

Vermont's Wildlife Action Plan*

November 22, 2005

Appendix C Definitions for the Problem & Strategy Categories found in the Wildlife Action Plan

Definitions of the Problem Categories	1
Definitions of Strategy Categories	7

**formally the Comprehensive Wildlife Conservation Strategy*

Appendix C: Definitions of the Problem Categories used in the Wildlife Action Plan

Element number three of the eight congressionally required elements of a Wildlife Action Plan requires that states describe the problems that may adversely affect Species of Greatest Conservation Need or their habitats and priority research and survey efforts needed to identify problems which may assist in restoration and improved conservation of these species and habitats. For the purposes of this report "problem" is defined as follows:

Problem: A force causing a negative impact at the species, population, habitat and landscape levels (e.g. habitat conversion, pollution, illegal pet trade). A problem can also be the lack of information or a data gap vital to the successful management of a species.

For each Species of Greatest Conservation Need in the Action Plan we identified priority problems. Priority research needed to evaluate other potential problems was also identified. Problems are detailed in short narrative descriptions in each species summary and in each habitat summary.

Each of the problems identified in the Action Plan was assigned to one of 22 categories roughly grouped into habitat-related factors and non-habitat-related factors. These categories make it possible to search our database for similar factors impacting other species. It also makes it easier to organize and create summaries for broad scale conservation planning. The problem categories were developed by the U.S. Forest Service during the current Forest Plan Revision for the Green Mountain National Forest.

The 22 categories are not mutually exclusive and problems can often logically be placed into more than one category depending on the particular stress it causes for a species or habitat. For example, a road can fragment the habitat of grassland nesting birds, cars traveling the road can squash amphibians crossing the road to mate in an adjacent stream, and salt spread on the road to prevent icing can wash into that stream impacting its population of brown trout. In this example the problems stemming from the road would be recorded in the "Habitat Fragmentation," "Impacts of Roads & Trails," and "Pollution" categories.

Problems are often species and/or habitat specific. What may negatively impact one species may benefit another. For example, if a cold water stream with a healthy brook trout population was dammed it might no longer support brook trout. That impact of the dam would be described as the "conversion of habitat" category. However, the reservoir created by the dam might make it more suitable for a warm water fish species.

Clearly life is too complex to be stuffed into any one box. Therefore it is important to read the full description of a problem affecting a species or habitat in the appropriate species or habitat summary.

Habitat-Related Problem Categories

Climate Change: Long-term changes linked to global warming and other climate issues that can lead to major changes in habitat availability (e.g., high elevation habitats), vegetative composition and location (e.g., the movement up in elevation or north in latitude, invasion by exotic pests) as well as climate variability (e.g., change in snow depth, rainfall and/or natural disturbances).

Habitat Alteration/Degradation: A lessening of the quality of a habitat by human action stopping short of complete conversion (examples include: the reduction of mast production from a forest stand, the riprapping a streambank, and significant land use changes adjacent to a habitat such as replacing a forest stands on the edge of a wetland with a housing development. In the last case, the development would be a conversion of the forest stand and, if not designed properly, could also degrade the wetland). Habitat Conversion, Habitat Fragmentation, Hydrologic Alteration, Sedimentation, Pollution and Inadequate Distribution Of Successional Stages are closely related categories.

Habitat Conversion: The complete transformation or loss of a habitat by human action (examples include: filling a wetland to create a grassy field, converting a forest into a parking lot, or damming a stream to create a reservoir). Habitat Alteration/Degradation, Habitat Fragmentation, Hydrologic Alteration, and Inadequate Distribution of Successional Stages are closely related categories.

Habitat Fragmentation: The breaking up of habitats into smaller, non-contiguous patches as a result of habitat conversion (e.g., housing, commercial development, roads, utility lines). Fragmentation can: 1) render important habitats inaccessible (such as isolating a den site from a feeding site), 2) breakdown of the metapopulation structure of a species (for example grassland butterflies, spotted salamander, and tiger beetles); and, 3) degrade remaining habitat patches through edge effects that favor edge-tolerant species such as raccoons and crows, as well as invasive exotic species that can out-compete native and rare species. The result of habitat fragmentation is often increased predation, increased mortality, reduced mobility and changes in habitat micro-climates. Habitat Alteration/Degradation, Hydrologic Alteration and The Impacts off Roads and Trails are closely related categories.

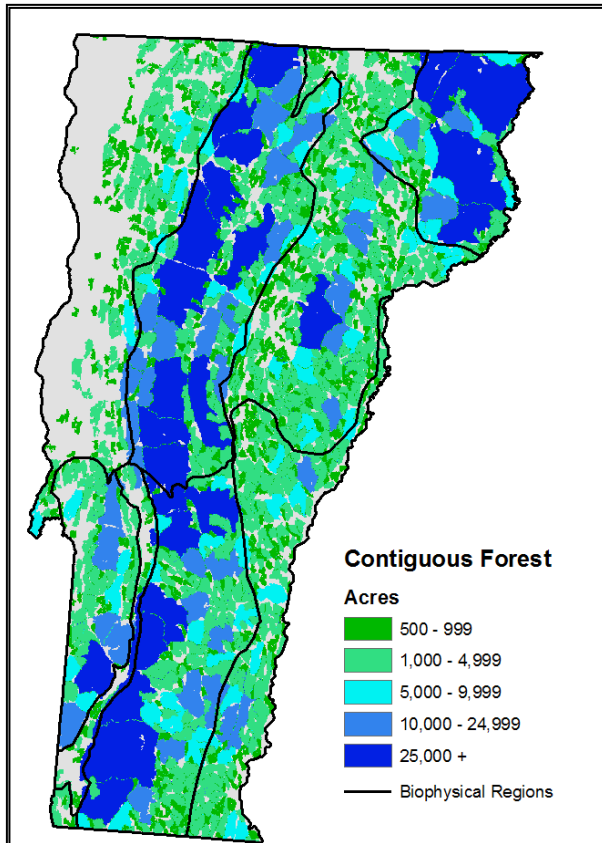
Hydrologic Alteration: Changes in the flow, periodicity or quality of a surface or subsurface water system (examples include a dam on a river preventing historic fluctuations in water level and mining activities causing a perennial seep to run dry). Dams can also increase water temperature. If warm water was identified as a problem then that problem would be placed in the pollution category. Hydrologic Alteration is a subset of Habitat Alteration but is a significant enough problem to warrant a separate category.

"But Vermont is 78% forested. How could habitat conversion, alteration or fragmentation be a problem?"

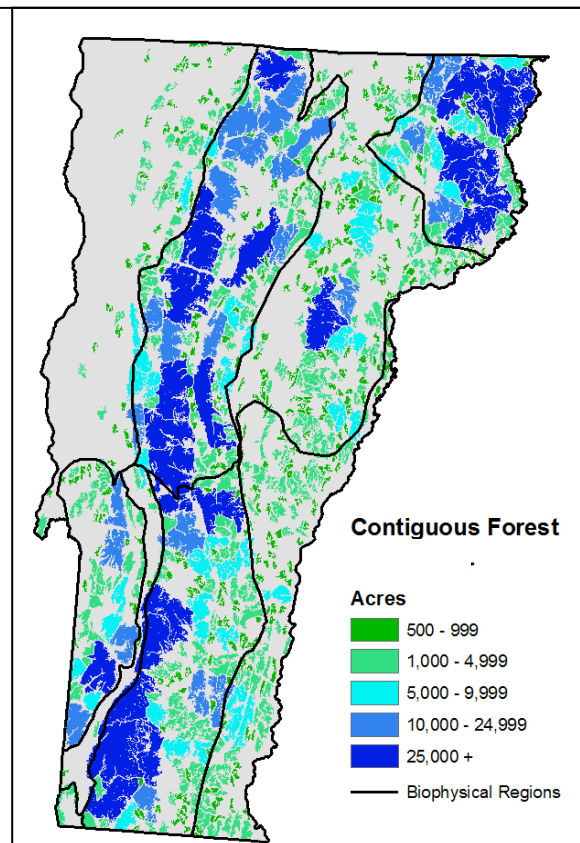
First, many Species of Greatest Conservation Need require non-forested habitat. This plan is concerned about loss and fragmentation to non-forested habitat too.

And, second, Though Vermont's forests look intact from the sky, if you peer below the canopy it's clear that 78% forested does not mean 78% unfragmented.

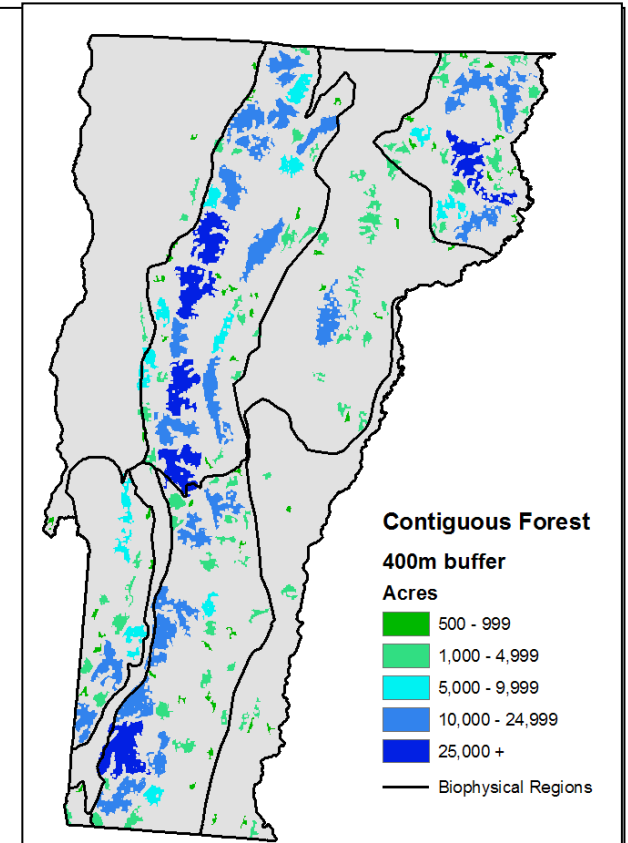
See figure 1 for details.



1-A. Forest blocks bordering developed lands



1-B. Forest blocks at least 100m from edge of developed lands



1-C. Forest blocks at least 400m from edge of developed lands

Fig 1: Vermont Contiguous Forest Blocks

Why be concerned about wildlife if Vermont is 78% forested? As these maps indicate, though forest cover is significant (map 1-A) in many cases forests are fragmented into smaller parcels with few large blocks far from development (maps 1-B, 1-C). While some wildlife species thrive in smaller parcels, large contiguous blocks provide more suitable habitat (and reduce potential conflict with humans) for Lynx, American marten, Mountain lion, Black bear, River otter, Northern goshawk, Red shouldered hawk and others. As the number and size of blocks decrease, it becomes more difficult for these species to persist.

Contiguous Forest Block refers to an area of forested land either without roads or with low densities of class IV roads, and little or no human development (buildings, parking areas, lawns, gravel pits). Contiguous forest may have various age classes of forest cover and include other habitat types such as wetlands or grasslands that are part of the overall contiguous habitat complex.

Maps depict forested habitat in blocks of at least 500 acres. Blocks include actively and passively managed forest. Source data are 1992-1993.

Impacts of Roads and Trails: Transportation corridors that bring people, disturbance, and exotics to a habitat or directly impact a Species of Greatest Conservation Need (examples include: road kill, bird species whose mating calls are drowned out by the noise of road traffic, a road corridor that speeds the spread of an exotic invasive species, poorly planned ORV or hiking trails that cause wildlife to abandon a den site). Habitat Fragmentation, habitat Alteration/Degradation and Impact of Roads & Trails are closely related categories.

Inadequate Distribution of Successional Stages: The lack of either late, mid or early successional habitat in appropriate size and/or juxtaposition (examples include ruffed grouse and woodcock which prefers early successional forest stands, American marten which prefers late-successional stands and lynx which depends on a mix of stages).

Inadequate Disturbance Regime: A disturbance regime is re-occurring process that disrupts a habitat, ecosystem, populations, and/or substrate causing significant change to a system (Picket and White). Many species have adapted to these disturbances and depend upon them to maintain habitats (examples include: the loss of beaver created wetlands, and a dam preventing the yearly flooding of floodplain forests that brings nutrients to the site and creates opening for early successional vegetation).

Invasion by Exotic Species: The introduction and spread of nuisance exotic and native species (plants and animals). These species may lead to the elimination of populations, threats to long-term stability or extirpation by out-competing a native species, displacing its food source or altering a key process or function of a habitat. Note that this category includes both exotic species and invasive native species such as cowbirds and sea lamprey. Exotic disease and parasites are addressed separately in the disease category.

Parcelization: The separation of a large parcel of land into multiple smaller parcels. Parcelization is a significant driver of habitat fragmentation (and is often driven itself by tax policy). Parcelization can make it difficult to deliver management programs or present access issues which could impede actions benefiting SGCN even when fragmentation is not a problem (e.g., when a single 800-acre parcel is broken into many smaller lots some of the new landowners may choose to post their land while others may close logging roads).

Sedimentation: Excessive inputs (in frequency and/or abundance) of solid material (inorganic or organic solid fragments) that are carried and deposited by wind, water, or ice to a water body. These materials have a negative impact on Species of Greatest Conservation Need through their physical presence (example: soils washing into a stream from a construction site and smothering fish eggs and other aquatic species that live in the spaces between rocks and gravel in a streambed). Sedimentation was broken out from the habitat alteration/degradation category because of its significant impact on aquatic species. Note: a problem that exerted a negative chemical impact on wildlife (e.g., road salt), would be listed in the Pollution category.

Non-Habitat-Related Problem Categories

Competition Where two or more species are in competition of the same limited resource (e.g., space, food, nutrients) there will be a decrease of survival, growth rate

and/or reproduction of competing individuals (for example: fisher, bobcat and coyote have overlapping habitat needs and preference for prey).

Disease: Any disease causing agent such as, fungi, bacteria and viruses (examples include: rabies, West Nile disease, whirling disease, chronic wasting disease, hemlock wooly adelgid, and sudden oak death). Diseases are often transmitted by parasites, a related problem.

Genetics: A reduction of survival or fecundity of a species due to inbreeding depression (the mating of close relatives) usually due to small and isolated populations, and outbreeding depression (the mating of different locally adapted populations). Examples include lake sturgeon and timber rattlesnake for whom inbreeding depression and genetic drift may be distinct possibilities due to small and isolated populations. Outbreeding depression can be a problem for native baitfish whose locally adapted genes may be swamped out by the accidental release of relatives taken from other waters in the state or elsewhere.

Harvest or Collection: The legal or illegal taking of biological resources (such as hunting, trapping, collecting, fishing) for commercial, recreation, subsistence, research, or management purposes (examples include: the accidental taking of spruce grouse or American marten by a hunter or trapper, illegal collection of wood turtles for sale in the pet trade, and the harvesting of eels).

Incompatible Recreation: Recreational activities (outside of established transport corridors) that directly impacts SGCN or their habitats (examples include: bird watchers that get too close to nesting common loons can cause the loons to abandon their nest, and off-road vehicles operated outside of approved areas can run through vernal pools degrading the pool and crushing spawning amphibians and their eggs) Because of the scale of impact, the construction of a golf course or ski area would be listed in Habitat Conversion or Habitat Alteration categories respectively. Incompatible Recreation is also closely related to Impacts of Roads & Trails.

Loss of Food Base or Prey Base: The disappearance of a food source important to a species' survival (examples include: lynx which feeds primarily on snowshoe hare and the whippoorwill whose primary diet of flying insects has been decreased).

Loss of Relationship with Other Species: A species whose existence depends upon another for a process, function or product (examples include the larvae of many mussel species will attach to fish and depend on these fish for dispersal). Many insects, including butterflies and moths, have specific relationships with host plants that serve as its sole food. In some cases the host plant also conveys a chemical protection to the insect.) This category differs from the Loss of Prey Base category in that there are no alternatives (e.g., lynx and whippoorwill can take other prey, monarch butterflies won't persist without milkweed to feed on and to provide chemical protection from predators).

Parasitism: A relationship between two species in which one benefits (the parasite) and the other (the host) is harmed, (Smith 1980) although not directly killed (examples include: ticks, sea lamprey parasitizing lake whitefish and lake trout). Parasites may

transmit diseases to the host therefore disease is a closely related problem. Examples include ticks transmitting Lyme disease and mosquitoes transmitting West Nile virus.

Pollution: The introduction of exotic materials (other than sediments) from point and non-point sources. This includes: chemicals and toxins such as industrial chemicals in the air, land, and water; excess nutrients from farm and municipal sewage plants; garbage and other solid waste; radioactive materials; road salt; excessive noise; excessive heat; and light pollution that disturbs animals and disrupts migration patterns. Note: Sediments were broken out from this category because of its significant impact on some water bodies. Greenhouse gasses such as carbon dioxide and methane would be covered in the Climate Change category.

Predation or Herbivory: Species or habitats negatively impacted by wildlife species that eat them (examples include: raccoons and skunks that eat wood turtle and spiny softshell turtle eggs and moose over-browsing vegetation and preventing the regeneration of a forest stand. This category differs from Competition in that competition is two or more species vying for the same specific resource, whereas predation is one species eating another.

Reproductive Traits Species whose specific reproductive strategies make it vulnerable, such as species producing very few offspring because they take a long time to reach sexual maturity and/or take a long time between reproductive events (examples include: lake sturgeon and wood turtle).

Trampling & Direct Impacts: Non-recreational, and sometimes inadvertent, negative impacts to a species (examples include the crushing of wildlife by agricultural equipment operating in a farm field, vehicles operating off-road, the killing of rattlesnakes or bats out of antipathy for the species, increased nest abandonment by brown thrashers due to the proximity of people). Impacts to a habitat would be assigned to the Habitat Degradation/Alteration and perhaps Habitat Conversion. Incompatible Recreation and Impacts of Roads & Trails are closely related categories.

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Appendix C: Definitions for Strategy Categories Used in the Wildlife Action Plan

Element number four of the eight congressionally required elements of a Wildlife Action Plan requires that states describe “conservation actions proposed to conserve the identified species and habitats and priorities for implementing such actions.”

We identified strategies to address the problems impacting each of Species of Greatest Conservation Need (SGCN) and habitats in the Action Plan. Strategies identified in the Action Plan are based on the best science available today as well as our strategic assessment of needs and priorities of all wildlife species. In the coming years, as monitoring data on SGCN and conservation actions becomes available, as priorities change, or new problems or opportunities arise, strategies may need to be revisited. Not every strategy in this report will be eligible for State Wildlife Grant funding. Furthermore, it may not be suitable, or feasible, for the VT Fish & Wildlife Department to implement some of the strategies in this report, however, some conservation partners may find them fitting and practical.

Strategies are described in the Action Plan in short narratives in each species summary and in each habitat summary. Strategies are intentionally broad, directional, and nonspecific so as not to constrain our selection of actions for implementing them. For example, a strategy such as “provide technical assistance to landowners to maintain or improve riparian habitat for Species of Greatest Conservation Need” allows for different approaches to providing that assistance and leaves the door open to a variety of providers to implement. Where strategy implementation is to be funded by the State Wildlife Grant program the approach should be consistent with the Department’s mission and strategic plan, and precise procedures will be detailed in operational plans once the Action Plan is finalized.

Vermont’s Wildlife Action Plan was designed to be a strategy for the state, not just the Fish & Wildlife Department. While the department may be responsible for implementing many of the strategies in this report, it will be Conservation partners, however, that may be the more logical and appropriate leaders for others, due to their skills and expertise, staffing, history, location, available resources and constituencies.

Each of the strategies identified in the Action Plan were assigned to one of 27 categories in six major classes. The categories were adapted from the Proposed Taxonomy of Conservation Actions (Salafsky 2005). The taxonomy was developed as a means to standardize terminology (not practices) among conservation practitioners worldwide. Many states have used these same categories to organize the strategies and actions in their Action Plan.

It should be noted that the categories are used solely for the purpose of organizing and grouping strategies developed by Action Plan teams and committees. It was not our goal to create strategies for every category. A few categories were not applicable to the species or habitats in Vermont whereas others were deemed not as effective. The categories with the greatest number of associated strategies were sections 4a, research; and 4c technical assistance.

Land/Water Protection

- a) **Creating Publicly-Owned Protected Areas:** Setting up or expanding public parks, forests and other protected areas where wildlife conservation is a primary management objective (examples include: wildlife management areas, state forests, municipal lands)
- b) **Creating Privately-Owned Protected Areas:** Setting up or expanding private reserves and other protected areas where wildlife conservation is a primary management objective (examples include: private lands managed by non-profit conservation or hunting groups)
- c) **Easements:** Setting up protection of some specific aspect of a resource on public or private lands (examples include: development rights, wild & scenic river designation)

2) Land/Water/Species Management

- a) **Protected Area Management:** Generally managing protected areas where wildlife conservation is a primary management objective (examples include: site design, training park staff, managing water levels).
- b) **Compatible Resource Use:** Promoting use of resource lands (where wildlife management is not a primary objective) to be compatible with conservation (examples include: promoting sustainable logging, grazing, fishing, hunting, farming, aquaculture, energy development, transportation infrastructure).
- c) **Invasive Species Control & Prevention:** Dealing with invasive and/or alien plants, animals, and pathogens (examples include: developing boat wash stations, pulling noxious weeds from a habitat).
- d) **Habitat Restoration:** Enhancing degraded or restoring missing habitats (examples include: clayplain forest restoration and riparian tree plantings). If a strategy specifically targets one or two species we consider it a species restoration strategy. If it specifically targets three or more species we consider it a habitat restoration strategy.
- e) **Natural Processes Restoration:** Enhancing or restoring natural ecosystem functions (examples include: prescribed burns, dam removal and restoration of historic flow regimes, fish ladders).
- f) **Species Restoration:** Enhancing or restoring specific plant and animal populations (examples include: translocating spruce grouse from Canada to Vermont, and erecting artificial nesting boxes/platforms for bluebirds and osprey.) If a strategy specifically targets one or two species we consider it a species restoration strategy. If it specifically targets three or more species we consider it a habitat restoration strategy.
- g) **Ex-Situ Conservation:** Protecting wildlife out of its native habitats (examples include: captive breeding of bald eagles and creating regional refugia for New England cottontail rabbit).

3) Law & Policy

- a) **Legislation:** Making, changing, influencing, or providing input into formal legislation at all levels: international, national, state/provincial, local (examples include: lobbying to make the State Wildlife Grant program permanent, addressing greenhouse gas emissions).

- b) **Policy & Regulations:** Making, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels: international, national, state/provincial, local (examples include: providing data to policy makers, development of wildlife harvest regulations).
- c) **Planning & Zoning:** Developing, changing, influencing, or providing input into plans governing natural resource use and allocation (examples include: municipal zoning, public or private management plans for ecoregions, sites, habitats, or species, commenting on zoning plans, developing a town ordinance).
- d) **Standards:** Setting, changing, influencing, or providing input into voluntary standards that govern practices (examples include: best management practices for forestry, habitat guidelines for state lands).
- e) **Compliance & Enforcement:** Monitoring and enforcing compliance with laws, policies & regulations, plans, and standards (examples include: water quality standard monitoring, enforcement of ATV regulations).

4) **Research, Education & Awareness**

- a) **Research:** Conducting and disseminating research to improve knowledge about conservation issues (examples include: conducting inventories for SGCN, developing habitat maps, demonstration projects for sustainable forestry)
- b) **Technical Assistance, Training, Workshops:** Enhancing knowledge, skills and information exchange for practitioners, landowners, stakeholders, and other relevant individuals in structured settings outside of degree programs (examples include: providing technical assistance to landowners, monitoring workshops, conferences, learning networks)
- c) **Lifelong Learning:** Enhancing knowledge and skills of practitioners, stakeholders, and other relevant individuals through non-structured means (examples include: writing a how-to manual for landowners or towns and communities, stakeholder education on proper ORV use)
- d) **Awareness Raising and Communications:** Raising conservation awareness and providing information through various media (examples include: websites, newsletters, puppet shows, etc.)

5) **Economic & Other Incentives**

- a) **Linked Enterprises:** Developing enterprises that directly depend on natural resources as a means of influencing behaviors, attitudes, and beliefs (examples include: ecotourism, sustainable forest product harvesting).
- b) **Substitution:** Promoting products and services that substitute for environmentally damaging ones (examples include: floodplain restoration in place of dams and bank reinforcement and promoting recycling and use of recycled materials)
- c) **Financial Incentives & Market Forces:** Using market mechanisms to influence behaviors, attitudes, and beliefs (examples include: forestry certification, positive incentives, negative incentives, forest banking, valuation of ecosystem services such as flood control)

- d) **Conservation Payments:** Using direct or indirect payments to influence or reinforce behaviors, attitudes, and beliefs (examples include: landowner payment programs).
- e) **Non-Monetary Values:** Using non-market forces to change behaviors, attitudes, and beliefs (examples include: landowner/land manager recognition awards).

6) Capacity Building

- a) **Institutional Development:** Creating or providing non-financial support & capacity building for non-profits, government agencies, and for-profits (examples include: creating new local land trusts)
- b) **Alliance Development:** Forming and facilitating partnerships, alliances, and networks of organizations (examples include: Action Plan Conservation Partners, Vermont Monitoring Cooperative, Vermont Sportsmen's Federation).
- c) **Conservation Finance:** Raising and providing funds for conservation work (examples include: State Wildlife Grants small grants program, private foundations, debt-for-nature swaps).

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