

## CHAPTER 4

### LAND CONSERVATION LITERATURE REVIEWS

*New Hampshire Everlasting* is a document that was created by the Society for the Protection of New Hampshire Forests (SPNHF). The document outlines a series of goals and initiatives to conserve the quality of life that New Hampshire now offers. The overlying goal is to preserve one million acres of the state's most important land in the next twenty five years. Beneath this main goal are five sub-goals of the initiative:

- Support every community in conserving, with partners, at least twenty-five percent of its lands for a network of trails, parks, farms, and forests where people can connect with the natural world.
- Conserve our share of the world's productive forests and enhance the forest economy so the New Hampshire can sustainably help supply the equivalent of what its residents consume.
- Conserve enough habitat to sustain healthy ecosystems and ensure the survival of existing native species in each region of the state.
- Sustain drinking water supplies and healthy aquatic ecosystems by conserving upland buffers along shorelines and lands that feed water to existing and future public water supplies.
- Conserve the most productive agriculture land and invest in the evolving agricultural economy so that people in every community have the opportunity to grow healthy food and the state can sustain at least its current level of food production.

To learn about land conservation, the students studied the land conservation approaches of a variety of conservation minded groups from around the state including New Hampshire Audubon, The Nature Conservancy (TNC), and the Society for the Protection of New Hampshire Forests (SPNHF). Working with the Ausbon Sargent Land Preservation Trust (ASLPT), the students were able to help monitor many of the conservation easements in the area, learning first hand about conservation in the ASLPT region. Finally, to gain a broader perspective on conservation, the class read a text by Richard Brewer titled, *Conservancy, the land trust movement in America*.

The students completed their study of land conservation by completing literature reviews on the five conservation goals of *New Hampshire Everlasting*:

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New Hampshire is a state that is privileged to be covered in healthy forests, rivers, streams, and mountains. It is for these reasons that the Society for the Protection of New Hampshire Forests created *New Hampshire Everlasting*, a document that outlines a series of goals and initiatives to conserve the quality of life that New Hampshire now offers. The overlying goal is to preserve one million acres of the state's most important land in the next twenty five years (SPNHF). If this can be done SPNHF believes that their goal of preserving the state's quality of life will be accomplished. This first listed goal of *New Hampshire Everlasting* is to conserve lands that support our quality of life, and within the explanation of this there are different means of recreation touched upon, including parks and trails.

One way to think about the importance of trails is to consider the elements of trails. This literature review will cover several critical dimensions of parks and trails. In the book *With People in Mind*, the authors use a different technique to explain certain ideas of managing and designing environmental areas. In the seventh chapter of the book the authors address "Trails and Locomotion" by first explaining the appeal of trails to the general public, and second breaking down and explaining the elements of a trail. The first intriguing aspect of a nature trail to the public is that the trail allows an individual to venture into nature and use their sense of observation and exploration, while at the same time providing a sense of security to the explorer who would feel overwhelmed wandering in a forest with no trails, or direction. The authors even address the people who feel they do not have the time to enjoy nature, and perhaps these people could benefit from the trails by using them to get to and from work (Kaplan, 89). To further explain and understand how to create and manage a trail the author divides trails into five different categories:

- Trails, narrow and curving
- Views, large and small
- The trail surface
- The trails path
- Points of interest

Trails, narrow and curving: studies have shown that because of the user's sense of mystery, it is preferred that a trail be curved in such a manner that the user cannot see beyond the bend of the trail. However these bends should follow the lay of the land in order to preserve the natural characteristics of the area (Kaplan, 91). The width of the trail equally affects the user's experience. Although a wider trail allows for easier maintenance, humans will distance themselves further from nature mentally, the further from nature they are physically (Kaplan, 91).

Views, large and small: A trail that bisects a large open field is going to be equally as un-pleasing as a trail that cuts through a dense forest, both scenarios lack some sort of view. What is preferred for a trail would be a combination of the two scenes, open, and wooded areas (Kaplan, 93). Sensitive areas are common hot spots and provide nice viewing areas for the trail users. These spots can be protected by designating certain areas as viewing areas on the trail and will minimize the travel all over the area (Kaplan, 93).

The trail surface: The trail surfaces are important for both physical and visual reasons. Your average trail is preferred to have a somewhat soft surface, however in some situations hard surfaces are required. A nice alternative to a natural or hardtop surface is a board walk. Boardwalks provide a surface in fragile and otherwise non-navigable areas such as a wet land or swamp (Kaplan, 94).

The trails path: The most important aspect of the trails path is to help maintain the user's orientation. In order to contribute to the users way-finding, visual access points and landmarks should be visible from the trail. Trail systems are also another way to entice the user, as long as there are visible landmarks and the user is not afraid of becoming lost while on the trail system (Kaplan, 95).

Points of interest: the last category that the authors use to explain a trail is also one of the most important because it not only provides an area to observe, but also to rest along the trail. The trails that do provide access to these viewing points are much more valued to the users than trails that do not. Along trails benches are usually placed near areas that may be of interest or perhaps just areas where users may need to take a break. These benches can be used to sit and have a snack, observe the wildlife, or just take a break from exercise (Kaplan, 97).

Trails however do not have to be limited to just paths on land created to provide recreation to the user. In an article titled, *Blueways and Greenways, Connecting Communities*, the author writes about Americas Trail Network, and the slow, but significant expansion of it with the help of a little known sub-program of the National Parks Service called, Rivers, Trails, and Conservation Assistance Program (RTCA) (Dolesh). The RTCA is a non-profit organization designed for local governments with as little as 100 staff positions, however the program is still able to help local governments assist over 250 communities conserve more than 750 miles of river, 1500 miles of trails, and almost 100,000 acres of open space (Dolesh).

The first success story the author talks about is a blueway located on the Monongahela River in Pennsylvania. A blueway is different from a greenway because it is a path created along some sort of body of water. The water trail that was created allowed its users to enjoy the river on canoes, kayaks, and motor boats while proceeding sixty-five miles up the river and crossing into the state of West Virginia. The trip takes the users through a series of locks and dams that were once used to transport huge ferries transporting coal from the mines. Many years later the river is once again bringing a source of income into the area, however this time rather than degrading the environment with mining and coal extraction, the new blueway is bringing tourism into the area, as well as utilizing its pleasant river (Dolesh). Future plans to the blue way include possible interactions with a local greenway that would include a park on the river with docks, and trail heads into the greenway (Dolesh).

In the southeast the RTCA is currently working with local governments in Knoxville Tennessee and Asheville North Carolina to develop a one hundred mile water trail along the French Broad River (Dolesh). The long term goal of the project is to, in time connect greenways to both sides of the river creating river to land connections, define recreation access points, and to enhance the blue way itself (Dolesh). This project will require extensive mapping tools and skills that will be provided with the combination of skills between the Environmental Protection Agency (EPA) and the Tennessee

Department of Transportation using Geographic Information Systems (GIS) data and two different mapping systems (Dolesh).

In Florida another very extensive trail building project is going on utilizing the historic bridges and trail of the Florida East Coast Oversea Railroad. When finished this project will repair and rebuild many bridges that will provide a dry trail from Key Largo to Key West (Dolesh). This project is littered with set backs however, including a very long trail corridor, significantly deteriorated infrastructure, and damaged or missing bridges. However with the help of the local and federal government, as well as the RTCA the end of the project may be in sight. One of the planners for the project describes it as: “Will be a 106 mile long continuous trail from Key Largo to Key West. There will be new connections made to existing trail segments to complete the project. The trail will have Kiosks, interpretive sites, over looks, and there will be interpretation of Florida history and culture, including archeology” (Dolesh).

Within the first goal set by *New Hampshire Everlasting* not only trails are mentioned to preserve the quality of life in New Hampshire, but also the parks that the trails fall within. One of The National Recreation and Park Association’s (NRPA) main goals is to conserve the cultural and natural resources that our nation provides (Jarvis). However NRPA does not only preserve for preservation alone, they also bring people into their perspective. Conservation is for the enjoyment of the people, and it should be enjoyed in a manor that leaves the area untouched, however still brings enjoyment to the observer. The public use is of equal importance as the conservation priorities (Jarvis). The NRPA also feel that there is the right place for every legal recreational activity, however not every activity in every place. The key focusing point of this article is on how these parks and trails that cover our nation have acted as a security blanket for the nation during tough times. “At times of great stress and universal crisis, Americans flock to their public parks in huge numbers, especially close to home or when they can be reached as a day trip” (Jarvis). The parks provide peaceful, compassionate socialization as well as stress relief provided by the recreational attributes to the parks, thus emphasizing the role that the parks and trails play in Americans quality of life (Jarvis).

One very important person in the creation of our national parks was Morris K. Udall, a United States Representative who passed away recently. Udall dedicated much of his political life towards resource conservation and recreation access (Tindall). One of Udall’s most significant accomplishments was the passage of the Alaska Land Conservation Act in 1980. After an eight year battle, Udall, along with other representatives were able to set aside more then 100 million acres of Alaska for parks, refuges, and preserves. In 1988 the National Recreation and Parks Association presented Udall with their National Congressional Award, in honor of his ongoing support for parks and recreation (Tindall).

Today federal and local governments are still just as interested if not more interested in conserving land. Recently 257,000 acres of land in the Adirondacks was acquired for the Adirondack Park. This lot of land will become the largest land conservation project with in New York’s history, covering a larger plot of land than New York City itself (Adirondack Park Lands Expand Further). During an earth day celebration New York’s governor said, “ More then 100 years ago, the people of New York state had the foresight to create the Adirondack Park to ensure the preservation of

these environmentally significant lands for our benefit, and that of future generations” (Adirondack Park Lands Expand Further). The governor continued to say how he was proud to be part of a state that was building on that legacy. The transaction of the land should be complete by 2006, after the state of New York pays fair market value for the land being purchased and the conservation easements.

Growing up in an area where trails and recreation are an essential part of life, and the economy, I would agree that preserving the recreational aspects of New Hampshire contribute to preserving New Hampshire’s quality-of-life. Trails provide a place to get away from the everyday bores of life and give you a way to relax. And furthermore, in New Hampshire the trails combined with the views they provide leave their users understanding how important trails and recreation are to the state.

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Forestry is the management of forest lands. Forest lands are managed through cultivating, maintaining, and developing forests. The United States Department of Agriculture: Forest Service (USDA) is one of the major federal land managing agencies. The Forest Service is also the largest forestry research organization in the world and the national and international leader in conservation of the forests. This agency has been operating with the Department of Agriculture since 1905. They are operating in forty-three states and they manage some 191 million acres of land. The Forest Service Organic Act of 1897 and the Multiple-Use Sustained-Yield Act of 1960 are the guidelines the Forest Service follows to manage these lands (Forest Service Planning). The research and development branch is comprised of four different areas: resource valuation and use of research; science policy, planning, inventory and information; vegetation management and protection research; wildlife, fish, water, and air research (USDA).

Resource valuation and use of research provides information on economics, forest products, urban forestry and cultural heritage, outdoor recreation, and social sciences research. The research will come up with methods which will find economically efficient management practices and strategies on both public and private land. This research creates “methods to monitor and analyze the forest products markets and consumption to economic, technological, and institutional forces, and to measure impacts on rural development and diversification,” (USDA).

Wildlife, fish, water, and air research are all components needed to be studied in order to figure out the health and sustainability of a forest. The diversity and viability of the fish and wildlife communities/populations, the water and air quality tests, and soil quality tests all have a connection in telling the quality and sustainability of a forest, rangeland, and aquatic ecosystems. Forest Service research and development provides results that are “essential to the ability to manage forests and rangelands and also helps maintain or strengthen biological diversity, and sustain air, water, and soil quality,” (USDA). By this research a greater understanding of organisms, populations, ecosystems, and ecological processes are acquired.

Vegetation management and protection research provide the scientific and technical platform for smart natural resource policies and management decisions to protect the health, diversity, and productivity, of the nation’s forest and rangelands. This platform also meets societal needs for recreation, economic stability, forest products, and helps keep an eye on the forest from fires, insects, and diseases. The forest and rangeland vegetative cover and condition help figure out the health of riparian and aquatic systems (USDA).

The New Hampshire Division of Forest and Lands’ (NHDFL) goal is responsible management of the State's forested resources; by providing forest resource information and education to the public; and the protection of these resources for the continuing benefit of the State's citizens, visitors, and forest industry. The division is comprised of six units: “the Forest Management Bureau, the Land Management Bureau, the Forest Protection Bureau, the Community Forestry and Stewardship Bureau, the Natural Heritage Bureau, and Cooperative Forestry Programs through an agreement with the University of New Hampshire Cooperative Extension,” (NHDFL).

Forest management of all state-owned woodlands, the State Forest Nursery, and the

Fox Research and Demonstration Forest are the three programs of the Forest Management Bureau. "Through these programs the bureau is charged with the forest management of woodlands under state jurisdiction, cultivation and sale of seedlings for forestry and conservation, and the research, demonstration and promotion of scientific forestry," (NHDFL). The Land Management Bureau is in charge of all land transactions for the state forest and state park system. This bureau monitors and surveys parcel boundaries, maintains land records, and figures out the land use category or all department properties. Forest law enforcement, forest fire protection and forest health management are left up to the Forest Protection Bureau. These programs serve as a base for state forestry laws to be monitored and keep the forests in check. The Community Forestry Bureau is in charge of public knowledge. This bureau conveys accurate source information, expands knowledge, and tries to motivate the general public, professional resource managers, and other resource organizations (NHDFL). The Natural Heritage Bureau is in charge of finding and providing information on New Hampshire's rare plants and ecosystems. This program works with landowners, land managers, and natural resource professionals to help maintain New Hampshire's natural heritage. The UNH Cooperative Extension Forestry & Wildlife Resources is the 6<sup>th</sup> and final unit of New Hampshire Division of Forests and Lands. This unit supports and implements a forest resource education program which provides education and information about the use and stewardship of forest lands.

There are a variety of approaches to forest management. The Journal of Environmental Planning and Management outlines a planning methodology called values suitability analysis (VSA) that joins expanded public participation with a rational, analytic framework for implementing human values into forest plan decision making. Based on spatial inventory of ecosystem values, the VSA methodology creates a numerical rating for each management prescription and ecosystem value interaction. The VSA methodology can be used to generate forest plan alternatives, or serve as a benchmark to examine other forest plan alternatives. There are ten steps in the Values Sustainability Analysis: (1) identify management areas, (2) inventory ecosystem values by area, (3) inventory range and management activities, (4) assess general activity-value compatibility, (5) identify range of management prescriptions, (6) identify mix of activities in prescriptions, (7) assess general prescription-value compatibility, (8) assess specific prescription-value compatibility by area, (9) assess alternatives by prescription by area, and (10) conduct sensitive analysis. This is a "method to operationalize and model qualitative aspects of human dimension in forest planning" (Environmental Planning & Management). Ecosystem values can be modeled on a fairly equal footing with biophysical resources. Social and economic considerations in forest planning process have been qualitative and difficult to manage in the past. VSA allows such considerations to become quantitative and explicit (Environmental Planning & Management). The VSA is still in the experimental stage but will soon one day be used to integrate social values into forest planning.

Habitat depletion is serious component of forest harvesting. There are several animals which are or will be in danger if they are not protected. *Thinning Forests Lead Missing Lynx* is an article about several environmental groups from across the country suing the United States Department of Interior Fish and Wildlife Service for refusing to list the Lynx as threatened or endangered. The environmental groups also express

concern about wolverines and fishers. They claim that the federal government is not obeying the law which is to list a species on the brink of extinction (Knickerbocker).

Finally, a local story provides insight into how good forest management combines forestry, conservation, recreation, economics and community involvement. *Once Upon A Time, A Tiny Sought To Nurture A Forest To Happily Ever After* is an article about Randolph, New Hampshire and there newly acquired forest land. There are two massive parcels of the White Mountains consisting of three separate watersheds and 10,000 acres that will be forever joined. The area around Randolph had recently been sold many times over the last ten years. The forest was becoming farther and farther away from the town due to the owners which purchased the land. Thanks to a massive private fundraising effort the Pond of Safety and this 10,00acre chunk of the North Country will be wild forever. "Creative financing and thinking in and between local, state, and federal agencies, a supporting cast of conservation organizations and outdoor organizations, and the willingness the Hancock company," (Timber Company) made it possible to save this area for the future generations. In 1998 a terrible ice storm struck this region. All the trees above 1,400' in elevation were hit with over a ½ foot of ice destroying almost all trees. The Hancock Company went through and took out valuable timber and decided to sell the rest of the land. The town of Randolph along with Jefferson, and over 200 individuals, corporations, and foundations finally purchased this land on December 27, 2000. The town of Randolph went through the forest and took all the fallen timber from the ice storm out of the woods and will see profit from the timber over some time. "This was really an effort to keep forest under local control" explained Mudge. "We want to protect the historic recreational uses. We want to make a contribution to the wood products industry. We want this land to be preserved and properly managed as a working resource in the North Country," (Nickens). Randolph is serving as a prime example for other towns across New England and the country.

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There are many factors that are key to sustainable forestry. The landholder must first ask themselves if they want to manage their land. If so, they have a number of options. They may manage for wildlife habitat, recreational or economic value. The owner must then find a strategy to manage their land. To create a sustainable forest however, the owner must be educated on what methods are needed to be good stewards. The owner must also be aware of the number of pressures that may have a negative impact on creating a sustainable forest. Development, which is the expansion of human activities in an area that was once wilderness, is a major factor concerning the loss of forest. Natural disturbances are also important into creating a plan for forestry. With the right planning, the landholder can overcome these impacts and create an environment that is physically and possibly economically beneficial for them.

Fifty-eight percent of Americas forests are held privately (Best, Wayburn). In the northeastern United States, eighty-eight percent the forested land is private (Irland 204) These lands are constantly under threat from urban sprawl, fragmentation, population growth even natural forces (Best, Wayburn). To create a plan to protect these lands we must have an understanding of where these forces are coming from. As early as the 1600's, people neglected to understand forests as a whole. Authors in this era were indeed looking at the forests however, only at the types of species in a specific area. By the 1880's Americans discovered a domestic market for forest products. It was only at the beginning of the 1900's that scientists started to apply fieldwork and statistics to the forested environment (Irland 46).

With a greater scientific understanding of forests, it has been discovered that fragmentation, which is caused by human development, is probably the greatest threat to a forested land. Economics and demographics is the leading cause of fragmentation. This consists of population growth population growth, people between the ages 35-64 who are in the working and buying period, disposable income, the strive for more living space and fact that more people are buying second homes (Best, Wayburn 98). One fourth of all private forests are owned by people age sixty-five or older. With such a large elderly population holding the forests, it is difficult for them to manage the land properly. They may sell their land to another owner or pass it on to another, younger generation. The new owners or caretakers may have opposing views and want develop the land (Best, Wayburn.)

Urban sprawl is another major factor in fragmentation. The development of major roads is fueling sprawl. In addition, the edges to urban areas are often rezoned to help push more development. This in turn pushes owners of private forests to sell their land to developers as land value rises (Best, Wayburn 102). As forested lands are developed, mills in the area close. Foresters then cannot sell off their timber so most likely will sell their land.

Human influence is not the only cause of fragmentation even though many of these natural forces are caused by human neglect. It has always been thought that fires are destructive and should be suppressed at all costs. For sixty years, the forest service has used such advertisements as Smokey the Bear to say that forest fires (now all wildfires) are bad for the environment. By suppressing fires, there is an increase in the fuel load, which leads to bigger and hotter fires (Best, Wayburn 113). This may be the

reason forest fires in the Pacific region have been particularly bad in the past years. More development intensifies the spread of invasive species that take over native species. Acid rain, global climate change and increased CO<sub>2</sub> are just some factors that are changing the growing conditions of many forests. Human influences have also increased the incidence of intense storms. Two examples of what may be human related are the many hurricanes that hit Florida in a short period and the eruption of Mount Saint Helens, both occurring in 2004.

There are typically three different reasons a landowner may want to manage their forest. The first reason for managing a forest is for recreational benefit. It is estimated that seven million acres of the northeastern forest is used for recreation (Irland 159). Historically, forest recreation has driven the need to preserve forests. Towns have benefited in the past from recreation and still do today. However, around the late 1960's many small recreational businesses such as ski resorts have been taken over by large out-of-state corporations. This has negatively changed these towns economy and social values (Irland 162). Some states have created legislation to help overcome this problem. For example, Vermont has a Land Use Control Program that assesses many factors before development of a recreational facility begins (Irland 170). This is like an Environmental Impact Assessment but also includes questions on social impacts.

Managing for wildlife habitat is another reason why owners will manage forests. Overhunting and habitat loss have caused many animals to become threatened or extinct. In the past, many people were content with the extinction of top predators as they were thought to kill livestock. However, most people accept the fact that driving animals to extinction can destroy ecosystems fragile equilibrium. Some animals that were on the edge of extinction such as the bald eagle, peregrine falcon, moose and lynx have rebounded due to intensive forest management (Irland 63). Protecting wildlife is also important to local economies as it brings hunting, fishing, birdwatching and more. People understand that every animal has its own habitat requirement and land can be managed in a way to best suit a particular animal.

The final way a landowner may look at forest management is timber harvesting. While the latter two plans may have an economic gain, timber harvesting is a large and direct value for the landowner. Harvesting timber from private forests has both positive and negative sides to it. A NonIndustrial Private Forest (NIPF) is a parcel that is less 160 acres in size. Unlike larger parcels held by logging companies, NIPF is not regulated by law for what and how much they cut except for rare or endangered species (Foster 13). This means the landowner can cut whichever trees they want to sell off. However, this also means they may choose to clearcut an entire parcel of land. Many people who do this are unaware of the destruction the ecosystem they are causing. Fortunately, most NIPF owners are educated enough not to clearcut an entire parcel.

There are three of different types of harvesting timber as to sustaining the health of the forest. One type is even-aged logging. Clearcutting an entire stand is an example of even-aged logging. Seed-tree harvesting is another example of this type. This is better than clearcutting in that some sturdy trees are left to regenerate the stand. The final method of even aged logging is shelterwood harvesting. In this method, the logger will cut about half the trees and leave the other half to reseed. Five to twenty-five years later, the logger will then cut the rest of the trees from the stand (Foster).

The second type of harvesting is uneven-aged logging. This type of logging is select cutting. Single-tree selection is when a logger removes single trees while group selection is when a small cluster of trees in an area is logged. The logger should focus on cutting the worst trees and taken only a few good trees. However, some loggers do the opposite and log the good trees while leaving the poor ones. This is could potentially destroy a forest stand and lead to the regeneration of weaker, instable trees. Another type of harvesting similar to this is diameter-limit cutter where all trees over a certain diameter are logged. This is generally the method used in past centuries.

The final type of harvesting is thinning. A logger will log smaller trees to give the larger more productive trees more room to grow. The logger may choose to sell that timber for uses such as firewood or paper pulp. This is different from even and uneven-aged logging in that regeneration does not take place (Foster 16-17).

One of the most important things a landowner who wants to harvest timber could do is write a management plan. The first step in creating a management plan is to consider what is on the parcel and what will be taken. The landowner should then detail how the cutting will be done. Both the positive and negative sides of using any one of the methods should be considered and any alternatives. For example, the logger should examine which trees will be cut which so there is little to no damage to the environment. If the landowner is new to logging, they should seek advice from professionals. This advice may come from someone the logger knows or a non-profit organization. Finally, the landowner should divide the land by how diverse the forest is (Foster 35-36). For example, if the owner has both a coniferous forest and a deciduous forest on their property, they should be treated a two different sections.

Nonprofit organizations are starting to understand the importance of sustainable logging. Groups such as The Nature Conservancy are developing a program to give landowners a yearly fee if they let the group harvest timber on their land (Foster 117).

The history of forestry is not a positive one. Early settler would slash and burn, cut any tree in sight causing landslides fires and pollution. Through the centuries science has become a part of sustainable forestry. With new methods, loggers have been able to make a profit, protect wildlife and make a profit. Landowners must be educated either formally or informally on how to manage their parcel best. With new technology, landowners can better manage their land. With proper management, America's forest will be here for many generations.

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Goal three of the *New Hampshire Everlasting* proposal from the Society for the Protection of New Hampshire Forests is to conserve habitat for native species. This aspect of the document is critical because less than a quarter of New Hampshire's rare plant and animal species are currently protected in conservation areas. It is imperative that more of these important habitats are conserved before they are lost to elevated human development and sprawl. *New Hampshire Everlasting* advocates preserving three or more sites in each of the state's nine eco-regions where "rare species, exemplary natural communities, critical wildlife habitats, and ecological linkages occur" (NH Everlasting). It is important to preserve areas where common species live so that they do not become rare. *New Hampshire Everlasting* also puts priority on the more vulnerable areas of the state, the southern, more developed, areas.

The need for habitat conservation began shortly after humans began to dramatically change the world around us. Before this occurred the largest affect that humans had on flora and fauna was the over hunting of certain species. Now, however, things are drastically different. Since large scale agriculture and the start of massive industry began there has been increased pressure on wildlife habitat. "Few regions on Earth are now secure from our chain saws, bulldozers, earth-movers, plows, dredges, and other equipment. [...] Today, plants, invertebrates, and small vertebrates, including many species yet to be described by science, are as threatened as the large mammals and birds we have sought for meat, feathers, and furs or killed because we feared them as predators or competitors," (Noss et al 19). This data sets the stage for a new movement to be put into motion, that of habitat conservation.

In the past the effects human development had on wildlife was not taken into consideration. Now, we need to make sure we do not make the same mistake, or do the opposite: forget human needs and only think of wildlife. "Conservation problems cannot be solved through biological information alone, nor from applying 'scientific truth.' Rather, solution comes from a combination of considerations that satisfy society's interests. A strategy that has any chance of adoption in the short term and any chance of success in the long term must include consideration of human needs and desires. To ignore the human condition in conservation strategies is to fail" (Yaffee 126). To change the way that people relate to the land we need to understand and find solutions to concerns that people have. The solutions must be able to address both human needs and those of wildlife (Clark 680).

There has been an evolution of the way in which people treat wildlife and the environment. Formerly they simply used the land for their own benefits, but recently there has been a change in the way people think. Although there is not a detailed understanding of such things it is now commonly held that there is a direct link between humans and the environment (Noss et al 23). As Also Leopold stated nearly fifty years ago, we need to put into effect "... a land ethic [that] changes the role of *Homo sapiens* from conqueror of the land community to plain member and citizen of it" (Clark 680).

It is the idea that humans and the environment are interconnected that helped push forward the habitat conservation movement. This new way of thinking helped the United States to implement the Endangered Species Act in 1973. Under this act endangered or threatened species could not be harmed in any way, both direct (hunting) and indirect

(habitat destruction) (Noss et al 24). This was the first step in the new wave of habitat conservation.

According to F. James "[m]ore than 90% of endangered species in the United States are estimated to occupy at least some private land. It is unreasonable to expect all that land to be put into public ownership, but it may also be unreasonable to expect private landowners to bear the full responsibility for the protection of the endangered species on their land. Section 9 of the Endangered Species Act prohibits the "taking," on both public and private land, of species listed as endangered; [...] private land owners and developers could be subject to criminal and civil penalties for construction-related activities that might harm a listed species" (James 871). One way that the government helped humans and wildlife to coexist under the Endangered Species Act is by implementing Habitat Conservation Plans (HCP). This form of adaptive management, a system that changes over time depending on information that is available at that time (Wilhere 22). An HCP is the basis for a contract between a landowner, usually a private party, and the organization responsible for protecting federally listed threatened or endangered species. The applicant must apply and receive an incidental take permit, which allows this group or person to proceed with plans that may incidentally harm a member of a threatened or endangered species. The HCP allows development while protecting as well as possible threatened and endangered species (US Fish and Wildlife Service).

Before Habitat Conservation Plans were put into effect the government banned any activity that would harm endangered or threatened species. Even though this seems like a positive step towards habitat conservation it is forgetting that human needs must also be taken into consideration (Yaffee 126, Clark 680). Even the government was reluctant to enforce a policy that made so many common practices illegal (Wilhere 22). These harsh policies led to many people refraining from reporting occurrences of endangered or threatened species on their property and the destruction of areas where endangered or threatened species were found. It also did little to increase the numbers of these species (Wilhere 23). In 1982 section 10 of the Endangered Species Act was revised so that it "establishes a procedure whereby those persons whose actions may affect endangered or threatened species may receive permits for the incidental taking of such species, provided the action will not jeopardize the continued existence of the species" ( U.S. Congress, House of Representatives 1982)." (Wilhere 23).

However, not all people believe that HCP are a good thing. The American Institute of Biological Sciences (AIBS) and the National Center for Ecological Analysis (NCEA) have brought up some points about them that are unsavory. One point they make is that we do not have enough information to adequately address the biological aspects of the species that will be affected by the plans. The plans also do not estimate the number of species that will be affected or give provisions for monitoring the conditions of the plans. The AIBS and the NCEA have suggested "greater use of 'explicit scientific standards'; inclusion of biological goals and the likely number of species to be taken; and the establishment of a scientific advisory committees and greater use of scientific peer review in evaluating the adequacy of plans" (Beatly 11).

Once it was widely accepted that habitats of certain animals and plants needed to be conserved new doors were opened. There has been a great deal of disagreement on the best way to approach habitat conservation. One idea is the ecosystem approach,

which uses adaptive management to assess conservation priorities. To use this approach we must take into account two unfortunate aspects of this concept: that we only have minimal knowledge of how ecosystems actually function and that important and immediate human uses of the land cannot be ignored in using the ecosystem approach. In the past a single-species approach was taken thus the ecosystem approach is very controversial; "the scientist is urging the wildlife manager to take a big risk to leave behind the time-tested single-species approach" (Clark 679). The single-species approach is comparatively very easy to measure than the ecosystem approach since it only focuses on one species. With the ecosystem approach, however, there is a much benefit to a greater number of species.

One way that habitat conservation can be achieved is through conservation easements. "A conservation easement is a voluntary agreement that allows a landowner to limit the type or amount of development on their property while retaining private ownership of the land. The easement is signed by the landowner [...] and the Conservancy" (What is a conservation easement?). In other words, once a property is under conservation easement there are a number of restrictions that are placed on the property that allow the property to be permanently conserved.

One of the most important results of habitat conservation is the preservation of biodiversity. Schwartz, Jurjavlc, and O'Brien performed a study in which they assessed the amount of biodiversity in urban areas. They concluded that "22 percent of known occurrences of endangered plants are found in the 12 percent of the counties, on 8.4 percent of the land area, where half of all Americans live" (Schwartz et al 601). This means that increased emphasis should be put on these areas for the preservation of biodiversity.

S. Thompson proposes that any type of construction should provide plans that outline the environmental impacts of the development. "Plans must provide outline descriptions of the proposed measures, indicate how they would actually be put in place, and propose how they might be modified if unforeseen post-project ecological impacts manifest themselves" (Thompson 284). Thompson also raises the issue of habitat creation. Some scientists believe that habitat creation can serve just as well as habitat conservation, however this is untrue. These people do not take naturalness, continuity, and complexity into account when proposing this. Thompson further states that habitat conservation should always be put above habitat creation (Thompson 285).

The USDI Fish and Wildlife Service developed a procedure known as the Habitat Evaluation Procedure (HEP) to assess environmental conditions at the species level. This system uses habitat units (the product of habitat quality (on a scale of zero to ten) and how much of that type of habitat exists), and other data (such as forage rate) to document environmental conditions. The HEPs can be repeated thus a structured way to assess different habitats has been developed. HEPs are often used to evaluate proposed projects (Morrison et al 238).

Once lands are conserved by federal, state, local, or private organizations they need to be monitored to make sure the stipulations of the agreement are being followed. The Conservation Land Stewardship is one organization that performs this task for conservation easements held by the state of New Hampshire. This organization monitors about 100,000 acres of land divided up into about 330 individual properties (Conservation Land Stewardship program). The Ausbon Sargent Land Preservation

Trust (ASLPT) is an example of a private organization devoted to acquiring land to put under conservation easement and monitoring those parcels. The ASLPT works to maintain the "rural landscape of the Kearsarge/Sunapee region [of New Hampshire] by working with local governments and private landowners to develop conservation easements" and monitoring 3,446 acres of conserved land (ASLPT).

Demographers estimate that by 2050 the population of the United States will have grown from 294 million to 419 million, an increase of 125 million people (Clark 679). This means that humans will press further into wildlife habitats. This is why Beatley suggests that "each state should prepare a plan that delineates a comprehensive ecological network, and each region or metropolitan area a plan which fits within and further reinforces these larger ecological structures" (Beatly 15). Noss et al suggests that the "plan [for conservation] should include an explicit framework [...] for making specific decisions about land protection and management" (Noss et al 213). They also suggest that "habitat-based planning would be an intelligent way to guide development and conservation" (Noss et al 209).

This third goal of *New Hampshire Everlasting*, to conserve habitat for native species, is a very important one. It is these species that help to define and give character to New Hampshire. Without them this area would be far less diverse and appealing. If this initiative is taken seriously and followed it will be possible to increase the amount of species protected much higher than the quarter of all native species that is currently conserved. This conservation should first be focused on areas where rare species occur and in areas more susceptible to development, the southern and middle regions of the state.

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Growth and development within New Hampshire is an event that is almost inevitable. With an increasing population within the country, and very desirable, sales tax free living environment in New Hampshire, the state has become one of the fastest growing locations in the northeast. This type of development could potentially be detrimental to the existence of New Hampshire wilderness, and the quality of natural resources within the state. While growth and development cannot be stopped, a well thought out plan could help to further develop lands that are already suburbanized or urbanized, and preserve lands that are undeveloped. Such a plan has been developed and is entitled *New Hampshire Everlasting*. This plan uses land conservation as a major tool to protect wilderness lands and natural resources. One of the natural resources it focuses on is water.

Water is one of the most important natural resources on the planet. Without it, life on earth would not be possible. Unfortunately, the planet's supply of water is under constant attack.. Its quality and purity are being degraded, and the prospect of sustainable future use seems unlikely. Many people however, have paid a great deal of attention to this problem and many potential causes, as well as many potential solutions have been identified. The effect of increased population and the problems that go along with it such as increasing demand for clean, potable water and a lower supply of it caused by inefficient use and higher levels of pollution are currently being examined.

One of the major threats that is placed on the world's water supply is population growth. Population growth increases the likelihood that water will be used in an unsustainable manner. Since it is difficult to place ownership on water, it is often challenging to place regulations on it to control its use. Another thing that prevents the creation of strict regulations on water usage is the fact that throughout history, the access to water has been considered a natural right. The fact is that there is only so much water on the planet, and that if population increases, and people continue to think of water as something that they have infinite access to instead of something that is necessary for the survival of all living organisms, the small supply will be quickly used up. Many argue that the current population of the world is already large enough that regulations on water usage should be put in place (Shiva, 20).

Along with increasing demand for water, a larger population also adds to the pollution that reduces the amount of clean drinking water. One of the ways this occurs is through the construction of new housing units. A large population requires a greater number of housing units, and since people must have a source of income, these housing units are usually positioned around an area with economic opportunity, thus creating sprawl.

Sprawl creates a number of different problems for controlling water quality, one being an increased amount of erosion. Erosion is a natural occurrence, but without the interference of mankind, it happens much more slowly. The rate of the erosion caused by natural occurrences is slow enough that other geologic and hydrologic processes can compensate for the added amount of sediment. Since erosion is naturally occurring, the extra sediment that gets washed into bodies of water is not technically considered pollution. However the rate of erosion has increase so much through human interference that the other natural processes can no longer keep up (Novotny, 2007).

Sprawl contributes to the increased rate of erosion by creating disturbances that loosen the soil. The looser soil can then be washed away by wind or precipitation more easily than it normally would. The soil disturbances begin when the construction of new housing units and other types of buildings begin. Construction is very hard on the soil and can loosen it, and also rip up the very things that normally hold it together such as grass, trees, shrubs, and mosses (Polluted Runoff). In the United States, over 80 million tons of extra sediment are washed into the country's water supply. That amount is far more than the earth and its natural processes can keep up with. The result is murky lakes, streams and rivers (Novotny, 207).

After the construction is finished, the rate of erosion slows, but is still much faster than the naturally occurring rate. This is because the buildings are often surrounded by lawns or other types of land in which the soil is held more loosely together than it was. It has been shown that urbanized areas produce twenty-six times as much sediment from erosion as undeveloped areas. Although it is less sediment than what is produced by construction, it is still significantly larger than the naturally occurring amount (Novotny, 208).

Because of the severity of this problem many possible solutions have been proposed. Many of these solutions involve better planning during the construction of new buildings. This would involve choosing the area on which to build more carefully, such as areas that are on flat ground as opposed to on slopes or ridge lines, and being more careful not to tear up the ground during the building process (Novotny, 208).

Other possible solutions including minimizing the amount of land that is more likely to have an increased rate of erosion by encouraging tree planting to hold the soil in place. This brings the cleared land closer to its condition before the construction occurred, thus making the rate of erosion more manageable (Polluted Runoff 5).

If the rate of erosion cannot be slowed down, it is sometimes proposed to redirect the eroded materials to a place where they can be filtered out. This is done through the use of water quality inlets. There are a number of different types of water quality inlets, but most involve using a small channel or depression in the ground to direct water to a basin. Once in the basin, the water can be filtered and then re-released (Polluted Runoff, 5).

Although the water quality inlets have been somewhat successful, a study has been done on larger versions of the water quality inlets called storm drainage wells. The storm water drainage wells are often man made, but are sometimes constructed in old, dried up ponds. Like the water quality inlets, the storm water drainage wells provide a basin for runoff to collect in. However, unlike the water quality inlets, the storm water drainage wells normally do not have any kind of filtration system to improve water quality. Their purpose is more to prevent the flooding of homes and agricultural lands rather than to improve water quality (Storm Water Drainage Wells, 1).

While storm drainage wells pose no real threat to surface water, but they do pose a large threat to ground water. Much of the water that flows into the storm drainage wells contains contaminants such as sediments, nutrients, metals, salts, fertilizers, pesticides, and microorganisms (Storm Water Drainage Wells, 1). The fear is that the contaminants in the storm water drainage wells will leech into the drinking water, making it unsafe to drink.

To further investigate this concern, a qualitative study was done by the United States Environmental Protection Agency (USEPA). The study involved looking at the number of storm water drainage wells used in the country, where and how they were made, and if and how their construction and use were regulated. The study found that while the use of storm water drainage wells was thought to be widespread across the nation, only half of the states report using them. This could be because of lack of documentation, or the fact that the need for storm drainage wells is greater in areas with poorer drainage capabilities and more severe precipitation (Storm Water Drainage Wells, 5).

The states that do report the use of storm water drainage wells are yet to develop a universal policy to govern their use. Some states have little to no policy in place to regulate their use, while other states strictly regulate their construction and use. Some states require permits for the construction of larger wells. In Idaho, a permit is necessary for a well that is larger than eighteen feet deep. Anything smaller is authorized without obtaining a permit. In many other states such as Arizona, California, Hawaii, Florida, and Maryland, a permit is required for the construction of any storm water drainage well, regardless of the size (Storm Water Drainage Wells, 3). Numerous other states have banned the use of storm water drainage wells altogether. In Georgia and North Carolina, the construction of new wells, and the active use of old wells is prohibited. In Wisconsin, wells deeper than ten feet are not permitted (Storm Water Drainage Wells, 3).

These regulations were developed as a result of storm water drainage wells contaminating drinking water. The study done by the USEPA identifies a number of cases where drinking water was contaminated by the water in the wells. One case was in 1989 when a commercial petroleum facility in Ohio released 21,000 gallons of oil that flowed into storm water drainage wells. The contaminated water then leached into the ground water, making it unsafe to drink without first treating it (Storm Water Drainage Wells, 2).

Another case in 1980 involved the discovery of an organic solvent in the drinking water. This discovery was made shortly after the disposal of organic waste solvents in storm water drainage wells. This took place in Lakewood, Washington at the McChord Air Force Base (Storm Water Drainage Wells, 2). Water with such high level of contaminants can have a serious effect on human health. The health risks can involve poisoning, an increased risk of cancer, and damage to the nervous system (Barzilay, 3).

Another problem caused by the creation of sprawl that affects water quality is the creation of new impervious surfaces. Like erosion, impervious surfaces are naturally occurring things. Naturally occurring impervious surfaces include bedrock, tightly packed clay, and other tightly packed soils. Humankind has added a large amount of new impervious surfaces in the form of rooftops, sidewalks, roads, and parking lots. The problem that is created by impervious surfaces is that storm water cannot be absorbed by the ground and therefore creates a great deal of runoff. This runoff, besides causing erosion is often contaminated with other pollutants either from pesticide use, oil on the roads, or the use of fertilizer (What is an Impervious Surface, 1).

A study done in Poland by Z. Polkowska examined the correlation between different types of roofing material, and the amount of contamination found in the runoff water. In urbanized areas, roofing makes up a large percentage of the impervious surfaces. The study involved collecting runoff water from houses with different types of

roofing in different parts of the country. Once the water samples were collected, they were then brought back to the lab and test for organic nitrogen, organic phosphorus, and organic chlorine pesticides. The study showed that each different kind of roofing had a higher concentration of one or more of the contaminants, and that a correlation could be made between the type of roofing, and the type of contamination found in the runoff water (Polkowska).

Because of the correlations that have been made between impervious surfaces and the degradation of water quality, impervious surfaces are now being used as an indicator to estimate the ecological health of an area. In order to estimate the ecological health of an area by using impervious surfaces as an indicator, the types of impervious surfaces, and the range they cover must first be identified. After this is done, the impervious surfaces can be matched up with their correlating contaminants, and ecological health can be estimated (Impervious Surface Coverage: The Emergence of a Key Environmental Indicator).

This type of study is particularly useful for planning new developments. It allows developers to look at the major types of pollution in an area, and plan their project to minimize those particular types of pollution. The results from this study could also be used to put devices such as water quality inlets in place to improve to water quality. Many communities used this study to spearhead their effort in and conservation. Conserved land is generally far less impervious than developed land. This means that the more conserved land a community has, the better their water quality will be. Many communities have also used this information to encourage the planting of trees and shrubs in public parks to reduce imperviousness (Polluted Runoff).

Over the years, water pollution has become an increasingly serious problem. The issue has been raised, and some action has been taken. There is still however a great deal of information that is yet to be determined, and many problems that are lacking solutions. The only way to remedy this is with more research. It is difficult to fix a problem without first fully understanding it and all of its components. *New Hampshire Everlasting* is an initiative that breaks down the problems relating to land conservation into the relative components. Each individual component can then be broken down further for an even deeper understanding. This can be applied to research done concerning water pollution. Instead of just researching water pollution, one can research the effect of conserved lands on water quality, or the effect of impervious surfaces etc. By researching the problems concerning water quality in this manner, it will be possible to gain a better understanding of them.

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*New Hampshire Everlasting* has five goals that SPNHF would like every town in the state to strive for; the one I will talk about is agriculture. *New Hampshire Everlasting's* goal for agriculture is to conserve the most productive agricultural land and invest in the evolving agricultural economy so that people in every community have the opportunity to grow healthy food and the state can sustain at least its current level of food production. *New Hampshire Everlasting* wants every community to have the opportunity to have at least one farm or community garden, local farmers' markets, or farm stands.

So a good place to start when thinking of conserving agricultural lands is the land itself. You need to think of the soil quality and if you can even grow where you want to conserve farmlands. Also you need to think of the farming and what is being grown. If you are growing food, flowers, or you letting native plants take over to allow for animal habitat, or are you just simply using the land to farm. Shutler (2000), says that modern farm practices can vary in their emphasis on tillage versus chemicals to control weeds, and researchers know little about which emphasis has greater ecological benefits. The researchers compared birds of uplands and wetlands in four treatments: conventional farms, conservation farms with those that eliminated chemical inputs [organic], and restored or natural (wild) sites in Saskatchewan, Canada. Of 37 different upland bird species encountered during surveys, one made greater use of farms, four made greater use of wild sites, and the remaining species showed no preference. When all upland species were combined, higher relative abundance occurred on wild than on farm sites, and on minimum tillage than on conventional farms. Wild upland sites also had more species than did conventional farms. Of 79 different species encountered during surveys of wetlands and their margins, most had similar encounter probabilities among treatments, although seven were more common on either organic farms or wild sites. Higher relative abundances were documented in wetland habitat of wild sites and organic farms than of minimum tillage or conventional farms.

So as you can see agricultural lands are a good thing for communities but as Shutler (2000) notes it depends on what type of farm/agricultural land you have and what its being used for because some lands are better for animal habitat and use where as others are better for simply raise and cultivating food.

Another important aspect of agricultural conservation is the importance of farmland habitats for conservation of plant species. Freemark (2002) states that little attention has been paid, particularly in North America, to the importance of the mixture of farmland habitats for the conservation of native plant species. Researchers examined patterns in plant species richness, composition, and abundance at the scale of site, habitat, and landscape for 10 farmland habitats (crop, hay field, pasture, old field, herbaceous fencerow, woody fencerow, roadside, ditch, plantation, woodlot) at 121 sites in eastern Ontario, Canada. At the site level, woodlots had the highest richness of overall (average 57.6 species), woody (23.4), and herbaceous species (25.0). Crop, herbaceous fencerow, and plantation habitats had few native species per site. Introduced species comprised > 50% of herbs per site in seven habitats. Across habitats, 305 species were observed; 227 species were herbaceous, 70% of which were native and 31% of which were weeds. Wooded fencerows had the highest species richness in total (153). Woodlots had the woodiest species (56). Percent native species was generally lower and percent weeds

higher at the site level than at the habitat level. All habitats had unique species; woodlots had the highest number of unique species. Results of the multivariate analysis for abundant herbs revealed that woodlots and plantations were different, as were crop and ditch habitats. The results of our landscape-level study show that plant species richness and composition varied substantially among the five landscapes studied, ranging from a row-crop monoculture landscape to a diverse mosaic of crop and non crop habitat landscape.

Vanhinsbergh (2002) studied summer and winter bird communities in recently established farm woodlands. The author examined the effects of woodland management and structure on the presence, abundance and species richness of birds in 65 farm woodlands created under agricultural-environment schemes in southern and central England. It also compares the avifauna of the woodlands with that of other farmland habitats for a subset of 11 farms. Over 50 different bird species were recorded in the woodlands in winter and breeding seasons. The geographical location, area, age and conifer content of the woodland, nature of the surrounding farmland and adjoining field boundaries, and the use of herbicides affected the occurrence of individual species at the sites. Species richness was positively associated with woodland area and sites connected to hedgerows with trees had more species than sites connected to treeless hedgerows. Smaller woodlands tended to support a greater overall abundance of birds than larger woodlands. Overall bird abundance and species richness was higher along field boundaries such as hedgerows and walls or ditches with scattered trees than in the farm woodlands. The latter, however, supported a greater overall abundance and number of species of birds than surrounding cropland. It is suggested that the creation of small farm woodlands provides habitat for several bird species that are currently declining and is a valuable tool for promoting bird diversity.

Macdonald (2000), using questionnaires circulated in 1981 and 1998, we assess the extent to which wildlife habitats were lost from English farms during the 1970s and 1990s, and attempted to identify the forces which motivated farmers to act as they did. Macdonald investigated how farmers' professed interest in wildlife and involvement with different leisure activities, particularly field sports, was related to their actions, and how these patterns had changed between the two surveys. These patterns are of some interest in assessing how the availability of subsidies, and changes in the legal framework surrounding farmland management, may effect the behavior of farmers. There were large regional differences between farmers in their reported strategies with respect to unproductive land in both surveys, which could be at least partially related to regional variation in cultivation types. While economic reasons were predominant in motivating farmers to remove hedgerows and other habitats in the 1970s, a large proportion of farmers then also professed positive attitudes to wildlife and stated that they would be willing to co-operate with schemes for habitat restoration if subsidies were available. In the 1990s subsidies have become available, and many of the 1990s respondents had made use of the various schemes recently in place to encourage habitat restoration and preservation. There was some evidence that field sport involvement was influential; hunting farmers reported least hedgerow destruction in both decades and shooting farmers reported creating more new woodland in the 1990s than did other farmers. Macdonald (2000).

In New Hampshire the Department of Environmental Services has addressed regional conservation and planning programs. Each Regional Planning Agencies are provided \$25,000 annually for environmental planning work. DES staff meet quarterly with the nine RPA directors to develop program priorities and assess progress.

Land conservation was identified as a priority issue when the REPP began in 1998. The RPAs each conducted intensive research with municipalities to determine local resource protection priorities for conservation. In addition to developing clear local conservation priorities, this work helped establish the need for the Land and Community Heritage Investment Program.

So in conclusion it seems to depend on what is being talked about because every article that is published seems to feel conservation is a great thing. Conservation is a good idea but what to conserve, agricultural land is a broad term do you want to conserve farmland, pastures, or croplands. And once you preserve it, should it be actively managed or allowed to grow up a little bit. Every article is the same in the conservation aspect but different in how they want to go about conservation and what they feel there priorities should be. Researchers all want to conserve but each article feels that different parts are the priority. Conservation is a difficult process and you need to take very careful considerations when conserving. The way people go about conserving is difficult as well because it makes people feel like you just want to take there land from them and land is what people have worked so hard to get and buy. Conservation of agricultural land is a great thing and needs to happened and some ways of doing that are better then others you must find the right method before you dive in.

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Conserving productive agricultural land and the farm economy has become an important goal in conservation practices. Farming represents the basis for growth and life in America's history, and is responsible for fresh and local produce, and scenic viewing opportunities (*New Hampshire Everlasting*). Keeping important agricultural lands safe deals with a lot more than simply conserving parcels that practice agriculture; it also deals with smart practices in farming that can help lead to healthier soils. *New Hampshire Everlasting* outlines the priorities of conserving productive agricultural land and the farm economy for many reasons. It is important to help the farm community continue to grow and prosper for New Hampshire's own benefit. *New Hampshire Everlasting* also states the importance of supporting local agriculture to help reduce outside costs spent to help the state obtain the food that it can potentially grow on its own. *New Hampshire Everlasting* also states that is important to designate between poor soil farm lands and plentiful ones. Conserving the wrong parcels will provide no benefit to New Hampshire and its way of life. *New Hampshire Everlasting* states its goal as to, "Permanently conserve the remaining 'prime' and 'statewide importance' farm soils and enough other agricultural lands so that the agricultural infrastructure can be sustained and strengthened, so that every community has land for growing healthy food, whether it be victory gardens, flowers and landscape plants, market gardens, or dairy farms, and so that New Hampshire can sustain its current level of per capita food production using environmentally sound methods." All of this can be achieved through smart conservation practices and the interest of farmers and their communities to keep an important part of their state's history alive instead of a memory of yesterday.

One method being practiced around the Connecticut area is a program where farmers are teaching other farmers how to practice sustainable agriculture on their own individual farms. A man by the name of John Collins is one of the leaders of this practice around his own Enfield, Connecticut farm. He has reduced the number of herbicides and pesticides, and raised his crop yield significantly (DeVito 1991). John Collins is now helping other farmers learn the practices that have greatly impacted his own personal farm. Through the program he has set up, other farmers around the Enfield area are learning to practice sustainable agriculture on their own farms. John believes that sustainable agriculture is a crucial practice that all farmers must use to help keep groundwater from becoming contaminated, and to help keep their crop yields healthier and more productive (DeVito 1991).

Community supported agriculture takes a different look upon the sustainable agriculture field, where it incorporates not only the farmer, but the consumers as well. With community supported agricultural practices the consumer is forced into being "part of the farm." The consumer buys a share in a farm's operations at the start of the growing season (Donahue 1994). With the buying of a share comes the option to lend volunteer work to the full time farmer. The payoff is a portion of the harvest at the end of the season. This practice reflects how well a farm can potentially become depending on the help from the community. The consumers are only hurting themselves by not participating with the farm, seeing how their benefit comes from how large the crop yield is. The point of this practice is so that community members can understand the pressures of farming. Under this practice every member makes out. If the season is good then not

only does the farmer make money, but he also shares in the crop bounty. In a bad year everyone receives the same reduced amount of crops (Donahue 1994). Donahue also states that, "A crucial aspect of Community Supported Agriculture is that the inherent risks of farming are shared among farmers and shareholders, rather than being borne solely by the farmers."

It is important in today's developing world that the communities surrounding the farm have a direct connection with the farm itself. Farmers face the fear that their family farm is no longer needed, that it does not produce enough crops to sustain the community, and that their agricultural lands may be better designated as residential lots. Farming businesses have sprouted up all over the world. They are commonly known as "factory farms," and generally yield high crop numbers through the use of machines rather than manual labor. This form of farming puts great stresses on the family farm in the sense that it cannot financially or physically compete with this scale of technology (Smithers & Johnson 2004). The intensification of mass produced agriculture can be too much for the family farm to handle. The family farm then begins to break down. When enough profit is not made by the farm, family members are forced to get jobs outside of their working farm. Consumers in the community may also choose not to buy the produce grown by the local farm, rather go to the supermarket and buy mass produced super foods (Smithers & Johnson 2004). These problems generally effect farms under two hundred fifty acres in size. Gradually as the market for local produce declines and the more profitable solution of factory farming presides, we lose more family farms in America each year. Large scale factory farming dismantles the need for the local farmer, and capitalizes off of their large scale and always sure-fire mass-produced crops (Smithers & Johnson 2004).

There are many forms of practices that can also help a farmer run a more efficient and healthy farm. Conservation Tillage is an old practice in farming that has regained popularity today. Practicing conservation tillage began in the mid 1930's and began becoming a popular practice in the 1960's. Today this practice is wide spread, having been accepted by the majority of major farms in the United States (Schertz 1991). Conservation tillage is a practice where farmers leave crop residue on their croplands to help prevent wind and water erosion from occurring in their fields. This practice may seem like a flawless one, but in fact there are many concerns about it. Many critics feel that conservation tillage will do nothing more than complicate farming techniques. Some have said that this practice will lead to the need for stronger herbicides and pesticides, possibly leading to more groundwater contamination. Others feel as if more chemicals will be needed simply to fend off the massive amounts of weeds sprouting up in tillage areas. Some even believe that they will need more expensive equipment for areas under conservation tillage (Schertz 1991). The fact is that conservation tillage technology is helping to make this practice more appealing by reducing erosion and cutting costs more than regular tillage practices. Conservation tillage is not recommended for every situation in farming, rather it is excellent in point-source concern areas such as on the sides of slopes neighboring water sources. Schertz also points out that, "Many believe that growing crops using conservation tillage is more sustainable on sloping cropland than a conventional plow system that buries protective crop residue and leaves the soil surface vulnerable to severe erosion."

John Tarrant discusses the United States as the, “food giant of the world,” stating that America grows and produces more food than it can consume. He stresses the importance of our farming for the world, and changes that have developed for farmers across the country. In New England the farm practice seems to be dying in relation to other parts of the country. The pressures from larger farms in the west have made it nearly impossible for farms in New England to compete on the same level. With this competition in mind, many New England farms have abandoned their practices and found other forms of work, or only farm for a personal benefit (Tarrant 1991). In the early 1900’s as much as half the region was under farmland. Seventy years later farmland controls less than one fifth of the land in the area. In the mountainous areas farmers have three main physical limitations for their farms. These include the possibility of a short growing season, length of snowfall, and thin, stony soils (Tarrant 1991). Most of the farming that exists in the New England area today is part-time farming. Many farmsteads have become summer homes for residents of the city or suburbs, or they have been subdivided and developed. The majority of small scale farms in New England are dying slowly. The pressures of large-scale, full-time farming puts a tremendous strain on the local farmer and leaves some with no choice but to drop out of the business (Tarrant).

The Natural Resources Conservation Service (NRCS) has, under one of its fields, the Farmland Protection Program. The Farmland Protection Program (FPP) “Helps farmers keep their productive lands in agriculture.” The FPP was established to help slow the trend of converting agricultural lands to non-agricultural practices. It assists in the purchasing of conservation easements so that productive cropland will not be lost to non-agricultural uses. Since New Hampshire has been facing pressure from development it has been losing up to 1500 acres a year, with about eighty two percent of this stemming from Urban Development (NRCS FPP). Over a fifteen year period New Hampshire has lost over 50,000 acres of pasture and cropland to non-agricultural use, which adds up to sixteen percent of the states farmland (NRCS FPP). While farmland has been on the decline, urban land is booming, increasing by about 230,000 acres during the same time period. Nine percent of this increase came directly from cropland in New Hampshire. The NRCS states that, “The gross acreage of cropland converted to urban development is not necessarily the major concern, rather the quality and pattern of the cropland being converted is of bigger concern.” The FPP states that prime and important agricultural lands are being converted two to four times faster than less productive and important farmland, putting stresses on these remaining farms to produce more or fall into the urban mix. The FPP states that it will help “Ensure that family farms remain an economically viable component of the state,” and that they “Are working hard in New Hampshire to protect open space and the states rural character.” The FPP also recognizes that family farming is a major part of New Hampshire’s natural tradition, and that it is a tradition that is in great danger of becoming extinct in New Hampshire. By aiding in buying conservation easements, the FPP helps to make it financially possible for these families to keep their farms in operation. The FPP is responsible for helping to protect open space, “Ensuring New Hampshire a local food supply and preserving an important part of New Hampshire’s heritage.”

Laurence Gross provides some numbers on the profitability New Hampshire has seen in the agricultural business between the years 2001 and 2002. In his document he states that New Hampshire saw a roughly 600 million dollar profit from agricultural sales

and services between the two years. In 2002 it was estimated that roughly eight thousand six hundred people were actively involved in farming across the state in one form or another. These varieties of sales has totaled in over 300 million dollars in profits. This only makes up about one percent of the states total gross product. Since most farm work is seasonal or part-time, the estimated number of full-time farmers is around four thousand five hundred people. This only represents .7 percent of the states fulltime employment. The other four thousand or so part-time employees represent one and half percent of New Hampshire's total part-time employment numbers (Goss 2002). About 43 million dollars in wages and salaries were earned through this total number of employees throughout the state, accounting for only .8 percent of the states employee total earnings (Goss 2002).

As one can see farming in New Hampshire does not exactly contribute the most economically to the state. Why then conserve agricultural lands, or practice more efficient, more sustainable techniques? The goal of conserving productive agricultural land and the farm economy can be helped through the practices and principles spoken of on the previous pages. It is always important to unite a community in some way, and community based agriculture shows a need for both the farm, and for the public. By running a more efficient and healthy farm, farmers will make their property more appealing to the public by allowing them to be able to purchase more natural and healthy foods. Keeping a farm open and operating allows for more jobs in the community. A big enough farm could provide up to one hundred jobs that rural communities could use. New England has been forced over the years into buying goods from farms not in its region. New Englanders have primarily had to go outside of their own states to purchase the food they need to survive, when it could be grown in their community instead. It is economically important for New England to be able to produce their own crops to distribute to its residents, rather than forcing residents to by from non-local sources. *New Hampshire Everlasting* supports farming in multiple aspects. It not only looks towards agricultural lands just for conservation purposes, rather it recognizes the important of farm life in general. The literature cited in this essay provides examples on how to keep agriculture alive, and the importance it provides to a specific region. New England grew from agricultural roots itself, and it is important to keep this heritage alive for the well being of future generations.

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