTE wetland habitat objective. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’ responses the protection of significant RTE wetland habitat objective for each policy.

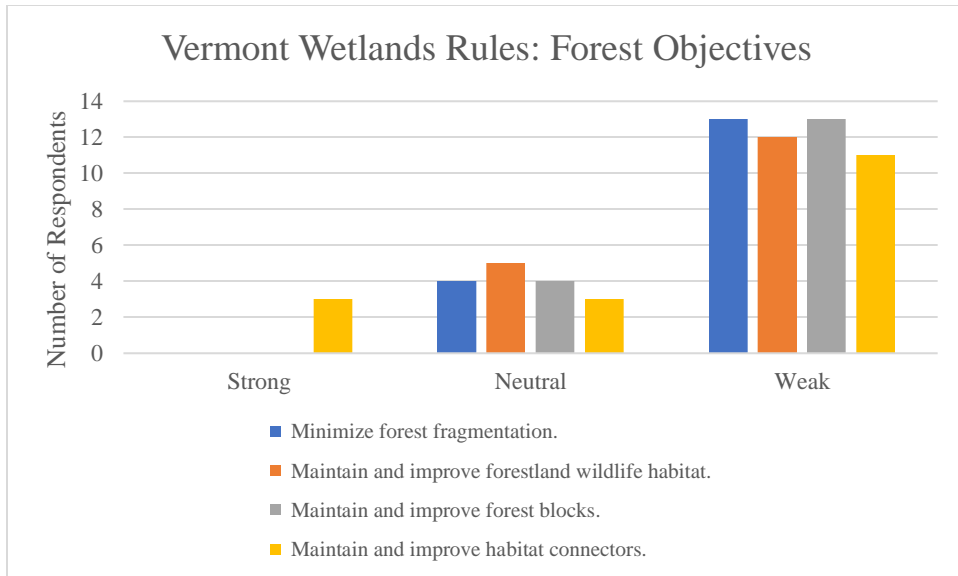


Figure 36. Relationship Between the Implementation of the Vermont Wetlands Rules and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 32.8%). Survey respondents were asked to describe the relationship between the implementation of the Vermont Wetland Rules and each forest objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each forest objective.

Table 2. Familiarity and Capacity

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the degree to which they agree or disagree with the following statement: *The VFWD has the requisite capacity to meaningfully engage in each regulatory or nonregulatory process.* Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The table displays the proportion of respondents who either ‘strongly disagree’ or ‘disagree’. Survey respondents were also asked to describe their familiarity with the policy as: ‘not familiar at all’, ‘slightly familiar’, ‘moderately familiar’, ‘very familiar’, or ‘extremely familiar’. The table also displays the proportion of respondents who are ‘moderately familiar’, ‘very familiar’, or ‘extremely familiar’ with each policy.

Policy	At least moderately familiar	Disagree that VFWD has adequate capacity
Act 250	96%	58.3%
Section 248	77.3%	59.1%
VESL	81.8%	45.5%
VWR	71.4%	28.6%
Act 171	55%	25%
Current Use	75%	35%

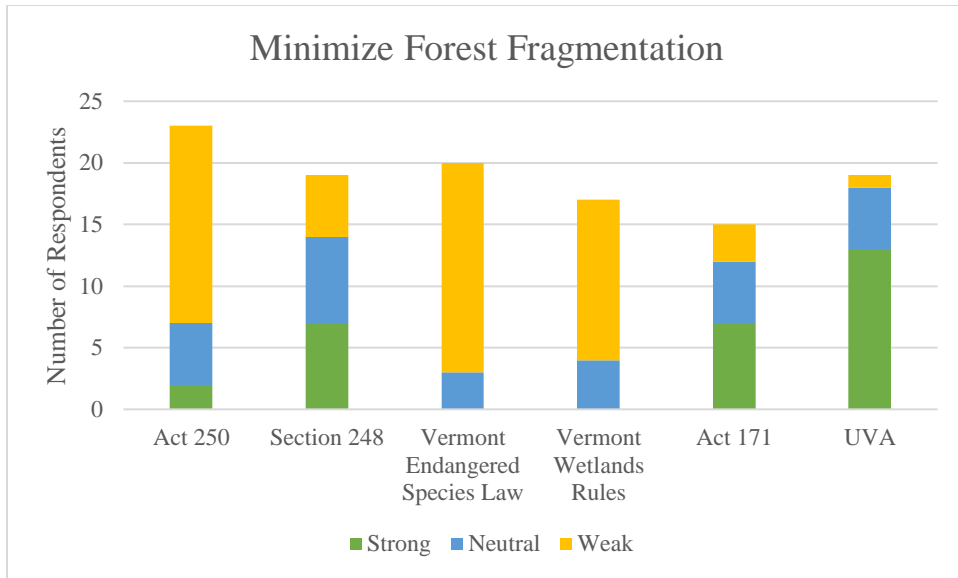


Figure 37. Minimize Forest Fragmentation.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the minimize forest fragmentation objective for each policy. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the minimize forest fragmentation objective for each policy.

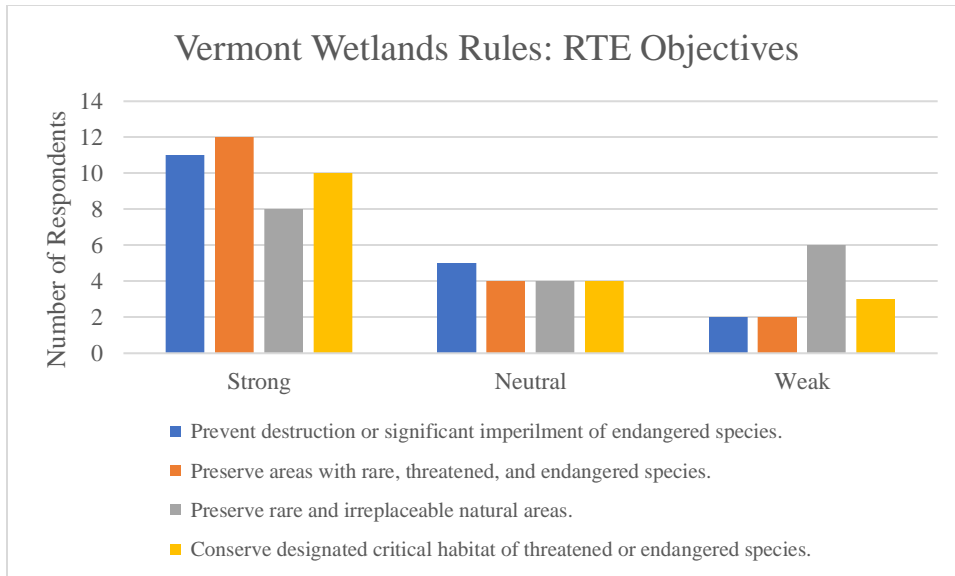


Figure 38. Relationship Between the Implementation of the Vermont Wetlands Rules and the RTE Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 32.8%). Survey respondents were asked to describe the relationship between the implementation of the Vermont Wetland Rules and each RTE objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each RTE objective.

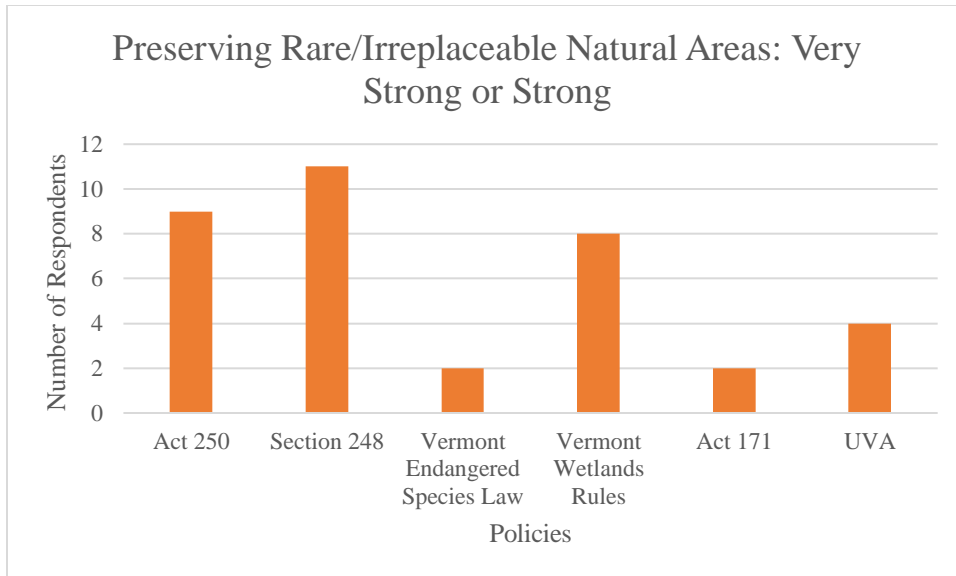


Figure 39. Strong or Very Responses for Preserving Rare/Irreplaceable Natural Areas.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the preserving rare/irreplaceable natural areas objective. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’ responses the preserving rare/irreplaceable natural areas objective for each policy.

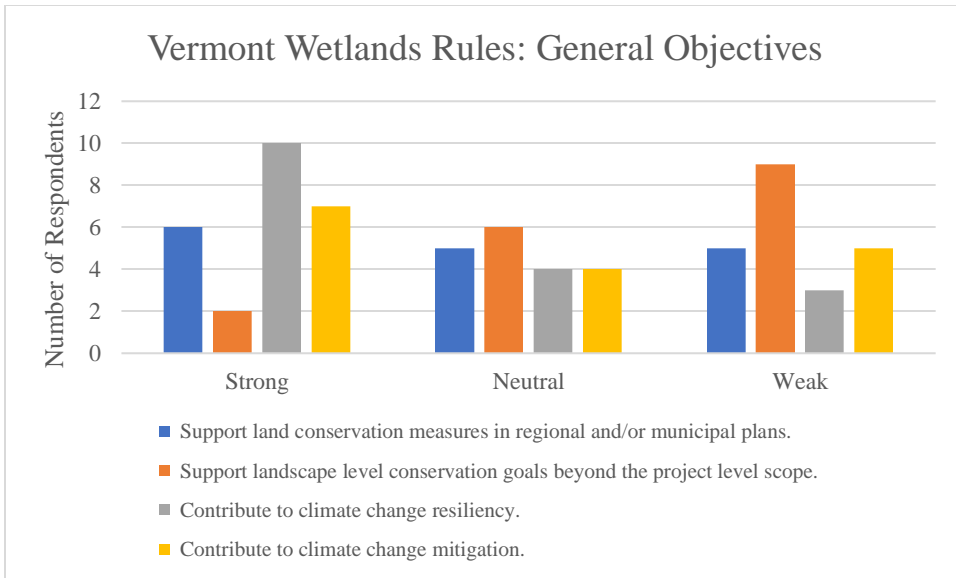


Figure 40. Relationship Between the Implementation of the Vermont Wetlands Rules and the General Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 32.8%). Survey respondents were asked to describe the relationship between the implementation of the Vermont Wetland Rules and selected general objectives (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for selected general objectives.

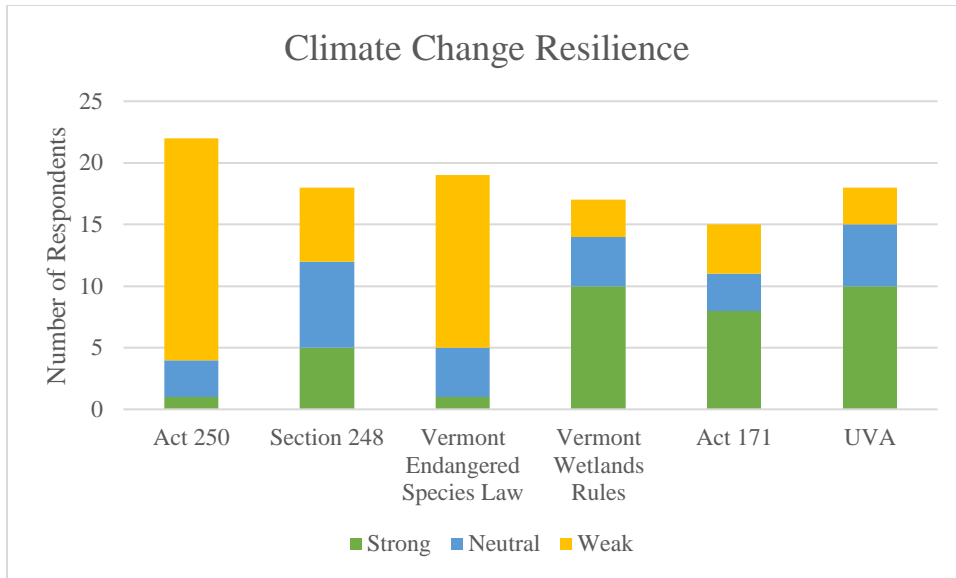


Figure 41. Climate Change Resilience.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the climate change resilience objective for each policy. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the climate change resilience objective for each policy.

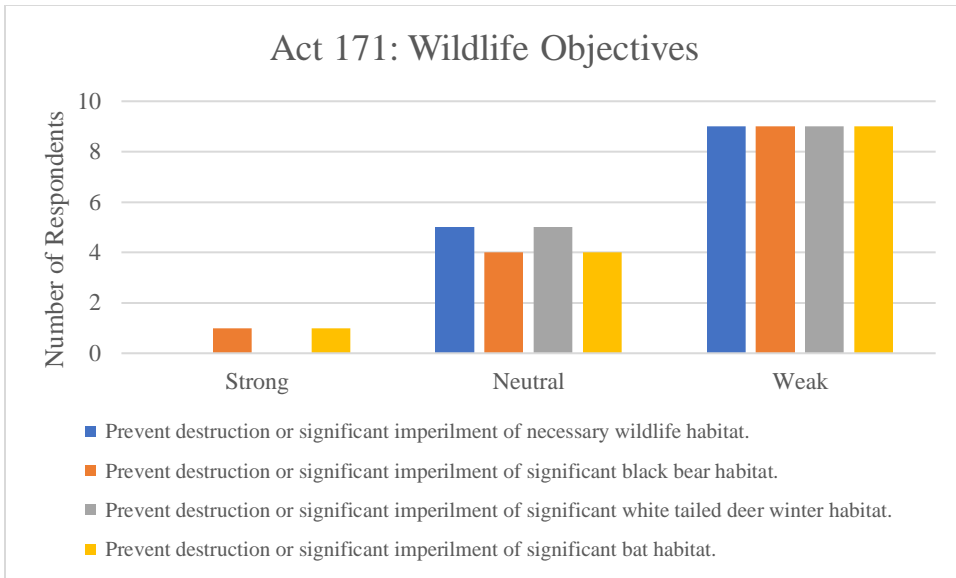


Figure 42. Relationship Between the Implementation of Act 171 and the Wildlife Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of Act 171 and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wildlife objective.

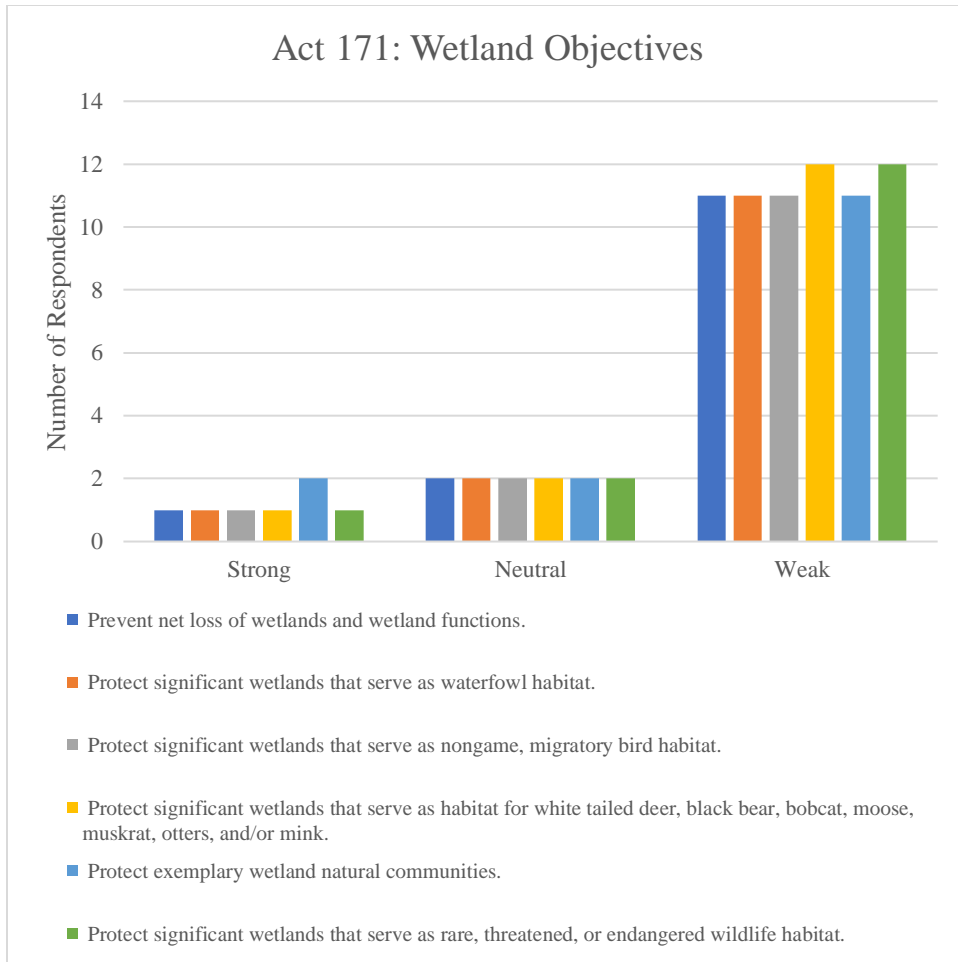


Figure 43. Relationship Between the Implementation of Act 171 and the Wetland Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of Act 171 and each wetland objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wetland objective.

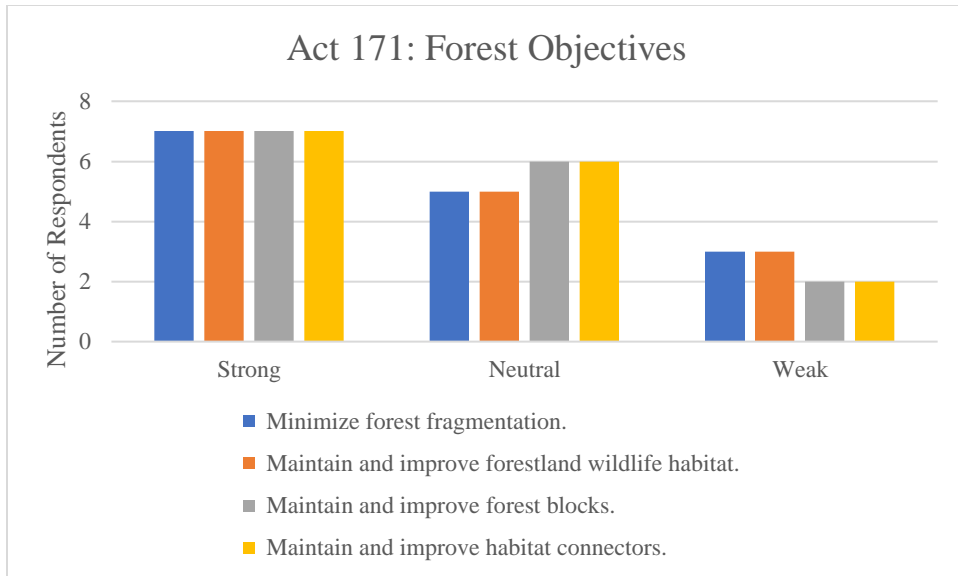


Figure 44. Relationship Between the Implementation of Act 171 and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of Act 171 and each forest objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each forest objective.

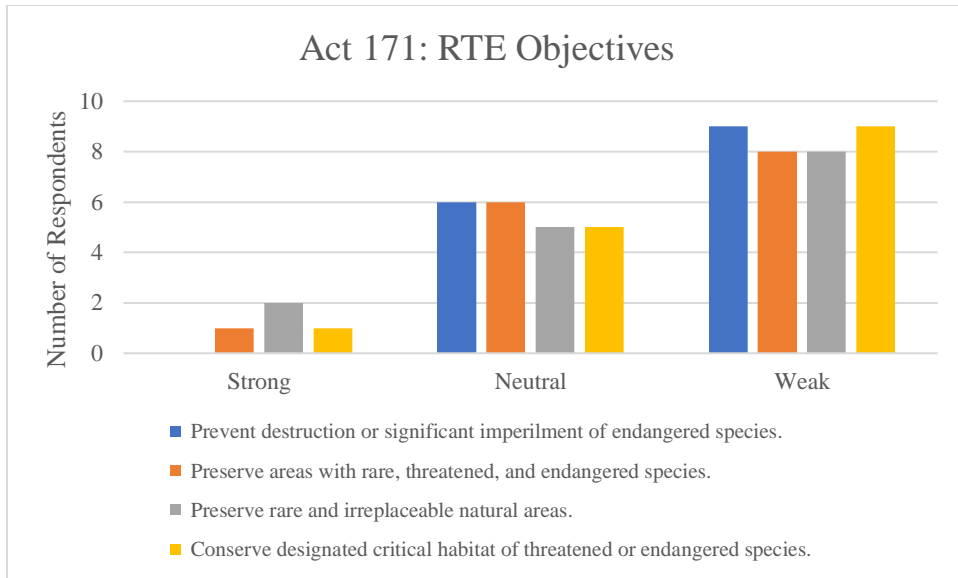


Figure 45. Relationship Between the Implementation of Act 171 and the RTE Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of Act 171 and each RTE objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each RTE objective.

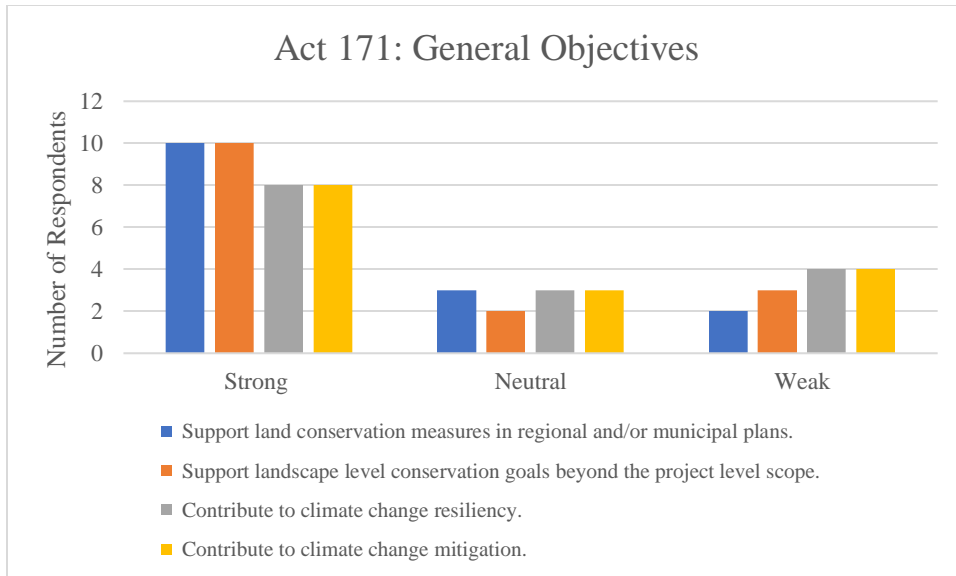


Figure 46. Relationship Between the Implementation of Act 171 and the General Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of Act 171 and selected general objectives (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for selected general objectives.

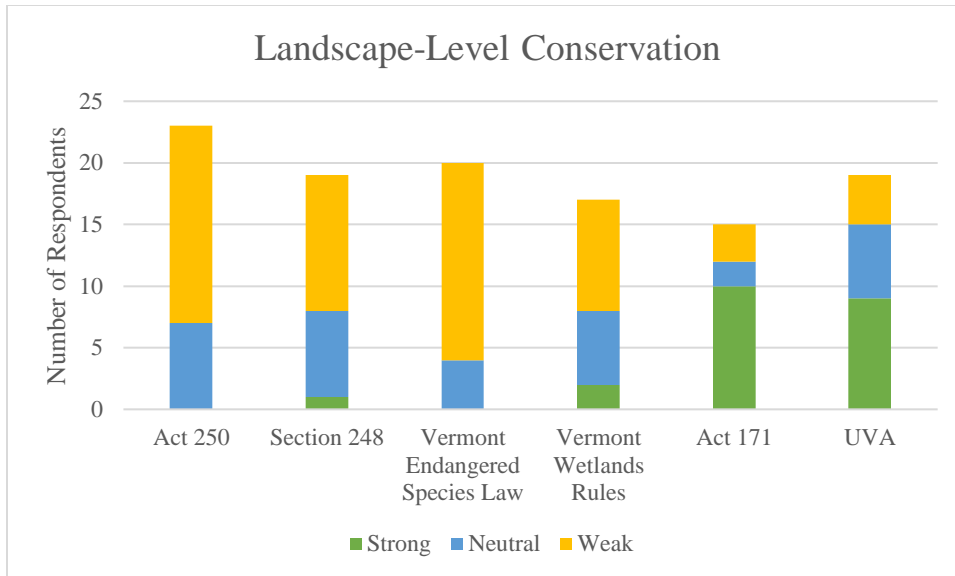


Figure 47. Landscape-level Conservation.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate = 31.3% - 39.1%). Survey respondents were asked to describe the relationship between the implementation of each policy and the supporting landscape-level goals beyond the project-level scope objective for each policy. Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for the supporting landscape-level goals beyond the project-level scope objective for each policy.

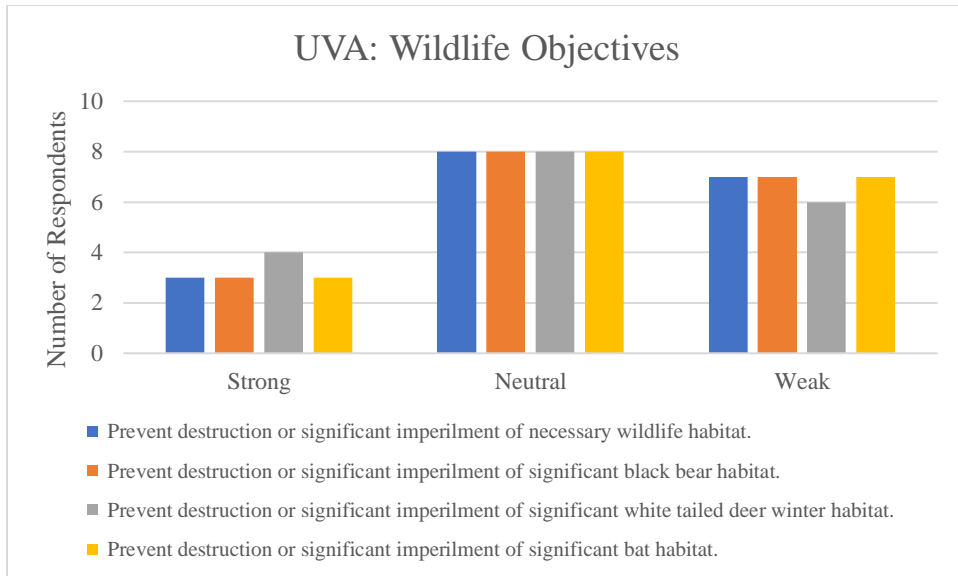


Figure 48. Relationship Between the Implementation of UVA and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of UVA and each wildlife objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wildlife objective.

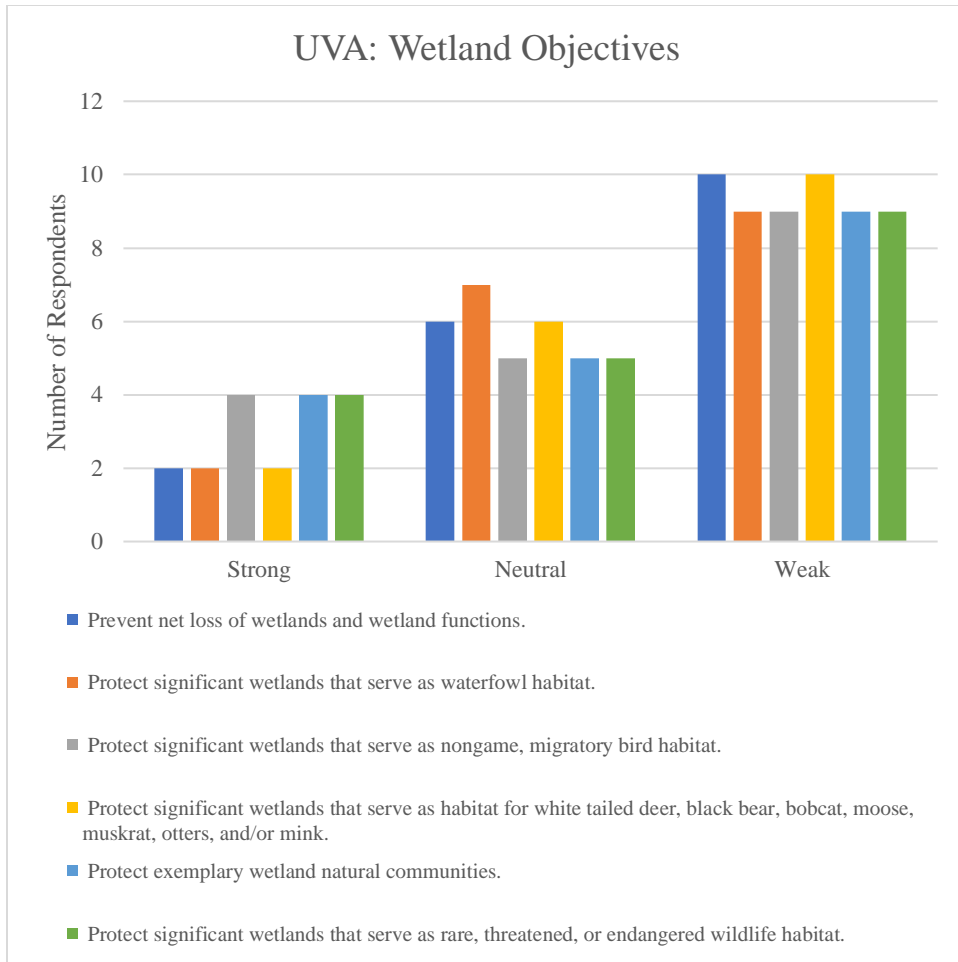


Figure 49. Relationship Between the Implementation of UVA and the Wetland Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of UVA and each wetland objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each wetland objective.

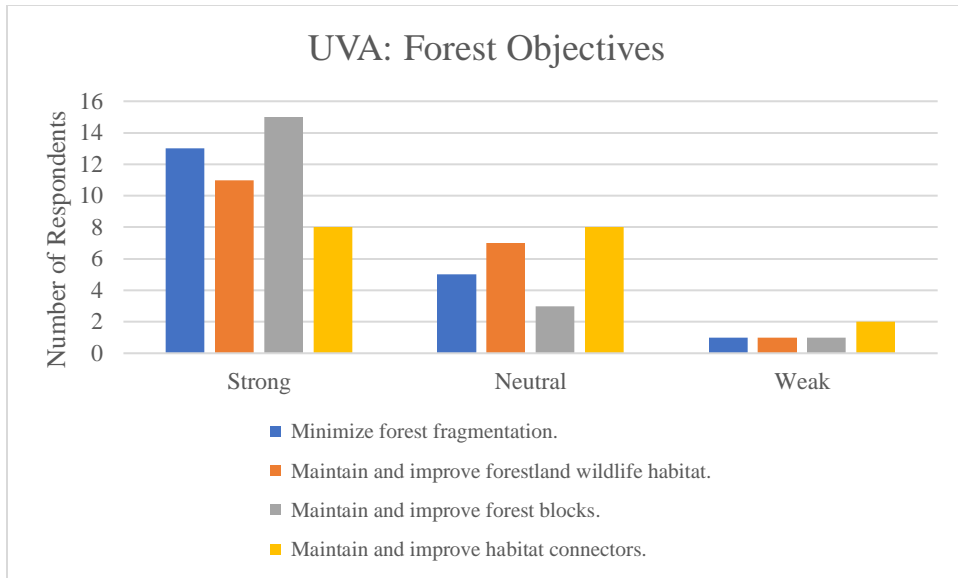


Figure 50. Relationship Between the Implementation of UVA and the Forest Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of UVA and each forest objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each forest objective.

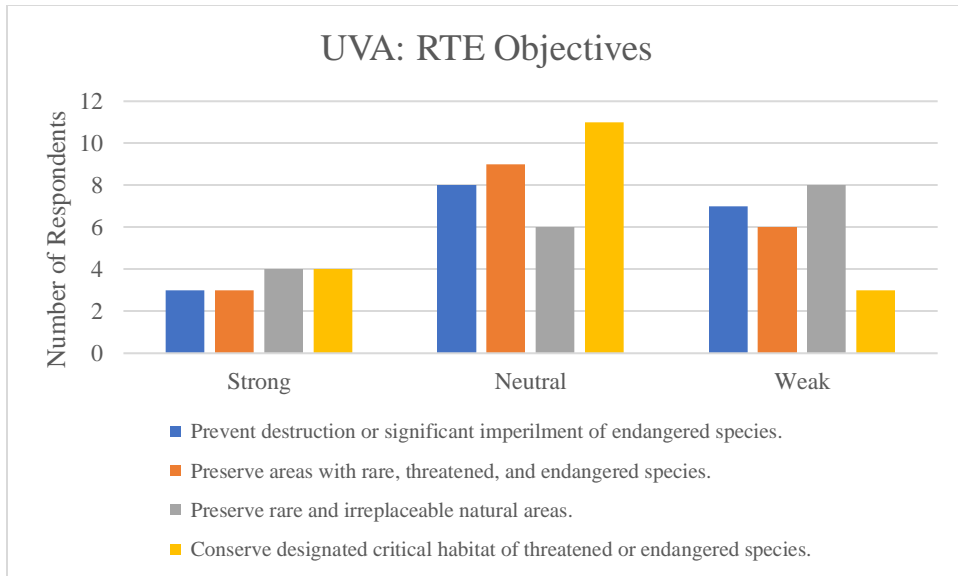


Figure 51. Relationship Between the Implementation of UVA and the RTE Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of UVA and each RTE objective (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for each RTE objective.

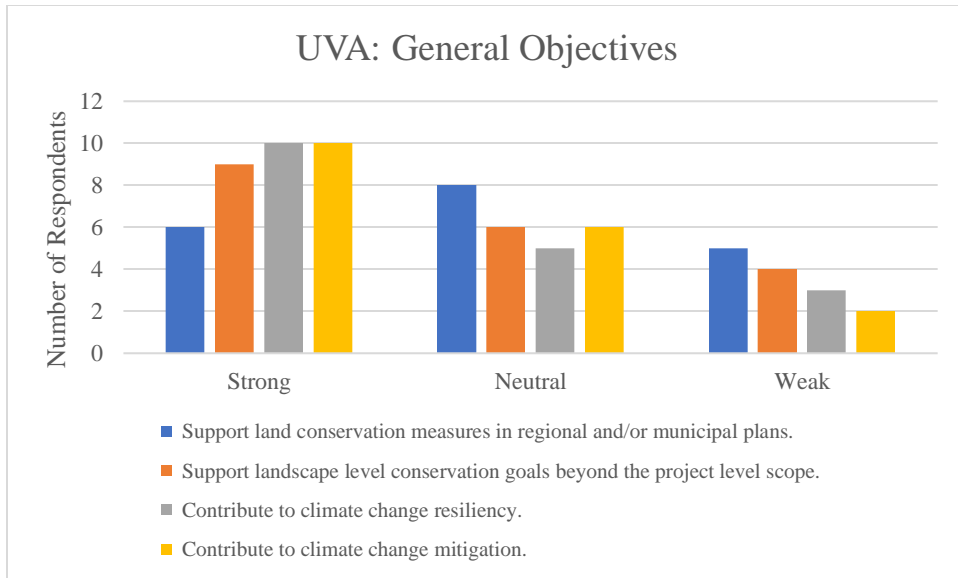


Figure 52. Relationship Between the Implementation of UVA and the General Objectives.

Results from a survey distributed to 63 conservation professionals in Vermont in 2021 (response rate for this section = 31.3%). Survey respondents were asked to describe the relationship between the implementation of UVA and selected general objectives (shown above). Respondents had the opportunity to respond with ‘strongly disagree’, ‘disagree’, ‘neutral’, ‘unknown’, ‘agree’, or ‘strongly agree’. The figure displays the sum of the ‘strong’ or ‘very strong’, ‘neutral’, and ‘very weak’ or ‘weak’ responses for selected general objectives.

Chapter V. Conclusions

Emergent Policy Gaps and Key Themes

Introduction

Several policy gaps and key themes surfaced across the results from the Vermont Wildlife Policy Gap survey. While the previous section discusses respondents' conclusions for each policy and each conservation objective in brief, the following section identifies and elaborates upon the crosscutting policy gaps and higher-level conservation themes which arose throughout the survey. Many of the policy gaps have implications for several policies as they pertain to wildlife conservation in Vermont, and the key themes have implications for conservation and conservation policy more broadly. The emergent policy gaps and key themes include regulatory capacity, Act 250 and forest fragmentation, the VESL as a fine-scale conservation tool, landscape-level conservation, and forested wetlands.

Regulatory Capacity

Insufficient funding is frequently identified as a barrier to sustainability and effectiveness for state and federal natural resource agencies (Ma et al. 2019; Vermont Fish and Wildlife Department 2017; Lemieux et al. 2013). Decline in traditional, utilitarian activities such as hunting, angling, and trapping has had a significant impact on funding for agencies (Berl et al. 2022). As noted in the previous chapter, a majority of respondents disagreed that VFWD has the adequate capacity to meaningfully engage in Act 250 (58.3%) and Section 248 (59.1%). Similarly, a plurality of respondents (45.5%) reached the same conclusion for Section 248. Further, respondents referenced capacity as a gap for each of these regulatory policies in the extended response section. In

comparison, the two non-regulatory policies—Act 171 and Current Use—received a considerably lower proportion of respondents who indicated that VFWD did not have the adequate capacity to engage in the policies (25% and 35%, respectively). As previously noted, by 2030, Vermont is expected to have an additional 85,000 residents compared with 2013 (Vermont Department of Forests, Parks, and Recreation 2015). The state is already seeing increases in the per-acre value of land and decreases in the amount of land in larger parcels, indicating rising development pressure and associated habitat fragmentation (Fidel et al. 2018). Further, the current rate of development is increasing twice as fast as the state’s population (Vermont Department of Forests, Parks, and Recreation 2015). As a result of this increasing development pressure, the Department will see increasing demands for engagement in each of these regulatory policies which interface with a variety of development impacts.

Act 250 and Forest Fragmentation

A majority of Vermonter’s (60%) agree that forest fragmentation and forest loss is a problem in Vermont (Duda et al. 2015). Forest fragmentation and forest loss is well documented in the state and has been discussed thoroughly in previous chapters (Morin et al. 2017; Vermont Department of Forests, Parks, and Recreation 2015). Act 250 has broader jurisdiction in the regulation of land use and development than any of the other policies surveyed. Project applications are evaluated for impacts on necessary wildlife habitat, air pollution, water pollution, erosion, transportation, educational services, municipal services, local and regional planning, and others (10 V.S.A. § 6086). However, there are no criteria which require an evaluation of impacts to forest blocks, wildlife corridors, or forest fragmentation. Survey respondents concluded that Act 250 was one of

the weakest policies for preventing forest fragmentation. Additionally, a majority of respondents felt that Act 250 was also weak in achieving each of the other forest objectives. The conservation professionals surveyed indicate that the lack of criteria related to forest fragmentation has led to impacts to forestland wildlife habitat and is a clear area of concern.

There have been various recent legislative efforts to expand the law to address forest fragmentation. Almost every year in the past 7 years bills have been introduced to the Vermont General Assembly to add fragmentation-related criteria to Act 250. During the Spring 2022 Legislative Session, the Vermont Senate passed S. 234 “An act relating to changes to Act 250,” which would amend Act 250 to address forest fragmentation (Senator Bray 2022). If passed, the bill would modify Criterion 8, adding Criterion 8(C) which states that a subdivision or development:

Will not result in an undue adverse impact on forest blocks and connecting habitat. If a project as proposed would result in an undue adverse impact, a permit may only be granted if effects are avoided, minimized, and mitigated in accordance with rules adopted by the Board. (An act relating to changes to Act 250 2022)

The bill would also add statutory definitions of ‘forest block,’ ‘connecting habitat,’ and ‘fragmentation’” (Senator Bray 2022). The amendment would require NRB and ANR development of guidance and standards for effective implementation, similar to the guidance developed for the implementation of Act 250 Criterion 8A (Necessary Wildlife Habitat). Political winds have previously stifled similar attempts; however, if Act 250 ever hopes to address forest fragmentation, modification or amendment of the historic land use regulation law is required.

VESL: A Fine-filter Conservation Tool

Survey respondents affirmed the VESL's implementation as a fine-scale or fine-filter conservation tool. A fine-filter conservation strategy focuses on meeting the conservation needs of individual species, while coarse-filter strategies focus on conserving aggregations of species or environmental units (Tingley et al. 2014). Across the survey, respondents scored the VESL poorly for habitat-related—or coarse-filter—objectives. Act 250, Section 248, and the Vermont Wetland Rules all received a higher proportion of respondents who indicated each policy was strong in protecting significant wetlands that serve as RTE habitat. A greater proportion of respondents concluded that the VESL is weak in minimizing forest fragmentation than for any other policy. Similarly, a majority of respondents indicated that the policy was weak in maintaining and improving forestland wildlife habitat. Respondents also indicated that the VESL is weak in meeting landscape-level conservation goals beyond the project-level scope. However, respondents indicated that the VESL was strong in achieving the RTE objectives which would all be considered fine-filter conservation strategies. A greater proportion of respondents indicated that the VESL was strong in preventing the destruction or significant imperilment of endangered species than for any other policy. Additionally, a majority of respondents concluded that the VESL is strong in conserving the designated critical habitat of threatened or endangered species. Although conserving designated critical habitat may benefit aggregations of species, its intent is to assist in meeting the conservation needs of a single species. Respondents' conclusions about the VESL's weakness in achieving coarse-filter conservation goals and strength in achieving fine-filter was predictable, it is less clear whether the conclusions identify a policy gap.

Nilsson et al. defined policy coherence as, “an attribute of policy that systematically reduces conflicts and promotes synergies between and within different policy areas to achieve the outcomes associated with jointly agreed policy objectives” (Nilsson et al. 2012). The VESL’s weakness in achieving coarse-filter conservation goals may not create conflict among Vermont environmental policies, however, it may not promote synergies between policies either. It is interesting to note that several of Vermont’s threatened and endangered species would likely benefit from coarse-filter conservation strategies (Alexander and Parren 2012; Parren et al. 2019). Similarly, it is well documented that non-focal species often benefit from single-species conservation efforts. The concept of an ‘umbrella species’—a species whose requirements for persistence are believed to encapsulate those of an array of additional species—has been debated in the literature (Lambeck 1997). Further research, discussed below, would be required to determine the extent to which the VESL’s current implementation as a fine-filter conservation tool creates a gap in terrestrial wildlife conservation in Vermont. Further research could also identify areas where synergies between the VESL and other environmental policies could be promoted.

Landscape-Level Conservation

Looking beyond the project-level scope and incorporating the cumulative impacts of development in a permitting decision is a chronic weakness for many regulatory tools. Cumulative effects occur due to the spatial and temporal accumulation of change in an environment (Spaling and Smit 1993). The cumulative effects of development can impact ecosystem integrity in forested ecosystems and may threaten native terrestrial wildlife species through associated increases in nest parasitism, predation, and the proliferation of

invasive species (Nitschke 2008). Certain species which require large, intact late-successional forests are particularly vulnerable to cumulative landscape change (Bridger et al. 2016). A majority of respondents indicated that each of the regulatory policies surveyed—Act 250, Section 248, VESL, and the Vermont Wetlands Rules—were weak in supporting landscape-level conservation beyond the project-level scope. Meanwhile, respondents concluded that the nonregulatory policies survey—Act 171 and Current Use—were the strongest in supporting landscape-level conservation. Nonregulatory policies are often criticized for their voluntary nature and limited ability to influence behavior, thus it is interesting that respondents drew a distinction between regulatory policies and nonregulatory policies when it comes to supporting landscape-level conservation.

Act 171 is a capacity-building planning policy that encourages adoption of innovative planning approaches, while Current Use is an incentive-based inducement policy that offers positive payoffs to encourage participation in a policy-preferred activity (Schneider and Ingram 1990). As discussed in [Chapter II](#), state planning policies have a strong influence over local and regional land use regulation in Vermont. Further, local and regional planning policies—which must be consistent with state planning goals—are directly tied to regulatory programs such as Act 250 and Section 248. The strong policy coherence between Act 250, Section 248, and Act 171 amplify Act 171’s impact as a landscape-level conservation tool. Current Use has the ability to achieve landscape-level conservation goals due to the large proportion of private land (~80%) in the state and the high level of public support for incentive-based conservation programs (Vermont Department of Forests, Parks, and Recreation 2015; Duda et al. 2015). These policies can

play a critical role in addressing the cumulative effects of development and supporting landscape-level conservation goals in the future.

Forested Wetlands

Respondents identified forested wetlands as a clear policy gap throughout the survey. Both policies aimed at conserving forestland habitat performed poorly for the wetland objectives. Respondents indicated that Current Use was one of the weakest policies in preventing a net loss of wetlands and a majority of respondents concluded that Act 171 was weak in achieving each wetland objective. There is no mention of wetlands in the amended state planning goals, the amended requirements for regional plans, or the amended requirements for municipal plans (24 V.S.A. § 4302)(24 V.S.A. § 4348)(24 V.S.A. § 4382). The Vermont Wetland Rules, the policy aimed at conserving wetland habitat, performed poorly for the forest objectives. A majority of respondents concluded that the Rules were weak in achieving each of the forest objectives. The Rules are relatively silent on the prevention of forest fragmentation and the functional criterion used to evaluate wetlands include no reference to forest fragmentation. Forested wetlands provide important wildlife habitat and make up several of the rare natural communities in the state. As previously noted, many of the wetlands identified as Vermont Natural Community Types are forested (Sorenson and Zaino 2019). Despite this perceived gap, below I will discuss existing authority within these policies and their implementation which could broaden their wetland conservation impact.

Policy Opportunities

Introduction

The policy gaps and key themes which respondents identified can serve as a starting point for policymakers and natural resources managers to develop future environmental policies. The following discussion suggests a few high-level strategies that may improve Vermont's environmental policies to maximize wildlife conservation outcomes. The policy opportunities identified are not an exhaustive list, and further opportunities for improving policy coherence and the achievement of conservation goals may be drawn from the results of the Vermont Wildlife Policy Gap Survey. Additionally, the policy opportunities discussed below do not offer specific statutory amendments or advocate for the adoption of specific policy tools, rather the discussion is limited to overarching ideas and broad recommendations.

Building Capacity

As previously discussed, respondents identified capacity as a clear barrier to effective implementation of several of Vermont's most influential regulatory policies, Act 250 and Section 248. Increasing development pressure will put greater demand on the VFWD to engage with these policies. In recent legislative sessions, the VFWD has advocated for amending the current billback structure in statute or changing the current Act 250 permit fee structure (Porter 2021). Formalizing the VFWD's engagement in Act 250 may be a first step towards securing a dedicated funding source. ANR is required to appear as a party under any Section 248 proceedings to provide evidence and offer recommendations with respect to effects on the natural environment (30 V.S.A. § 248(b)(5)). The addition of a similar requirement to Act 250 may facilitate the

development of a stable funding mechanism. Additionally, although respondents did not identify capacity as a clear gap for the VESL, increasing funding to support full implementation of critical habitat designation and recovery planning could improve the conservation impact of the law. Critical habitat designation has been fairly limited since the authority was added to the VESL and most designation has occurred on smaller parcels already owned by the state or by environmental organizations. Incentivizing the designation of critical habitat on private land with a program like UVA may increase the acreage of critical habitat and significantly aid in the recovery of listed species. However, this would require the identification and designation of a new funding source or the reallocation of an existing funding source. The VESL may also benefit from bolstering financial support of recovery planning. As previously discussed, several of the 14 VESL-listed species with recovery plans have been delisted; however, because recovery planning is not required for every species, it is likely that many species in need of a recovery plan do not have a plan due to limited resources. Finally, although respondents did not identify capacity as a gap for the implementation of Act 171, a low proportion conservation professionals were familiar with the policy. Increasing capacity for the implementation of Act 171 could result in increased engagement with partner organizations and further deployment of technical outreach to improve familiarity of the policy amongst conservation professionals. These are just a few areas within the policies surveyed that could be improved by increased capacity, and it is probable that other environmental policies in Vermont would also benefit from increased capacity.

A 2015 study found that a plurality of Vermont residents (44%), want funding for fish and wildlife conservation programs to stay the same; however, a higher proportion of

residents (38%) want funding increased rather than decreased (Duda et al. 2015). Increased support for conservation funding may help decision makers build collaborative partnerships that alleviate conflict and promote sustainable funding models that incorporate the best interests of wildlife species and the diverse publics who value them (Henderson et al. 2021). As a strategy for funding a land conservation initiative, respondents ranked the following policy options from least favorable to most favorable: a registration fee for kayaks and canoes, a parking fee on state lands, a bond to fund land acquisition, a state tax on sporting equipment, and an increase in the general sales tax (Duda et al. 2015). Several states have successfully deployed a number of these funding strategies and other creative conservation funding strategies.

The Arkansas Natural and Cultural Resources Grant and Trust Fund authorizes a tax on the transfer of certain real estate, and a portion of the revenue is dedicated to the acquisition, management, and stewardship of land for conservation purposes (Pohl and Lawson 2017). Great Outdoors Colorado appropriates state lottery funds for open space purchases, recreational trails, state parks, and local parks (Pohl and Lawson 2017). Colorado Parks and Wildlife receives 10% of the lottery proceeds to support wildlife habitat enhancement in state parks (Pohl and Lawson 2017). The Texas Sporting Goods Sales Tax authorizes appropriations from the collection of sales tax on sporting goods to support state parks, historic sites, and local park grants (Pohl and Lawson 2017). These are just a few examples of innovative state conservation funding mechanisms. Additionally, there have been various efforts to bolster state conservation funding through federal legislation. Recovering America's Wildlife Act (S. 2372) would provide federal funding to state and tribal wildlife management agencies to support the

development of threatened and endangered species recovery plans, private lands conservation efforts, voluntary conservation agreements, and ESA interagency consultation requirements (Ferri 2022). The U.S. Senate Committee on Environment and Public Works advanced the bill in spring 2022 and if signed into law it could transform state funding for nongame wildlife species conservation (Ferri 2022). Due to existing support, it may be valuable for Vermont policymakers and conservation professionals to study the potential impact of a state tax on sporting equipment or an increase in the general sales tax to help support VFWD's engagement in Act 250 and Section 248.

Protecting Forested Wetlands

Survey respondents identified the protection of forested wetlands as a clear gap across the Vermont Wetlands Rules, Act 171, and Current Use. Fortunately, authority already exists within each policy to further forested wetland conservation, and minor policy changes and adaptations to current implementation could support this authority. The exemplary wetland natural community criteria in the Rules emphasizes the protection of wetlands in unfragmented landscapes and protection of forested wetlands with old growth trees (Vermont Agency of Natural Resources 2020). The authority to adjust buffer zones beyond the default 50-foot buffer for a Class II wetland or 100-foot buffer for a Class I wetland could also further forested wetland conservation under the Rules (10 V.S.A. §§914-915). The wildlife habitat criteria could also serve as a tool for conserving forested wetland if forest fragmentation and wildlife connectivity elements were added to the criteria. While there is mention of wetlands in the amended state planning goals, the amended requirements for regional plans, or the amended requirements for municipal plans, the new statutory definition of 'forest block' as applied

in Act 171, states that a forest block “...may include...wetlands” (24 V.S.A. § 4303)(24 V.S.A. § 4302)(24 V.S.A. § 4348)(24 V.S.A. § 4382). Although forest blocks may include wetlands, it is unclear why conservation professionals felt that Act 171 was weak in conserving forested wetlands. More targeted outreach on this nuanced authority could improve conservation outcomes for wetlands in the implementation of Act 171. Finally, one ESTA subcategory in Current Use is Forested Wetlands (Vermont Agency of Natural Resources 2010). Again, more targeted outreach on this nuanced ESTA subcategory may potentially increase Current Use enrollment for forested wetlands. Because these policy tools already have the capability to conserve forested wetlands, further research may be required to determine the extent to which this perceived policy gap has on-the-ground conservation implications.

Highlighting and Improving Nonregulatory Programs

As discussed above, respondents indicated that the two nonregulatory policies—Act 171 and Current Use—were strongest in supporting landscape-level conservation goals and may have the opportunity to play a critical role in addressing the cumulative effects of development. Beyond conservation professionals, Vermont residents have also shown strong support for nonregulatory policies as well. As a strategy for protecting land for wildlife, Vermont residents most favor the provision of technical assistance/guidance (75% strongly support) and tax incentives (70%) (Duda et al. 2015). Meanwhile, only 49% of residents supported legislation or government regulation that would further protect land for fish and wildlife (Duda et al. 2015). Further, due to complex political factors, there is a tendency for governments to develop an implementation style with a select group of preferred tools, and to stick with that style for quite some time, focusing

on improving existing tools may be the most effective means of achieving conservation objectives (Howlett 2009). Because Act 171 and Current Use are already preferred tools, focusing on improving these policies may be more effective than proposing new policies. Building capacity to strengthen outreach efforts has already been discussed as a means of improving Act 171. Expanding enrollment categories has been recommended by various conservation professionals to improve Current Use enrollment, and similarly the policy may be improved by increased outreach and provision of technical assistance. Improvement and adaptation of these nonregulatory policies is one area deserving of further investigation.

Future Research Opportunities

Introduction

Many of the conclusions drawn from the Vermont Wildlife Policy Gap Survey could be further supported by future qualitative and quantitative research inquiries. Several of the perceived gaps identified by respondents are deserving of deeper investigation. Additionally, further research could identify policy solutions to address the policy gaps and maximize wildlife conservation in Vermont's current environmental policy suite. Finally, I will briefly describe additional research I plan to pursue.

Remaining Quantitative Gaps

Several quantitative investigations regarding Act 250 and forest fragmentation, the VESL, and forested wetlands could provide greater support for respondents conclusions regarding the policy gaps and key themes identified from the Vermont Wildlife Policy Gap Survey. While forest loss is a well-documented concern in Vermont, it is not clear to what degree forest loss is occurring as a result of Act 250-permitted projects (Duda et al. 2015; Morin et al. 2017; Vermont Department of Forests, Parks, and Recreation 2015). In 2018, the Vermont Conservation Design identified forest blocks within the state that are highest priority for maintaining interior forest (Sorenson and Thompson 2018). These are the largest forest blocks from that provide the foundation for interior forest habitat and associated ecological functions (Sorenson and Thompson 2018). By quantifying the amount (acreage) of Act 250-permitted development that occurs within these forest blocks, researchers could more clearly understand the extent to which Act 250 achieves or fails to achieve forest habitat-related conservation objectives.

Survey respondents affirmed the VESL's primary implementation as a fine-scale or fine-filter conservation tool, and future quantitative research could determine the extent to which this fine-filter conservation tool creates conflict or promotes synergies between policies. Wildlife species not listed under the VESL are likely to benefit from various aspects of the VESL including the take permitting program. The conservation of designated critical habitat may also benefit aggregations of species. Quantifying how or if the designation of critical habitat supports non-VESL species through the conservation of habitat may reveal that the VESL promotes synergies between policies. Similarly, the quantification of how VESL-listed species benefit from other policies such as Act 250, Section 248, and the Vermont Wetlands Rules may also reveal policy coherence. Although respondents did not feel that the VESL was strong in supporting habitat-related conservation objectives, this may not be a true policy gap and instead may highlight complementarity within a policy suite where different policies are meeting different conservation needs.

Finally, quantitative research could detail the forested wetlands gap which survey respondents identified across the Vermont Wetlands Rules, Act 171, and Current Use. A baseline investigation which described how many acres of forested wetlands in the state and what percent of these acres are protected would be a valuable starting point for this inquiry. It would also be valuable to determine how much land is enrolled in the Forested Wetlands ESTA subcategory and how many town plans identify forested wetlands for protection. This information could inform future policy directions and enhance outreach efforts for each policy.

Further Policy-related research

The Vermont Wildlife Policy Gap survey could motivate a variety of future qualitative investigations and policy-related research. First, the survey could be expanded to investigate a broader reach of vertical and horizontal policy coherence. The survey had minimal vertical policy coherence application as it dealt primarily with state-level policies and one state-level policy with local implications (Act 171). Additionally, the survey had limited horizontal policy coherence application as it dealt primarily with the environmental, land use, energy, telecommunication, and forestry sectors. Broader vertical coherence could be analyzed with the inclusion of federal policies in the survey (such as NEPA, the ESA, Farm Bill programs, and others). Broader horizontal coherence could also be analyzed with the inclusion of policies which related to the agricultural and transportation sectors in the survey (such as the Required Agricultural Practices, Vermont's Long Range Transportation Plan, and others). The policy gaps and key themes identified in the survey also necessitate further research in policy solutions.

A study of funding mechanisms to address capacity-related gaps in the implementation of Act 250, Section 248, the VESL, and Act 171 could inform future policy development. Investigation of the innovative conservation funding policies in Colorado, Arkansas, Texas, and other states may inspire Vermont policymakers to adapt these models to meet conservation funding needs in the state. Research on incentive-based conservation programs could inform the modification of the VESL and improve the critical habitat designation program. Research on the improvement and adaptation of the popular nonregulatory policies—Act 171 and Current Use—could result in improved conservation outcomes.

Finally, I plan to further characterize conservation professionals' perceptions of Act 250, Act 171, and Current Use, particularly regarding forestland habitat conservation. The Vermont Wildlife Policy Gap Survey provided a unique comparison of three different policy implementation approaches including: a regulatory policy that controls the amount of subdivision and development (Act 250), a capacity-building planning policy that encourages adoption of innovative planning approaches (Act 171), and an incentive-based inducement policy that offers positive payoffs to encourage participation in a policy-preferred activity (Current Use) (Schneider and Ingram 1990). Conservation professionals' conclusions about the successes and failures of each policy implementation approach may have broader implications for forestland habitat conservation beyond the state of Vermont. It is my goal to ultimately publish research on this topic in a peer-reviewed scientific journal.

Appendix I. Vermont Environmental Policies

Table 3. Vermont Environmental Policy Table

The table displays each of the six policies reviewed for the policy review and briefly describes the party primarily responsible for implementing the policy (commitment), the content of the policy which is most relevant to wildlife conservation goals in Vermont, and the year when the policy was enacted.

Statute	Year Enacted	Primary Implementing Party	Content
Act 250	1970	Vermont Natural Resources Board	Criterion 8A: development or subdivision shall not destroy/imperil necessary wildlife habitat or endangered species habitat
Section 248	1969	Vermont Public Utilities Commission	Due consideration given to Act 250 Criterion 8A before permitting the construction of energy generation, energy storage, energy transmission, and telecommunication facilities
Vermont Endangered Species Law	1972	Vermont Fish and Wildlife Department	Prohibits ‘take’ of threatened or endangered (T/E) species, and authorizes T/E critical habitat designation and recovery planning
Vermont Wetlands Rules	1990	Vermont Department of Environmental Conservation	Lays out criteria for determination of a wetlands significant and requires a permit for any construction or activity in a significant wetland
Act 171	2016	Municipal/Regional Planning Bodies	Requires municipal and regional planning for the maintenance and improvement of forest blocks and habitat connectors
Current Use	1978	Vermont Department of Forests, Parks, and Recreation	Tax equity program for landowners who practice long-term forest management, enrolled land appraised for property taxes based on its value for forestry

Appendix II. VESL Species Recovery Plans

Table 4. VESL Species Recovery Plans Table

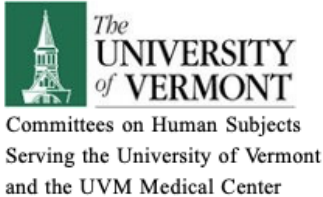
The table displays the 14 wildlife and fish species in Vermont which currently have recovery plans as described under 10 V.S.A. §5405, and lists the taxonomic class and state conservation status of each species. It is important to note that several grassland bird species share a recovery plan. Additionally, species with a recovery plan, including the bald eagle, Peregrine falcon, common loon, and osprey, were all recently removed from the VESL list (Vermont Agency of Natural Resources 2022).

Species	Taxonomic Class	Conservation Status	Recovery Plan
Lake Sturgeon (<i>Acipenser fulvescens</i>)	Cartilaginous Fish	Endangered; High Priority Fish Species of Greatest Conservation Need	Lake Champlain Lake Sturgeon Recovery Plan (2016)
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Bird	High Priority Bird Species of Greatest Conservation Need (delisted from Vermont threatened/ endangered species list)	Vermont Bald Eagle Recovery Plan (2010)
Common Loon (<i>Gavia immer</i>)	Bird	Medium Priority Bird Species of Greatest Conservation Need	Vermont Common Loon Recovery Plan (1998)
Common Tern (<i>Sterna hirundo</i>)	Bird	Endangered; High Priority Bird Species of Greatest Conservation Need	Vermont Common Tern Recovery Plan (1996)
Upland Sandpiper (<i>Bartramia longicauda</i>)	Bird	Endangered; High Priority Bird Species of Greatest Conservation Need	Vermont Grassland Bird Management and Recovery Plan (2014)
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	Bird	Threatened; High Priority Bird Species of Greatest Conservation Need	Vermont Grassland Bird Management and Recovery Plan (2014)
Sedge Wren (<i>Cistothorus stellaris</i>)	Bird	Endangered; High Priority Bird Species of Greatest Conservation Need	Vermont Grassland Bird Management and Recovery Plan (2014)
Henslow's Sparrow (<i>Centronyx henslowii</i>)	Bird	Endangered	Vermont Grassland Bird Management and Recovery Plan (2014)

Osprey (<i>Pandion haliaetus</i>)	Bird	None (delisted from Vermont threatened/endangered species list)	Vermont Osprey Recovery Plan (1997)
Peregrine Falcon (<i>Falco peregrinus</i>)	Bird	None (delisted from Vermont threatened/endangered species list)	Vermont Peregrine Falcon Recovery Plan (2000)
Eastern Spiny Softshell Turtle (<i>Apalone spinifera</i>)	Reptile	Threatened; High Priority Reptile Species of Greatest Conservation Need	Vermont Eastern Spiny Softshell Turtle Recovery Plan (2009)
Spotted Turtle (<i>Clemmys guttata</i>)	Reptile	Endangered; High Priority Reptile Species of Greatest Conservation Need	Vermont Spotted Turtle Recovery Plan (2019)
Spruce Grouse (<i>Falcipennis canadensis</i>)	Bird	Endangered; High Priority Bird Species of Greatest Conservation Need	Vermont Spruce Grouse Recovery Plan (2012)
Timber Rattlesnake (<i>Crotalus horridus</i>)	Reptile	Endangered; High Priority Reptile Species of Greatest Conservation Need	Vermont Timber Rattlesnake Recovery Plan (2015)

Appendix III. University of Vermont Institutional Review Board Exemption Certification

The following document was issued by the University of Vermont Research Protections Office certifying an exemption from Institutional Review Board review for the Vermont Wildlife Policy Gap Survey. The methodologies and assurance of respondent anonymity qualified the survey for a (2)(ii) exemption from review.



RESEARCH PROTECTIONS OFFICE
213 Waterman Building
85 South Prospect Street
Burlington, Vermont 05405
(802) 656-5040
{ [HYPERLINK "http://www.uvm.edu/rpo"](http://www.uvm.edu/rpo) }

Exemption Certification - Initial

To: Matt Lacey
From: Sarah Wright, Research Review Analyst
Approved Date: October 8, 2021
Study#: CHRBS (Behavioral): STUDY00001752
Study Title: Policy Gap Analysis of Wildlife Conservation Laws and Regulatory Structures in Vermont
Sponsor: Internal Funding
Finalized Documents: Exempt Form ; Information Sheet ; Research and Data Management Plan ; Respondent Email ; Survey ;



Note Regarding Conduct of Human Subjects Research During the COVID-19 Pandemic:
Please refer to the institution's { [HYPERLINK "https://www.uvm.edu/rpo/covid-19-information-rpo"](https://www.uvm.edu/rpo/covid-19-information-rpo) } to determine what research activities are currently allowed.

The study referenced above was reviewed by the Chair of the IRB (or an authorized designee) using the exempt procedures set forth under 45 CFR 46.104. While the project is exempt from IRB review, it is required that researchers follow all human subject protection regulations and notify the IRB of any problems that arise during the conduct of the project.

Exemption Category: (2)(ii) Tests, surveys, interviews, or observation (low risk)

(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:
(ii) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation

•Waiver of Documentation of Consent under 46.117(c)(1)

This determination applies only to the activities described in this IRB submission and will no longer apply should any changes be made. If changes are necessary, please submit a modification for consideration of a continued exemption.

Appendix IV. Vermont Wildlife Policy Gap Survey Information Sheet

The following document was developed by the researchers to provide potential survey respondents with adequate information regarding the Vermont Wildlife Policy Gap Survey and survey methodologies. The document was reviewed by the by the University of Vermont Research Protections Office before it was distributed with a link to the survey to 63 conservation professionals in Vermont.

Research Information Sheet

Title of Study: Policy Gap Analysis of Wildlife Conservation Laws and Regulatory Structures in Vermont

Principal Investigator (PI): Matt Lacey

Faculty Sponsor: Dr. James Murdoch

Funder: Rubenstein School of Environment and Natural Resources

Introduction

You are being invited to take part in this research study because you are a conservation professional in the state of Vermont with an expertise in wildlife conservation and/or wildlife conservation policy. This study is being conducted by Matt Lacey at the University of Vermont.

Purpose

The goal of this study is to identify the gaps in the suite of conservation policies and assess the impacts of those gaps on the management and conservation needs of wildlife in Vermont.

Study Procedures

If you take part in the study, you will be asked to provide input on how well state environmental policies in Vermont meet various conservation-related objectives.

You will be asked to complete several matrix tables for each of the 6 selected laws and then you will be granted the opportunity to provide additional feedback through a set of fill-in-the-blank questions.

Each matrix includes the same list conservation-related objectives. These objectives were drawn from the statutes under review for this research and from preliminary review of wildlife conservation policies in Vermont. You will be asked to describe the relationship between a given law and the accomplishment of the listed conservation objectives. Relationships will be described as either 'unknown', 'very weak', 'weak',

'neutral', 'strong', or 'very strong'. This information will inform a policy gap analysis used to identify what conservation objectives are not currently being met by our existing suite of conservation policies. In the final set of fill-in-the-blank questions you will have the opportunity to provide additional feedback on policy gaps and potential policy solutions to address those gaps.

The questionnaire should take less than twenty-five minutes and there will be no further tasks required of participants in the research study.

Benefits

As a participant in this research study, there may not be any direct benefit for you; however, information from this study may benefit other people now or in the future.

Risks

We will not collect any information that will identify you to protect your confidentiality.

Costs

There will be no costs to you for participation in this research study.

Compensation

You will not be paid for taking part in this study.

Confidentiality

All information collected about you during the course of this study will be stored without any identifiers. No one will be able to match you to your answers.

Please note that email communication is neither private nor secure. Though we are taking precautions to protect your privacy, you should be aware that information sent through e-mail could be read by a third party.

Information collected will be stored on a password-protected computer in a secure location. Only the project PI and faculty sponsor will have access to survey responses. Survey responses will be deleted after analysis or stored for no longer than two years. Survey participants will be notified of any publications or presentations related to the research study.

Voluntary Participation/Withdrawal

Taking part in this study is voluntary. You are free to mark any questions as 'unknown', or withdraw from the survey at any time. For any demographic questions you may mark 'prefer not to say'. You may choose not to take part in this study, or if you decide to take part, you can change your mind later and withdraw from the study. Information is de-identified at the time of collection and therefore your data cannot be removed from the study once you have submitted your response.

Questions

If you have any questions about this study now or in the future, you may contact me, Matt Lacey, at the following email address Matthew.Lacey@uvm.edu. If you have questions or concerns about your rights as a research participant, then you may contact the Director of the Research Protections Office at (802) 656-5040.

It is recommended you print this information sheet for your records before continuing.

Appendix V. Vermont Wildlife Policy Gap Survey Respondent Email

The following email was distributed to 63 conservation professionals in Vermont along with a customized link to the Vermont Wildlife Policy Gap Survey through Qualtrics and the Vermont Wildlife Policy Gap Survey Information Sheet. The email was sent individually to each conservation professional on October 19th, 2021.

Hello,

My name is Matt Lacey, and I am a graduate student in the Rubenstein School of the Environment and Natural Resources at the University of Vermont. For my graduate research project, I am conducting a policy gap analysis of wildlife conservation policies in Vermont. As a part of my research, I have designed the survey attached below. I will use the survey to identify gaps in Vermont's current suite of environmental policies and assess the impacts of those gaps on the management and conservation needs of wildlife in the state. You are being invited to take part in this survey because you are a conservation professional in the state of Vermont with an expertise in wildlife conservation and/or wildlife conservation policy. Each respondent will receive an individualized survey link and we ask that you **please do not share your survey link**.

If you take part in the study, you will be asked to provide input on how well state environmental policies in Vermont meet various conservation-related objectives. These objectives were drawn from the statutes under review for this research and from a preliminary review of wildlife conservation policies in Vermont. You will be asked to complete a set of matrix tables for each of the six selected policies and will then be granted the opportunity to provide additional feedback through a series of fill-in-the-blank questions. The laws under review include: Act 250, Section 248, the Vermont Wetland Rules, the Vermont Endangered Species Law, Current Use, and Act 171. **The questionnaire should take less than thirty minutes and there will be no further tasks required of participants in the research study.** Further details will be provided in the opening page of the survey.

Taking part in this study is voluntary. We recognize that not everyone will be a subject matter expert in each of the 6 selected policies and we appreciate any feedback you are able to provide. You are free to mark any questions as 'unknown' or withdraw from the survey at any time. Demographic information is only being collected to describe the survey sample. There will be no analysis related to demographic information and any demographic information reported will remain anonymous. If you are not comfortable reporting demographic information, please feel free to select 'prefer not to say' for the questions in that section. Additionally, in order to maintain anonymity, all information collected during the course of this study will be stored without any identifiers.

We would appreciate your participation in this research and ask that you if you choose to participate, **please complete the survey in the next three weeks, by Tuesday, November 9th**. Reminders for survey completion will be sent weekly to all respondents until the deadline.

Thank you for your consideration and any feedback you can provide through the survey! If you have any questions don't hesitate to reach out to myself, the principal investigator at Matthew.Lacey@uvm.edu, or to Dr. James Murdoch, the faculty sponsor of the research. To maintain anonymity, we ask that you **please do not respond to this email** and reach out individually if you have any questions.

Best regards,

Matt

Appendix VI. Conservation Objectives

Table 5. Conservation Objectives.

The table displays the list of researcher-generated conservation objectives for the Vermont Wildlife Policy Gap Survey conservation objectives section. Many of the objectives come directly from statutory language referenced in the table, while others may come from agency-issued guidance associated with relevant statutes.

Law	Reference	Statutory Language	Conservation Objectives
Act 250	10 V.S.A. § 6086(a)(8)(A)	Before granting a permit, the District Commission shall find that the subdivision or development: Will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics, historic sites, or rare and irreplaceable natural areas. Necessary wildlife habitat and endangered species. A permit will not be granted if it is demonstrated by any party opposing the applicant that a development or subdivision will destroy or significantly imperil necessary wildlife habitat or any endangered species.	Prevent destruction or significant imperilment of necessary wildlife habitat.
	Additionally: 30 V.S.A. § 248 & § 248a		
	10 V.S.A. § 6086(a)(8)(A)		Prevent undue adverse effects on the natural environment.
	10 V.S.A. § 6086(a)(8)(A)		Preserve rare and irreplaceable natural areas.
	Review and Mitigation of Impacts to Significant Black Bear Habitat in Vermont		Prevent destruction or significant imperilment of significant black bear habitat.
	Guidelines for Review and Mitigation of		Prevent destruction or significant imperilment of

	Impact to White-Tailed Deer Review and Minimization of Impacts to Bats from Wind Energy Facilities		significant white-tailed deer winter habitat. Prevent destruction or significant imperilment of significant bat habitat.
Section 248	30 V.S.A. § 248(b)(1)	(b) Before the Public Utility Commission issues a certificate of public good as required under subsection (a) of this section, it shall find that the purchase, investment, or construction: (1) With respect to an in-state facility, will not unduly interfere with the orderly development of the region with due consideration having been given to the recommendations of the municipal and regional planning commissions, the recommendations of the municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality.	Support land conservation measures in regional and/or municipal plans.
Vermont Endangered Species Law	10 V.S.A. § 5403	Except as authorized under this chapter, a person shall not: (1) take, possess, or transport wildlife or wild plants that are members of a threatened or endangered species; or (2) destroy or adversely impact critical habitat. (b) Any person who takes a threatened or endangered species shall report the taking to the Secretary. (c) The Secretary may, with advice of the Endangered	Prevent destruction or significant imperilment of endangered species

		Species Committee and after the consultation required under subsection 5408(e) of this section, adopt rules for the protection, conservation, or recovery of endangered and threatened species.	
	10 V.S.A. § 5403		Preserve areas with rare, threatened, and endangered species.
	10 V.S.A. § 5402a(a)	(a) Except as provided for under subsection (f) of this section, the Secretary may, after the consultation required under subsection 5408(e) of this section, adopt or amend by rule a critical habitat designation list for threatened or endangered species. Critical habitat may be designated in any part of the State. The Secretary shall not be required to designate critical habitat for every State-listed threatened or endangered species. When the Secretary designates critical habitat, the Secretary shall identify the species for which the designation is made, including its most recently accepted genus and species names and, if available, its common name.	Conserve designated critical habitat of threatened or endangered species.
Vermont Wetland Rules	Vermont Wetland Rules (2020): Section 1	It is the policy of the State of Vermont to identify and protect significant wetlands and the values and functions which they serve in such a manner that the goal of no net loss of such wetlands and their functions is achieved.	Prevent net loss of wetlands and wetland functions.
	Vermont Wetland Rules (2020):	Wetlands that support a significant number of breeding waterfowl,	Protect significant wetlands that serve

Subsection 5.4 Wildlife Habitat	including all species of ducks, geese and swans, or broods of waterfowl or that provide important habitat for other wildlife and migratory birds are significant wetlands. Wetlands that provide wildlife habitat are extremely diverse and range from small isolated wetlands to large forested swamps.	as waterfowl habitat.
Vermont Wetland Rules (2020): Subsection 5.4 Wildlife Habitat Vermont Wetland Rules (2020): Subsection 5.4 Wildlife Habitat		Protect significant wetlands that serve as nongame, migratory bird habitat. Protect significant wetlands that serve as habitat for white-tailed deer, black bear, bobcat, moose, muskrat, otters, and/or mink.
Vermont Wetland Rules (2020): Subsection 5.5 Exemplary Wetland Natural Community	Wetlands that make an important contribution to Vermont's natural heritage are significant wetlands. These include wetlands that are identified as high quality examples of one of Vermont's recognized natural community types. There are over forty wetland natural community types recognized in Vermont by the Nongame and Natural Heritage Inventory of the Vermont Fish and Wildlife Department.	Protect exemplary wetland natural communities.
Vermont Wetland Rules (2020): Subsection 5.6 Rare, Threatened, and	Wetlands that contain rare, threatened, or endangered species of plants or animals are significant wetlands.	Protect significant wetlands that serve as rare, threatened, or endangered wildlife habitat.

Endangered Species Habitat		
Act 171	<p>24 V.S.A. § 4382</p> <p>See also: 24 V.S.A. § 4302 24 V.S.A. § 4348</p> <p>24 V.S.A. § 4382</p> <p>24 V.S.A. § 4382</p>	<p>(a) A plan for a municipality... shall include the following:</p> <p>(2) A land use plan, which shall consist of a map and statement of present and prospective land uses, that:</p> <p>(A) Indicates those areas proposed... for the maintenance of forest blocks, wildlife habitat, and habitat connectors; or for other conservation purposes.</p> <p>(D) Indicates those areas that are important as forest blocks and habitat connectors and plans for land development in those areas to minimize forest fragmentation and promote the health, viability, and ecological function of forests.</p> <p>Maintain and improve forestland wildlife habitat.</p> <p>Maintain and improve forest blocks.</p> <p>Maintain and improve habitat connectors.</p> <p>Minimize forest fragmentation.</p>
Other	<p>Conservation objectives drafted by the research team.</p>	<p>Support landscape-level conservation goals beyond the project-level scope.</p> <p>Contribute to climate change resiliency.</p> <p>Contribute to climate change mitigation.</p>

Glossary of Acronyms

ANR: Vermont Agency of Natural Resources
BED: Burlington Electric Department
BLSG: Brandon-Leicester-Salisbury-Goshen-Pittsford Insect Control District
CPG: Certificate of Public Good, Section 248 project approval
CRP: Conservation Reserve Program, Farm Bill conservation incentive program
CWP: Community Wildlife Program of the Vermont Fish and Wildlife Department
DEC: Vermont Department of Environmental Conservation
ESA: Federal Endangered Species Act
ESC: Endangered Species Committee, as described in the Vermont Endangered Species Law
EQIP: Environmental Quality Incentives Program, Farm Bill conservation incentive Program
ESTA: Ecologically Significant Treatment Area enrollment category for Current Use
EU: European Union
NEPA: National Environmental Policy Act
NRB: Vermont Natural Resources Board
PSB: Public Service Board of Vermont, now the Vermont Public Utility Commission
PUC: Vermont Public Utility Commission, formerly the Public Service Board of Vermont
RTE: Rare, Threatened, or Endangered Species
SGCN: Species of Greatest Conservation Need, as identified in a state Wildlife Action Plan
SWG: State Wildlife Grant Program, federal grant administration program for state fish and wildlife agencies
USDA: United States Department of Agriculture
UVA: Vermont Use Value Appraisal Program or Current Use
VAPDA: Vermont Association of Planning and Development Agencies
VDFPR: Vermont Department of Forest, Parks, and Recreation
VESL: Vermont Endangered Species Law
VFWD: Vermont Fish and Wildlife Department, the Department
VHCB: Vermont Housing and Conservation Board
VLS: Vermont Law School
VNHI: Vermont Natural Heritage Inventory of the Vermont Fish and Wildlife Department Wildlife Diversity Program
VNRC: Vermont Natural Resources Council
VWR: Vermont Wetlands Rules, the Rules
VWRB: Vermont Water Resources Board, former administrator of the Vermont Wetland
WMSD: Watershed Management Division of the Vermont Department of Environmental Conservation
VWSI: Vermont Significant Wetlands Inventory maps

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