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Project Title/Subject: The Use of Conservation Easements to Protect Private Forestland in Rhode Island

Brief Description of Project:

In Rhode Island, 54% of the land (364,000 acres) is forested with 74% of these forests (269,360 acres) under private ownership. Private forestland face development pressures and an estimated 1,350 acres of forestland are lost per year due to such pressures. In order to achieve its forest stewardship goals of protecting and managing the forest resources to obtain valuable ecosystem services, such as clean water and forest products, Rhode Island increasingly utilizes conservation easements as a tool to protect private forestland from conversion into urban areas. Currently, 18% of forestland (64,221 acres) is protected under conservation easements, 79% of which (59,262 acres) is held by RIDEM. Through evaluating the history of forestland conservation and the rising use of conservation easements in lieu of fee simple purchases in the United States to preserve private forestland, this report focuses on Rhode Island as a case study to analyze the extent to which conservation easements have been effective in protecting Rhode Island forestland and its associated ecosystem services. Two main issues have been determined to limit the potential effectiveness of conservation easements: annual monitoring and forest fragmentation. Methods for monitoring and reducing fragmentation used by other agencies were examined to assess for any improvements that could be made. The main recommendation for Rhode Island rests in greater collaborative efforts among interest groups. Pooling in resources, the main limitation to Rhode Island’s conservation easement effectiveness, allows for more frequent monitoring efforts and provides multiple avenues for pursuing landowners into conserving their land under easements.
The Use of Conservation Easements to Protect Private Forestland in Rhode Island

Abstract

In Rhode Island, 54% of the land (364,000 acres) is forested with 74% of these forests (269,360 acres) under private ownership. Private forestland face development pressures and an estimated 1,350 acres of forestland are lost per year due to such pressures. In order to achieve its forest stewardship goals of protecting and managing the forest resources to obtain valuable ecosystem services, such as clean water and forest products, Rhode Island increasingly utilizes conservation easements as a tool to protect private forestland from conversion into urban areas. Currently, 18% of forestland (64,221 acres) is protected under conservation easements, 79% of which (59,262 acres) is held by RIDEM. Through evaluating the history of forestland conservation and the rising use of conservation easements in lieu of fee simple purchases in the United States to preserve private forestland, this report focuses on Rhode Island as a case study to analyze the extent to which conservation easements have been effective in protecting Rhode Island forestland and its associated ecosystem services. Two main issues have been determined to limit the potential effectiveness of conservation easements: annual monitoring and forest fragmentation. Methods for monitoring and reducing fragmentation used by other agencies were examined to assess for any improvements that could be made. The main recommendation for Rhode Island rests in greater collaborative efforts among interest groups. Pooling in resources, the main limitation to Rhode Island’s conservation easement effectiveness, allows for more frequent monitoring efforts and provides multiple avenues for pursuing landowners into conserving their land under easements.


**Introduction**

The first documented forest survey in 1767 estimated 31% of Rhode Island to be forested after a period of extensive clear cutting for agricultural purposes by early settlers (Burdett *et al*.). After reaching its lowest estimate of forest cover (24%) in 1887, the Rhode Island legislature established the Rhode Island Forest Commission in 1906 to improve forest management (Burdett *et al*.). With better management and the establishment of State forest reserves, forests slowly recovered with the reemergence of various oaks, red maples and white pines (Burdett *et al*.). While various diseases, such as chestnut blight, and natural disasters, such as fires and diseases, decimated forests throughout the early 1900s, Rhode Island reached its peak forest cover (67%) in 1963. This was due to the industrial revolution and World War II, which made Rhode Island’s farming economy less viable (Rhode Island Statewide Planning Program, 2000). Since then, however, Rhode Island has become more urban and the associated suburbanization and development pressures have led to a steady decline in forest cover [Fig. 1] (H.C. Planning Consultants, Inc. and Planimetrics, LLP, 1999).

![Rhode Island Forest Cover](image)

**Figure 1.** Changes in Rhode Island Forest Cover from 1630 to 2007. (Taken from RIDEM, 2010; data from Smith, *et al.* 2009).
As of 2012, Rhode Island has an estimated 364,000 acres of forestland, approximately 54% of the State’s total land acreage, having lost 5 percent of forestland since 1998 (Butler, 2013; Alerich, 2000). Although State and local government agencies, such as the Rhode Island Department of Environmental Management (RIDEM) and municipal towns, and non-governmental agencies (NGOs), such as the Nature Conservancy (TNC), have acquired and manage 64,221 acres of extant forests (26%) for multiple uses including preservation, recreation, most of the State’s extant forests (74%) remain privately owned [Fig. 2] (USDA, Forest Service, 2012).

Within the last several decades, conservation easements have become an increasingly popular tactic for agencies to use to conserve privately owned forestland (McLaughlin, 2005).

The goal of this report is to **consider the extent to which Rhode Island’s efforts to utilize**
This report begins with a brief history of forest conservation and the use of conservation easements in the United States. Then, the report narrows its focus onto Rhode Island’s forests, outlining its forest conservation efforts and its use of conservation easements, evaluating its successes and areas in need of improvement within the State. The report continues with a literature review on the methods that have been utilized to mitigate the noticeable disadvantages. In the last section, suggestions are recommended for Rhode Island’s forest interest groups to improve its use of conservation easement for private forestland protection.

**Part I. Forest Conservation in the United States**

A desire for forest conservation in the United States grew in the mid-nineteenth century as a newfound appreciation of the wilderness led to sadness in its loss. By then, much of the forests had been lost due to a combination of excessive logging, industrialization, and agriculture. Recognizing the loss of forests, Horace Greeley, in 1851, charged Americans “to spare, preserve and cherish some portion of [their] primitive forest” stating that if the forests disappeared, they could not be easily replaced (Nash, 1982). Several years later, in 1858, Henry David Thoreau expanded upon Greeley’s sentiment and advocated for the creation of national preserves that would be kept undisturbed for modesty and reverence’s sake (Thoreau, 1858). Samuel H. Hammond, an Albany lawyer, also believed in segregating civilization and forests. He wanted to “mark out a circle of a hundred miles in diameter and throw around it the protecting aegis of the constitution” in which the land would be a “forest forever” and “lumbering or settling would be prohibited” (Hammond, 1857).
As preservationist thoughts arose, George Perkins Marsh argued for forest protection through a utilitarian perspective. In *Man and Nature: or, Physical Geography as Modified by Human Action* (1864), he observed how man abused his power to alter nature. He believed that clear cutting of the forests on watersheds resulted in droughts, floods, erosion, and other unfavorable climatic changes that led to the decline of Mediterranean empires in power and influence. To him, preserving primeval forests was compatible with progress and economic welfare. This compatibility became the staple for preservationists (Nash, 1982).

Many cite George Perkins Marsh’s *Man and Nature* as the beginning of United States forest conservation (Cox, 1981). Marsh’s rationale for wilderness preservation compounded with the overall sentiment toward saving wilderness led to the development of governmental responsibility in preservation efforts. This idea was first realized in 1872 with the large-scale wilderness preservation of Yellowstone National Park. Following this, New York State established a 715,000 acre “forest preserve” in the Adirondacks in 1885, hoping to keep the land forever as wild forestlands (Nash, 1982).

Also convinced of the need for governmental action on forest preservation, Dr. Franklin B. Hough presented, “*On the Duty of Governments in the Preservation of Forests*” in 1873. Federal involvement in forest preservation arose from this presentation as Hough argued that timber production would be halted by overexploitation. In 1876, an amendment to the Appropriations Act of 1876 was included to fund a person to study national forest consumption, supply, renewal and means of preservation. Hough was appointed to undertake this study and following his report on forestry, the Department of Agriculture Division of Forestry was temporarily established in 1881 and become a permanent division in 1886.
In the private sector, many landowners began forming conservation groups, such as the American Forestry Association in 1875, to reorient forestry practices in the United States in an organized manner (Cox, 1981). They lobbied for forest reservations and provided recommendations to private forestland owners and governmental agencies. After years of petitioning Congress, federal forest preservation efforts developed. The Forest Reserve Act was established in 1891, allowing the President to establish forest reserves from public domain land. In 1897, the Organic Act set forth a charter for managing forest reserves. By 1905, the Forest Service was established, unifying all federal forest administration under the USDA (Williams, 2005).

The combination of a centralized Forest Service and forest decline due to natural causes, such as fires, and unsustainable management led to greater government control of the country’s private and public forestland. As a means to control massive fires that burned forests throughout the country, the Weeks Act was passed in 1911, allowing the government “to purchase important watershed land on the headwaters of navigable streams” (Williams, 2005). Within less than a decade, over 2 million acres of private forestland was purchased under the Act, most of it in the Eastern United States (Williams, 2005).

The Forest Service’s involvement in private forest conservation grew during the Great Depression and WWII era. “Shelterbelt Projects” were initiated to reduce forest loss due to the Dust Bowl. Trees were planted on private property as a way to reduce wind erosion and protect crops from wind damage. With WWII increasing timber demand, the Sustained-Yield Forest Management Act was established in 1944. Cooperative units were created to combine Federal timberland management with private land. However, continuous demand for timber led to less
than sustainable yields. The result of “Timber Resources for America’s Future” published in 1958 revealed that more timber was being harvested than being grown.

In response to the report, the Multiple-Use Sustained-Yield Act was established in 1960. The Act sought to ensure that all forms of ecosystem services associated with national forests were treated equally. However, clearcutting continued in the forests and thus, the Wilderness Act was passed in 1964 to establish a National Wilderness Preservation System in which national forest areas with roads were set aside for preservation. To strengthen forest preservation, the National Forest Management Act was passed in 1976, amending the Resources Planning Act of 1974, to regulate the long term planning of national forests. Long term planning required the inclusion of wildlife diversity considerations.

During the same time period, the rising awareness of environmental protection led to numerous environmental legislations that affected forest management (Cubbage & Newman, 2006). The National Environmental Policy Act (NEPA) of 1969 mandated that environmental impacts be analyzed by all Federal agencies. Thus, all forest management activities initiated by the Forest Service had to be first evaluated for its environmental effects. The Clean Water Act (CWA) of 1972 and the Endangered Species Act (ESA) of 1973 set forth provisions for water quality standards and the protection of rare and endangered species, respectively. All of these laws impacted the use and management of forestland in the United States, placing many private forestlands under federal protection.

**Alternative Tools for Forest Preservation**

In the 1980s, the use of alternative land preservation methods, such as conservation easements, rose in popularity as a way to protect open space, wildlife habitat and other sensitive
ecological lands while still maintaining private ownership of the land (Diehl & Barrett, 1998; McLaughlin, 2005). While conservation easements and PDRs have been used in the United States since the late 1880s for the purposes of keeping agricultural and open space land undeveloped, it was not until the 1980s, during rapid urbanization and growing awareness of the value of such undeveloped areas, that these alternative methods were extensively utilized (McLaughlin, 2005). Federal laws protected national forests but tended to regulate private forestland use without keeping them protected as forests. Unless private forestland was deemed under federal authority through acts such as the ESA and CWA, private landowners were allowed to sell their land or develop it. Thus, conservation easements and PDRs became a way to keep private forestland protected and regulated.

Conservation easements are a voluntary means of protecting forests from development via transferring the development rights of the land to a third party, an NGO or governmental agency. They incentivize private landowners by reducing the cost of maintaining the land undeveloped. A “purchase in development rights” (PDR) is a type of conservation easement that involves the *purchase* of the development right by the third party while a conservation easement is a donation of the right. Both terms tend to be used interchangeably; for example, agricultural PDRs are referred to as “purchase of agricultural conservation easements” (PACE) (Wright and Skaggs, 2002).

In a PDR, the landowner earns money from the development right and must pay taxes on the gain earned from the sale. In a conservation easement, because the development rights are donated, the landowner pays no taxes. As such, in towns with use-based zoning, landowners reduce the full fair market value of the land and thereby, reduce the amount in taxes he or she must pay annually (Wright and Skaggs, 2002).
With growing use, the National Conference of Commissioners on Uniform State Laws established the Uniform Conservation Easement Act (UCEA) in 1981. The Act defined the term “conservation easement” and outlined its uses, restrictions and obligations with the goal of providing a solid blueprint for state legislatures to use as a guide when writing their own conservation easement laws (UCEA, 1981). According to UCEA, a conservation easement is

Nonpossessory interest of a holder in real property imposing limitations or affirmative obligation the purpose of which include retaining or protecting natural, scenic, or open-space values of real property, assuring its availability for agricultural, forest, recreational, or open-space use, protecting natural resources, maintaining or enhancing air or water quality, or preserving the historical, architectural, archaeological, or cultural aspects of real property (UCEA Sec. 1(1)).

Section 1(2) of the Act established certain conditions for conservation easements. It restricted conservation easement holders to governmental agencies and charitable organizations, such as land trusts, to prevent any tax incentivized abuses that may occur from its use. It also established the principle that easements be maintained in perpetuity (UCEA, 1981).

Although conservation easements have the benefit of preserving forestland while maintaining it within private ownership, the use of PDRs and the reduction in taxes paid are costs to government agencies. Town residents also incur costs, as they must pay higher taze to absorb the cost of the services. PDRs are purchased through taxes and with conservation easements, state and local governments lose total tax revenue (Daubenmire and Blaine). However, outright land acquisitions tend to be more costly upfront (Gregg Cassidy, personal communication, November 20, 2013).

Recognizing the value of these alternative methods of forest protection, federal programs have been developed to encourage the use of conservation easements and PDRs. An amendment to the Farm Bill of 1990 led to the creation of the Forest Legacy Program (FLP). Through the
FLP, the Forest Service financially supports conservation easement acquisitions by participating states (USDA, Forest Service, 2006). The FLP is only one of many types of federal conservation easements that exist today.

With regulatory measures, 106 million acres (14% of all forestland) of forests in the United States have been protected as of 2010. An average of 1 million acres of forests have been set aside for conservation purposes since Yellowstone was established as protected public land in 1872 (Nash, 1982; USDA, Forest Service, 2011). Conservation easements and PDRs add more. While the area of forestland has remained relatively stable since 1900, regionally, forests are disappearing and becoming fragmented due to human development and greater forest disturbances (USDA, Forest Service, 2011).

II. Forest Conservation in Rhode Island

Forestland conservation has followed a similar path in the State of Rhode Island as the rest of the United States, going through similar fluctuations in forest cover due to land use trends [Fig. 1-2] (Burdett et al.). Rhode Island’s mission statement for forest stewardship aims to “protect and manage the forest resources of Rhode Island to meet the demands for recreation, water supply, wildlife habitat, forest products, and a high quality environment” (RIDEM, 2010).

To achieve these goals for forest conservation, Rhode Island has made fee simple purchases and conservation easements. As Rhode Island has gone through similar fluctuations in forest cover due to land use trends [Fig.1-2], its response to these fluctuations has been toward greater use of conservation easements as well. Modeling its conservation easement law very closely to the UCEA, RIDEM began utilizing conservation easements more so since the 1980s, purchasing its first conservation easement in 1982 (US Endowment for Forestry and
Communities [USEFC], 2012; R.I. Gen. Law § 34-39-2; USEFC, 2012).\(^1\) As of 2012, 64,221 acres of Rhode Island (18\%) are protected under conservation easements.

Another economic incentive is Rhode Island’s Farm, Forest, and Open Space Program (FFOS-P). The General Assembly established the FFOS-P Act in 1980 after recognizing that it was in the public interest to preserve farm, forest, and open space land “to conserve the state’s natural resources”, “to provide for the welfare and happiness of the inhabitants” and “to prevent the force conversion of [such] land to more intensive uses as a result of economic pressures caused by the assessment for purposes of property taxation at values incompatible with their preservation” (RIDEM, 2002).

Under R.I. Gen. Law 44-27, landowners who own at least 10 acres of forestland may enroll in FFOS-P. In doing so, the land is assessed at its current use, rather than its value for development, reducing property taxes. As a stipulation of the Act, landowners must have a forest stewardship or conservation plan that is updated every ten years and are subject to re-inspection every five years to maintain status as forestland (RIDEM, 2002).

**Timeline 1. Timeline of Major Forest Conservation Events in the United States and Rhode Island**

<table>
<thead>
<tr>
<th>Year</th>
<th>Forest Conservation Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1767</td>
<td>31% of RI forested</td>
</tr>
<tr>
<td>mid-1800s</td>
<td>Recognition for the need for forest conservation</td>
</tr>
<tr>
<td>1872</td>
<td>Wilderness preserved for the first time by the federal government</td>
</tr>
<tr>
<td>1876</td>
<td>Appropriations Act passed to fund the study of the nation’s forests</td>
</tr>
<tr>
<td>1886</td>
<td>Forestry became a permanent division within the USDA</td>
</tr>
<tr>
<td>1891</td>
<td>Forest Reserve Act passed, allowing forest reserves to be established</td>
</tr>
</tbody>
</table>

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\(^1\) Under R.I. Gen. Law § 34-39-2, a conservation restriction is a right to prohibit or require a limitation upon or an obligation to perform acts on or with respect to or uses of a land or water area, whether stated in the form of a restriction, easement, covenant, or condition, in any deed, will or other instrument executed by or on behalf of the owner of the area or in any order of taking, which right, limitation, or obligation is appropriate to retain or maintain the land or water area, or is appropriate to provide the public the benefit of the unique features of the land or water area, including improvements thereon predominantly in its natural, scenic, or open condition, or in agricultural, farming, open space, wildlife, or forest use, or in other use or condition consistent with the protection of environmental quality.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1900s</td>
<td>RI forests decimated by natural disturbances</td>
</tr>
<tr>
<td>1905</td>
<td>Forest Service established</td>
</tr>
<tr>
<td>1911</td>
<td>Weeks Act passed, allowing government to purchase private land for watershed protection</td>
</tr>
<tr>
<td>1920s-1930</td>
<td>“Shelterbelt Projects” initiated to protect forests from the effects of the Dust Bowl</td>
</tr>
<tr>
<td>1944</td>
<td>Sustained-Yield Forest Management Act passed to manage timber production on public and private lands</td>
</tr>
<tr>
<td>1960</td>
<td>Multiple-Use Sustained-Yield Act passed to ensure all ecosystem services derived from forests had equal weight</td>
</tr>
<tr>
<td>1963</td>
<td>67% of RI forested</td>
</tr>
<tr>
<td>1964</td>
<td>Wilderness Act passed to set aside more forests under conservation</td>
</tr>
<tr>
<td>1976</td>
<td>National Forest Management Act passed to regulate long term planning of national forests</td>
</tr>
<tr>
<td>1969</td>
<td>National Environmental Policy Act passed, requiring environmental impacts to be analyzed by all Federal agencies</td>
</tr>
<tr>
<td>1972</td>
<td>Clean Water Act passed, establishing water quality standards</td>
</tr>
<tr>
<td>1973</td>
<td>Endangered Species Act passed, protecting rare and endangered species’ habitats</td>
</tr>
<tr>
<td>1980</td>
<td>RI Farm, Forest, and Open Space Program established</td>
</tr>
<tr>
<td>1980s</td>
<td>Use of conservation easements and PDRs rises</td>
</tr>
<tr>
<td>1982</td>
<td>RIDEM purchases its first conservation easement</td>
</tr>
<tr>
<td></td>
<td>RI loses approximately 1,350 acres/yr starting now due to development pressures</td>
</tr>
</tbody>
</table>

**Current Status of Rhode Island Private Forestland**

While more and more forestland has been placed under protection, each new protected area are more fragmented as well. This is due to a declining trend of acreage owned by each landowner [Fig. 2b] (Butler et al., 2002). According to a woodland owners’ survey from 1980 and from 2003, more landowners owned smaller tracts of land in 2003, associated with the subdivision of larger forest tracts (White & Jones, 1980; RI Department of Environmental Management [RIDEM], 2004).

The parcelization of private forestland has been due to a combination of urban development pressures, including increasing population densities, escalating land values from development pressures, and high property and inheritance taxes (Butler et al., 2002). Urban
sprawl and road building have significantly contributed forest development pressures as well (Riitters & Wickham, 2003; Riitters, Coulston & Wickham, 2012). With these factors, the USDA Forest Service estimates an average of 1,350 acres lost per year (Burdett et al.).

A. Impact of Current Rhode Island Forest Status

The decline of large forest tracts has the potential to threaten the future of forest ecosystems and ecosystem services. Smaller parcels exacerbate fragmentation as each landowner may have different forest management perspectives and/or may decide to sell due to economic pressures (Platinga et al., 2007). Forests provide a multitude of ecosystem services that fragmentation and forestland reduction would harm. Forests help mitigate anthropogenic climate change through carbon dioxide intake. They protect watersheds by filtering nutrients out of the water supply. Forests reduce erosion, hold and process runoff, and act as barriers to floods, all of which positively benefit human communities (Smail & Lewis, 2009). Without such ecosystem services, Rhode Island would require extensive monetary expenditures to artificially reproduce these goods. For example, New York City saved billions of dollars by protecting riparian forestland in the Catskill mountains (Sagoff, 2002). By spending $1 billion to purchase the forest and restore the watershed underlying it, New York City was able to provide enough clean water for its inhabitants without building an EPA-mandated new filtration plant (Sagoff, 2002). The new filtration plant would have cost the city an estimated $6 to $8 billion (Sagoff, 2002).

Forests have other economic benefits as well. Forest products, while significantly smaller than it has been in the past, still remains active in Rhode Island. In 2003, 31% of forest landowners commercially harvested parts of their land (RIDEM, 2004). As of 2013, the forest products industry made over $106 million in Rhode Island (American Forest and Paper...
Association, 2013). However, since data collection began in 1950, the areas of harvestable forest and timberland have declined (Butler, 2013). The most recent comparison between 2007 and 2012 revealed a decrease in 90% of annual harvest removals in the state (Butler, 2013). The loss of forestland directly affects the forest economy and through the associated increased potential for invasive introductions, does so indirectly as well. In other areas, non-native pests have entered forests, directly feeding on or destroying valuable timber species, such as hemlocks (RIDEM, 2004).

The introduction of new species and changes in species’ compositions can bring human health implications. A study by Allan et al. (2003) revealed that habitat fragmentation could positively influence disease-bearing vectors, such as white-footed mice, and increase the risk for Lyme disease. Secondly, human recreational opportunities are negatively affected. Reduction of wildlife provides less bird watching and damaged riparian habitats affect fishing opportunities (Harris, 1984; Robinson et al., 1995; Boulinier et al., 2001). Forest reduction means less land for hiking (Harris, 1984).

From a conservation and ecological standpoint, forest fragmentation and reduction also have severe implications. Forest fragmentation threatens terrestrial biodiversity (Laurance, 2008). Fragmentation forms forest edges, changing the habitat structure of the environment. Through changes in precipitation, soil nutrition, and temperature among other changes, species composition and diversity within a community tend to fluctuate and decline from changing fitness levels (Saunders, Hobbs, & Margules, 1991; Heithecker & Halpern, 2007). With these changes at the forest edge, trees may also experience unfavorable conditions, resulting in increased tree mortality and creating a positive feedback loop of forest loss (Bierregaard et al., 1992; Laurance, 2008).
These microclimatic changes may permeate into the forest interior as well, even with tree resiliency at the forest edge (Ranney, Bruner & Levenson, 1981; Harris, 1984; Chen, Franklin & Spies, 1992). Ranney et al. (1981) found microenvironmental changes extending 15m into the interior in deciduous forest patches of southeastern Wisconsin. Moreover, fragmentation creates island effects, or isolated habitats, that can increase a species’ extinction risk (Miller & Harris, 1977; Miller, 1978; Harris, 1984; Riitters, Coulston, & Wickham, 2012). Certain species require dispersal for reproduction and these isolated habitats may prevent its movement and recruitment potential (McEuen & Curran, 2004; Aune, Gunnar Jonsson, & Moen, 2005). Species may also require large habitat ranges or may need to migrate to find more suitable habitats; fragmentation creates barriers to such movement (Robinson et al., 1995; Palomares et al., 2010). Thus, protection of private forestland holds great value for biodiversity preservation purposes [Table 1].

<table>
<thead>
<tr>
<th>Provisioning</th>
<th>Regulating</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Goods people can extract from nature)</td>
<td>(Benefits that control natural processes in a way favorable to humans)</td>
</tr>
<tr>
<td>• Clean Water</td>
<td>• Water Filtration</td>
</tr>
<tr>
<td>• Timber</td>
<td>• Carbon Sink</td>
</tr>
<tr>
<td>• Fish</td>
<td>• Flood Protection</td>
</tr>
<tr>
<td>• Food</td>
<td>• Erosion Protection</td>
</tr>
<tr>
<td></td>
<td>• Reduce risk of Lyme Disease</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cultural</th>
<th>Supporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Emotional/psychological benefits)</td>
<td>(Biogeochemical and ecological processes necessary for the production of all other ecosystem services)</td>
</tr>
<tr>
<td>• Hiking</td>
<td>• Nutrient Cycling</td>
</tr>
<tr>
<td>• Fishing</td>
<td>• Temperature Regulation</td>
</tr>
<tr>
<td>• Bird Watching</td>
<td>• Precipitation Cycling</td>
</tr>
<tr>
<td></td>
<td>• Wind Protection</td>
</tr>
</tbody>
</table>

Table 1. – A set of Ecosystem Services accrue from forests summarized from Section II.
Constituting 74% (269,360 acres) of Rhode Island’s forests, private forestland protection is essential toward achieving Rhode Island’s forest stewardship goals. As conservation easements serve the purpose of “provid[ing] the public the benefit of the unique features of the land” and supporting the “protection of environmental quality”, a tight relationship between private forestland and conservation easements exist (R.I. Gen. Law § 34-39-2). The following section analyzes the effectiveness of this relationship within the State of Rhode Island.

**III. The Use of Conservation Easements for Private Forestland in Rhode Island: A Case Study**

Since RIDEM purchased its first conservation easement in 1982, 1,521 easements have been purchased in Rhode Island, protecting 64,221 acres [Fig. 3] (USEFC, 2012).

**Figure 3. - GIS map of all conserved land within RI.** The conserved land is then further differentiated in blue if the land is conserved through a conservation easement. The land under conservation easement is then differentiated in red if it is under conservation easement through the Forest Legacy Program. The properties under Forest Legacy Program are protected private forestland, however, the type of land protected under the other two types of conserved land are unknown.
In Rhode Island, conservation easements can be purchased by federal, state, local
governments or NGOs. They can also be purchased through a collaborative effort among
interested government agencies and non-profit organizations. By collaborating, the parties can
delegate responsibilities and share funds in order to purchase and monitor easements. Depending
on the party that holds the easement, the ways in which the easements are purchased may differ.

A. Federally funded State held Conservation Easements

RIDEM holds 3,236 acres under forestry easements through the Forest Legacy Program
[Fig. 3]. These easements were purchased through a partnership between RIDEM and the USDA,
Forest Service (USFS) Forest Legacy Program (FLP), which provides grants for participating
states to purchase conservation easements (Food, Agriculture, Conservation and Trade Act,
1990).

Through the program, the USDA, Forest Service establishes forest conservation
standards. In addition to the rules aforementioned by the UCEA, participating projects must have
a forest management plan (FMP) that is updated every ten years and must be monitored annually
(USDA Forest Service, 2003). Through requiring a FMP, the FLP reduces the pool of applicants
who inquire simply looking for tax breaks, attracting a greater proportion of those with a
stewardship mindset who own land with pertinent qualities under the FLP (Gregg Cassidy,
Personal Communication, October 7, 2013). As such, the FMP requirement selectively weeds out
potential applicants with objectionable intentions (Gregg Cassidy, Personal Communication,
October 7, 2013). However, the Program only provides funds for easement acquisition without
providing funds for annual monitoring efforts. This has become an issue for RIDEM, which short
on staff, has had difficulty in monitoring annually (Gregg Cassidy, Personal Communication, October 7, 2013).

Another issue highlighted by RI’s participation in the program has been the fact that conservation easements exist “in perpetuity”. Therefore, whomever the ownership goes to after the landowner who originally accepted the conservation easement passes away must continue to abide by the easement conditions (McLaughlin, 2005). While this is a general issue with conservation easements as a whole, it becomes especially problematic for those who are participants of the FLP. The easement holder, RIDEM in this case, has the responsibility of maintaining a forest management plan, which has to be proactively updated and must act in accordance with the plan (USDA Forest Service, 2003). A lack in desire to uphold the stipulations of the easements will cause the State to lose its ability to apply for future FLP projects. Furthermore, because easements are a collaborative conservation effort between the holder and the landowner, continual communication is required, which the new landowner may not desire. Such an instance has entailed RIDEM to seek legal counsel to help enforce the regulations bound with the property (Gregg Cassidy, Personal Communication, October 2, 2013).

This has been the case for at least one FLP project within RIDEM. The landowner who acquired the title to the land under conservation easement refused to communicate with RIDEM. As the land was purchased with the help of the FLP, RIDEM was required to seek legal actions for the lack of communication between RIDEM and the new landowner prevented RIDEM from meeting the FLP compliance standards.

**B. Solely State held Conservation Easements**
In addition to the 3,000 acres of forests under conservation easements through the FLP, RIDEM holds conservation easements on 59,262 acres of open space as of 2012, constituting 79% of all conservation easements in Rhode Island (USEFC, 2012) [Fig. 4]. In combination with the FLP, RIDEM purchases conservation easements for forestland through land acquisition grants from the State. Within a ten-year period (2002-2012), RIDEM has protected 15,502 acres of land, a $171.5 million value, through using $46.6 million in state funds and leveraging the rest through federal and local investment (RIDEM, 2012).

Issues similar to those associated with the FLP exist at the state level, however, because conservation easements are not attached to a federally regulated program, the conditions for the easements tend to be more lenient. RIDEM purchases a number of easements based on
opportunities present. These easements are purchased using state bonds or other departmental funds if an interested party contacts RIDEM and if RIDEM determines, after monthly land acquisition meetings, they have the resources to do so (Gregg Cassidy, Personal Communication, July 17, 2013). In evaluating the amount of resources RIDEM can allocate for an easement purchase, they consider financial and time availability. An easement’s effectiveness in conserving forests is only ensured if it is monitored. Thus, RIDEM prefers fee simple acquisitions over conservation easements: through outright purchases, RIDEM saves the long-term cost of monitoring, which is an issue for RIDEM’s conservation easements that are not under the FLP (Gregg Cassidy, Personal Communication, November 15, 2013).

The loss of staff in the Department has been a major reason for the decline in monitoring and use of easement purchases (Gregg Cassidy, personal communication, November 15, 2013). Even though RIDEM is unable monitor all of its easements, due to lack of accountability and enforcement by the State, RIDEM has been able to continue purchasing easements without ensuring that the lands already under easement are acting in accordance with its restrictions (Gregg Cassidy, Personal Communication, December 13, 2013). Moreover, land acquisition funds come from bond money. Thus, funding to purchase land or easements does not depend on proper monitoring and/or management, rather it depends on the public’s interest on open space conservation, which the public supports (RIDEM, 2004). As monitoring efforts are not included within land acquisition bond money and cannot be used for monitoring purposes, the separate financial sources allow for land to continue to be purchased (Gregg Cassidy, Personal Communication, December 13, 2013).

While monitoring is an issue of concern that will be addressed later, the existence of an easement provides some assurance that the property owner is less likely to subdivide and develop
the property. Landowners also appear to share this sentiment. In a 2003 survey of over 2,500 stakeholders of RI forests, most felt that while the State owned more land that it could adequately manage, it should continue to buy conservation easements if a potential for the forestland being sold for conversion existed (RIDEM, 2004).

Another issue that must be considered is the fragmentation of the easement purchases. Rhode Island’s method of land conservation is reactionary. The State does not actively seek out land acquisitions; however, if employees of RIDEM find “for sale” signs on property that looks valuable, RIDEM may seek further information (Gregg Cassidy, Personal Communication, December 11, 2013). Most often, landowners call in inquiring if their property qualifies for an easement. Thus, easement purchases may not be located in the most strategic locations. This issue becomes less of a concern at the local level due to a greater connection between landowners and local government/organizations.

C. Locally held Conservation Easements

Local agencies deal with a smaller group of landowners and thereby, tend to know more about the land conservation concerns occurring in their neighborhood (Gregg Cassidy, personal communication, November 6, 2013). These agencies, therefore, may be better equipped to handle conservation matters, communicating with landowners with property in strategic conservation areas, persuading them to either maintain proper stewardship or enter into an easement. However, focusing on a local scale, their priorities may not be associated with more regional/state issues such as watershed protection. The second advantage lies in the organizations’ monitoring capacities.
Some land trusts, such as Sakonnet and South Kingston Land Trusts, accrue enough volunteers to delegate monitoring efforts (Sakonnet Preservation Association Newsletters, 2013; Site Lines, 2013). Volunteers attend a half-day training session approved by the Land Trust Alliance and then spend a day in pairs or teams visiting easement sites, noting any discrepancies. The use of “monitoring days” and volunteer aide has been an effective measure for conservation easement monitoring. Landowners expect annual inspection, reducing the risk that they will violate the conditions of their easement. In the past five years, Sakonnet Preservation Association has only encountered minor violations on the 17 properties (124 acres) covered by conservation easements, and these did not require any extensive action (Heather Steers, personal communication, November 4, 2013).

Other land trusts do not have the public support base for such monitoring methods. However, due to their size, they also do not own as many easements. The director of the Weekapaug Foundation for Conservation stated that while the organization does not conduct any formal monitoring, the director knows each of the 31 landowners individually and thereby, visits the property on an annual basis (Michael Doyle, personal communication, November 4, 2013). Therefore, the potential for and severity of conservation easement violations are smaller compared to that of RIDEM’s easements.

However, as a drawback to working in a localized setting, protected lands tend to be smaller. Moreover, depending on the activeness of the community, the amount of land conserved varies. For example, South Kingstown’s active land trust has been able to conserve more forestland in total than in Foster, where land trusts are not as active. However, as a tradeoff, South Kingstown is a more populated town and thus, each parcel protected under a conservation easement is on average smaller than the few forest areas protected under a conservation easement.
in Foster [Fig. 5]. On average, locally conserved land protect 15.02 acres per parcel while state conserved land protects 86.64 acres.

Even though most of the properties under conservation easements are located relatively close to other conserved lands [Fig. 6] and forestland in the State seems relatively intact [Fig. 7a], small disturbances and edges can have feedback effects as mentioned earlier. These properties are also subject to the environmental conditions faced on and by non-conserved, developed areas [Fig. 7 a & b].
Figure 6. – Histogram of the distance frequency of the conservation easements in Rhode Island. Most are within 512 feet of another. Data from NCED database.

Figure 7. – GIS map of urbanization and conserved land. (a) Urban areas are defined as areas with significant populations by the 2000 census and/or as areas with industrial centers as determined by RIGIS. While much of the conserved land is separated from urban areas, major roads cut through much of the rural, forested areas. Moreover, a closer look into the forested areas reveal that the forests are subdivided into small parcels, which the small inset from Foster showing the average acreage of the properties in the box to be 14.67 acres. (b) The areas of high conversion risk are defined by the proximity of a property to major roads. While the Maine Forest Service (2009) determined any forests within 5 miles of a major road was at a high risk of deforestation, that would cover the entire state. Thus, the distance to major roads was reduced to within 1 mile as that would indicate high conversion risk if it were referring to a local road. The map indicates that (157,680.73 acres) of currently not protected forestland has a high likelihood of conversion for development.
In regards to the easement holders, the main issues are a lack of active monitoring and fragmentation issues [Table 2]. Private forestland owners and other forest stakeholders share these concerns (RIDEM, 2004). With these shared concerns on conservation easements, the next sections reviews the methods that have been utilized to address these two disadvantages.

<table>
<thead>
<tr>
<th>Easement Holder</th>
<th>Benefits</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Government</td>
<td>• More thoroughly outlined set of rules and regulations</td>
<td>• Does not fund monitoring requirements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Takes 2 years for easement purchase to be complete*</td>
</tr>
<tr>
<td>State Government</td>
<td>• Can examine potential ecosystem services protected to a full extent</td>
<td>• Owns too many easements to properly monitor</td>
</tr>
<tr>
<td></td>
<td>• Have more resources available than local agencies</td>
<td>• Lack updated GIS data</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Makes non-strategic purchases</td>
</tr>
<tr>
<td>Local Municipalities &amp; NGOs</td>
<td>• Greater communication with landowners</td>
<td>• Localized scale of easement purchases make fragmentation/ ecosystem services difficult to evaluate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Monitoring not consistent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Smaller projects</td>
</tr>
</tbody>
</table>

Table 2. - Summary of the benefits and problems associated with easements held by the state and local governments and land trusts/other NGOs. While the federal government does not hold forestry-related conservation easements, the benefits and problems associated with the FLP, the federal conservation easement funding program, are listed. *Addressed in Part IV(a).

IV. Addressing the Main Conservation Easement Issues

A. Monitoring

The lack of monetary resources has made RIDEM’s current use of staff for ground monitoring infeasible. Thus, monitoring efforts can be addressed in two ways: first, by determining methods to increase resources and secondly, by determining alternative methods of monitoring. In regards to the first, RIDEM can request bond initiatives for land acquisition to
include all its associated externalities. In doing so, land acquisition bond money can be used to monitored acquired land. For future land acquisitions, RIDEM’s land acquisition committee can include monitoring into its calculation when determining the cost of acquiring new land. Thus, a small change to the language of land acquisition bond money initiatives can help alleviate some of the problems associated with Rhode Island’s conservation easement monitoring efforts.

Conservation easements purchased through partnerships between the state and local municipalities or NGOs provide additional resources for monitoring. Such easements can be monitored by any of the partnered organization. This can alleviate some of the monitoring burden from RIDEM by delegating the responsibility unto its partners.

Alternatively, or in conjunction to increasing monitoring resources, there are various monitoring methods that may better suit Rhode Island’s monitoring needs. In some states, land trusts have outsourced monitoring to consulting firms. This has the advantage of having specialized and experienced individuals inspect the land (Bouplon & Lind, 2008). According to the Mojave Desert Land Trust, the use of consultants “brings in familiarity with field work and real estate transactions allowing for services to be done quickly” (Bouplon & Lind, 2008). Nevertheless, it tends to hold less popularity than the use of staff for volunteers because it hinders building relationships between the landowner and the easement holder (Bouplon & Lind, 2008).

Therefore, increasing efficiency in ground monitoring by staff and volunteers may address the cost of time. One technique is the use of indicators, aspects of the ecosystem whose existence or abundance would be indicative of the ecological health of the site (Carignan & Villard, 2002). This prioritizes the time spent on each property. However, this requires that the
monitor knows what indicators to use, that the indicator can accurately be tested on the site, or that the indicator exists.

Similarly, geospatial system (GIS) data can be used to monitor changes (Lind, 2001). GIS shapefiles of key attributes can be documented on the property, pinpointing how conditions ought to be in certain areas. Thus, monitors can examine specific areas of importance.

Unfortunately, this requires that each property under easement is initially examined on-site to input ecological data with specific coordinates, which has not been done. The lack of sufficient ecological data in RIDEM and Rhode Island Geographic Information System (RIGIS), the two leading GIS data collectors in the state, suggest that this option may not be the most feasible in the current situation.²

In lieu of traditional ground monitoring, technological methods also exist. Remote sensing, such as LiDAR, allow for very fine-grained imaging of properties in which underground soil disturbances can also be determined (Ross, Sader & Reed, 2003). With this technology, once ground truthing confirmed the accuracy of the measurements, no additional ground monitoring would be needed. Remote sensing produces data for above and below ground biota, allowing for any tree cuttings or disturbances to be pinpointed (James Kellner, Personal Communication, December 3, 2013). However, current remote sensing technology is highly expensive, such so that Rhode Island only initiated one LiDAR data collection in 2011 (Rhode Island Geographic Information System, 2011). This remains unhelpful, as monitoring requires multiple datasets

² While some ecological features, such as forest habitat type and invasive plant existence, have recently been updated (2012), others such as Natural Heritage Areas, which pinpoints the existence of rare species and/or noteworthy natural communities, have not. The most recent data in existence dates from August 1990. Moreover, 2005 shapefiles from the Rhode Island Wildlife Action Plan (WAP) only exist for trout habitats and endangered species. However, starting this Fall 2013, the WAP will be updated, reassessing priority species and habitats, determining threatened fish and wildlife. The updated WAP will be completed by early 2015, if all goes according to plan (RIDEM, 2015).
from multiple years to analyze changes in the land. Thus, remote sensing is currently an unfeasible solution for Rhode Island.

Satellite imagery, while one level below remote sensing in terms of precision, is an expensive solution as well. Even though the quality of data for monitoring would be worthwhile, the expense makes it most suitable for large-scale properties (Bouplon & Lind, 2008). Large-scale, in this scenario, refers to tracts of land that are larger than any property Rhode Island could potentially protect. Easements monitored via satellite imagery include the Pingree Forest in Maine, which protects 762,192 acres of forest, an area larger than the state of Rhode Island (Bouplon & Lind, 2008).

The cheapest aerial tactic, however, could be a potential option for Rhode Island. With aerial photography, a plane flies over a property, capturing a bird’s eye view of the land (Lind, 1991). While there is an upfront cost of acquiring the data, it saves a lot of staff time in monitoring each tract by land. Through aerial information, staff can peruse through several thousands of acres of property, looking for apparent easement violations, then ground-truth them through site visits while slowly visiting other conserved property as time permits.

The Society for the Protection of New Hampshire Forests utilizes this method for its more than 500 easement properties and has found it to be an effective way to monitor (Society for the Protection of New Hampshire Forests, 2006). In New York State, the Columbia Land Conservancy also uses this method for its 159 easements. The Columbia Land Conservancy aerially monitor every year and ground monitor every two years. In the fiscal year 2012, the total cost of monitoring cost $82,976 for its 22,860 acres (Columbia Land Conservancy, Inc., 2013). As RIDEM owns roughly two times as many acres as the Columbia Land Conservancy, it would potentially cost RIDEM around $166,000 if the cost is proportional (USEFC, 2012). Yet,
because the State is quite small, Rhode Island has the potential to partner with local municipalities and land trust to acquire aerial photography of the entire state using pooled resources and then sharing the data.

However, for RIDEM or any other agency/organization in Rhode Island to use aerial photography for conservation easements of forestland, they must supplement their monitoring with on-site visitation. Aerial photography hides activity under forest cover and thus, any easement violations occurring below the forest canopy would not be detected. Although this may seem more costly, for those who feasibly cannot monitor all of its easements annually, such as RIDEM, it allows for monitoring to be prioritized. The properties with very evident violations can be visited first ensuring that violations are properly addressed.

Thus, a couple of options exist for RIDEM and other agencies that are experiencing active monitoring difficulties [Table 3]. Organizations can follow the model of the larger Rhode Island land trusts and coordinate volunteer monitoring efforts. If volunteer use is not possible, staff can become more efficient monitors by looking out for indicators or using some of the available GIS data to seek out key attributes that the easement protects. They can also pool their resources to obtain aerial data, saving more time spent monitoring.
B. Fragmentation

Fragmentation stems from the subdivision of forest property (RIDEM, 2010). By promoting and economically incentivizing forest stewardship, private forestlands have a greater probability of remaining intact (USDA, Forest Service). In doing so, conservation easements can be utilized more effectively.

The FLP attempts to spend its money wisely on conservation easement projects. It prioritizes projects protecting threatened forests with significant ecosystem services, such as biodiversity, water resource protection and productive soils (USDA, Forest Service, 2013). As such, the National Forest Legacy Committee also takes into consideration projects have strategic

<table>
<thead>
<tr>
<th>Ground Monitoring Methods</th>
<th>Strategy</th>
<th>Benefits</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site by volunteers</td>
<td>• Proven effective</td>
<td>• Initial cost of training</td>
<td>• Must rely on volunteers’ capabilities</td>
</tr>
<tr>
<td></td>
<td>• Cheap</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site by easement holder</td>
<td>• May know property well</td>
<td>• May not be feasible due to lack of resources</td>
<td></td>
</tr>
<tr>
<td>On-site by consultants</td>
<td>• Well-trained</td>
<td>• Doesn’t maintain relationship with landowner and easement holder</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Gets monitoring done quickly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-site with GIS data</td>
<td>• Can prioritize monitoring by focusing on key areas</td>
<td>• Requires updated data and solid baseline documentation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technology-Based Methods</th>
<th>On-site with indicators</th>
<th>Can prioritize monitoring by focusing on key areas</th>
<th>Requires the existence of indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Requires indicators to be an accurate evaluation of site health</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Require monitors to acknowledge indicators</td>
</tr>
<tr>
<td>Remote Sensing</td>
<td>• Fine-scale data</td>
<td></td>
<td>Highly expensive</td>
</tr>
<tr>
<td></td>
<td>• Saves time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satellite Imaging</td>
<td>• Saves time</td>
<td></td>
<td>Highly expensive</td>
</tr>
<tr>
<td></td>
<td>• Good quality data</td>
<td></td>
<td>Only cost effective for large easements</td>
</tr>
<tr>
<td>Aerial Photos</td>
<td>• Saves time</td>
<td></td>
<td>Upfront photography cost</td>
</tr>
<tr>
<td></td>
<td>• Can be coupled with on-site monitoring</td>
<td></td>
<td>Below canopy imaging not possible</td>
</tr>
</tbody>
</table>

Table 3. - Summary of the various monitoring strategies and their benefits and problems.
value, i.e. - large tracts or projects that are adjacent to already conserved land (USDA, Forest Service, 2013). Recognizing this, Rhode Island began favoring such types of projects.³

For the 2015 fiscal year, Rhode Island submitted two projects to the USDA, Forest Service. One was an 892.4 acre property with the largest acreage and the other was a 45.8 acre inholding within Arcadia State Management Area. However, the Program is a two-year process (USDA, Forest Service, 2006). Thus, some landowners may not find the long process of the FLP and the associated paperwork a desirable tradeoff for the forest conservation and tax incentive (Gregg Cassidy, personal communication, November 20, 2013).

Rhode Island’s Farm, Forest, and Open Space Program (FFOS-P) is an alternative for landowners who want a tax break and do not want to go through the lengthy FLP process. As of 2013, 436 landowners participate in FFOS-P under Forestry classification and 43,079.4 acres are protected [Fig. 8]. Through the FFOS-P, forest properties are monitored on an annual basis. By participating in FFOS-P, landowners also increase their chance of being selected by Rhode Island’s Forest Legacy Committee. FFOS-P provides assurance to Committee members that the landowner is indeed a steward for forestland conservation and the inclusion of a forest management plan makes it favorable to the State and National Committee. FFOS-P participants then can be further economically incentivized to conserve their forests through the FLP, which would in turn protect the forest in perpetuity. Thus, FFOS-P is a viable option for landowners who want to begin conserving their forestland.

³ In FLP, states pre-select projects to go forward for National Review. In RI, a Forest Legacy Program Committee composed of RIDEM employees from various divisions and NGOs meet to select the projects they believe will have the greatest chance of ranking highly and being awarded funding. The number of projects awarded funding varies year to year, depending on the President’s budget; thus, ranking near the top is desirable to ensure that one’s project gets funded.
To increase FFOS-P’s potential to effectively conserve private forestland, landowners must be educated and made aware that the program exists. Landowners believed that RIDEM ought to promote incentives for active forest management and provide informational materials about FFOS-P (RIDEM, 2004). Many surveyed felt the requirement of an active forest management plan would create greater expenses than the amount of money that would be saved from participating (RIDEM, 2004).

Through GIS technology, forests areas can be prioritized based on how much impact it would have on its surrounding environment. Using ecological and land use attributes deemed
important by the USDA, Forest Service, RIDEM began mapping out priority forest areas in the early 1990s. Some attributes included in the current strategic mapping effort include: natural heritage sites, special resource protection waters, and proximity to I-95 among many others. In doing so, RIDEM was able to determine areas within which the Division of Planning and Development ought to focus its forestland conservation efforts [Fig. 9].

This provides the opportunity for RIDEM to prioritize forest conservation efforts. For the FLP in the 2015 fiscal year application process, RIDEM communicated with land trusts and NGOs near potential projects to inquire if landowners around the area would be interested in participating in the FLP alongside landowners who had already sent in applications.
Collaboration between the State and NGOs can increase the effective use of conservation easements by protecting larger forest tracts.

This methodology has also been utilized in New York State for land use planning. Through GIS, New York established priority lands for conservation protection within Sterling Forest, a State managed park. The map helped negotiate a conservation-development plan, in which NGOs and development corporations allocated lands within the forest for preservation and for development (Lathrop & Bognar, 1998). While forestland was lost, it minimized the impact of forest loss by allowing development only in regions that did not fragment the largest contiguous forest blocks and did not impinge upon the Appalachian Trail corridor, an area found important for wildlife and human aesthetics (Lathrop & Bognar, 1998). Therefore, having a map prioritizing private forestland will be beneficial for instances when economic development and forest conservation collide.

Therefore, to reduce forest fragmentation and subdivision of forestland, Rhode Island has a multitude of options [Table 4]. It can promote tax incentives, work with other conservation-minded organizations, and utilize technological tools. It also has the option of using all these measures to influence local governments and private property owners to more effectively prioritize and protect forest lands and forest-related ecosystem resource values. Thus, the following section discusses the various solutions that can be implemented to better Rhode Island’s use of conservation easements.
V. Recommendations to improve the use of conservation easement practices in Rhode Island

In evaluating the extent to which Rhode Island has effectively utilized conservation easements to protect extant forestland and its associated ecosystems, one can confidently state that conservation easements have aided in the conservation of significant acreages of forestland. While federal and state regulations on forest preservation, such as the Clean Water Act and timber harvest regulations, have and continue to protect extant forestland, these measures tend to be less popular with the public than volunteer conservation efforts. With this growing recognition and greater use of conservation easements, Rhode Island has protected 64,221 acres of land through conservation easements, of which at least 3,236 acres are forested (USEFC 2012). In doing so, ecosystem services within such forests have also been protected in Rhode Island to the extent that they have not completely disappeared from urban development. However, as the previous sections have emphasized, monitoring and fragmentation issues are the main problems associated with current use. Therefore, recommendations are made with these two issues in mind.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Benefits</th>
<th>Problems</th>
</tr>
</thead>
</table>
| Forest Legacy Program (FLP) | • Reduces economic pressure to develop  
• Requires forest management plan  
• Tends to protect large intact forests or forests that abut already preserved land  
• Takes ecosystem services into valuation | • Must compete with larger states  
• Takes 2yrs to complete projects  
• Not well known by the public |
| Farm, Forest, Open-Space Program (FFOS-P) | • Reduces economic pressure to develop  
• Requires forest management plan  
• Can complement the FLP | • Not well known by the public |
| Prioritization of Forests with GIS | • Helps prioritize forests with important ecological/economic values  
   • Saves time/money  
   • Aides in sustainable land development | • Requires accurate GIS data |

Table 4. – Summary of the various fragmentation reduction strategies along with the benefits and problems associated with each.
A. Recommendations for local agencies

Improving Monitoring

Land trusts and local agencies tend to have solid monitoring efforts. Those with the resources utilize them effectively by organizing volunteer monitoring days. Those without the resources tend to know their limits with easement purchases, only acquiring to a feasible level that can be handled by limited staff. Both types frequently have solid relationships with the landowners. This ensures, that in the very least, site visits are made informally. However, greater consistency and documentation would improve monitoring for these agencies. In this regard, local agencies may partner with RIDEM to acquire annual aerial imaging of their conservation easements. This would provide some assurance that no severe easement violations are being made.

Secondly, as Rhode Island towns are nearby one another, local agencies can pool their volunteer resources, at least for monitoring days. Insofar as monitoring days occur over a two-day period annually, volunteers who want to monitor may not get the chance to due to scheduling conflicts. Thus, if land trusts were to partner with each other, members of one land trust may monitor an easement site purchased by another agency. Doing so would not only benefit those agencies with limited membership and resource; it would also benefit the agency providing assistance by protecting the ecosystem services within those easements that do not abide by property lines.

Reducing Fragmentation

Working at a local scale has both a benefit and harm to reducing fragmentation. As a benefit, it allows for greater personalized interaction with landowners. In this regard, land trusts
and other NGOs can help promote FFOS-P, increasing awareness and educating its community about the existence of such conservation programs. Moreover, for land trusts, it is one of the roles they aim to fill. According to the RI Land Trust Council, one of the main goals of their coalition is to “increase public awareness and participation in conserved lands and land trust” (2011). Thus, promoting FFOS-P is a very viable and feasible option for local agencies to pursue. This initial step can promote the more effective use of conservation easements. Moreover, through FFOS-P, public funds are not used to protect forests. As such, the FFOS-P helps evaluate potential conservation easement holders of their stewardship prior to spending public funds to hold forestland in perpetuity. The FFOS-P additionally saves public funds by ensuring the stewardship-oriented landowners are provided easements.

The issue associated with working at a local scale, however, is the potential to ignore the statewide effects of forest conservation. Focusing on localized scales may shift priorities away from issues that may affect multiple towns or towns downstream of rivers/watersheds. Secondly, as local agencies are smaller than RIDEM, the size of the protected lands tend to be smaller, on average. The most applicable option for local agencies is to partner with RIDEM. It allows for these local agencies to gain a wider perspective on the ecosystem service resources that exist within the state and allows for greater land areas to be protected. Figure 6 exemplifies this potential. Local and state conserved lands were both smaller than lands conserved through a collaborative effort between the State and a local agency. Thus, partnerships would yield the greatest benefit overall.

**B. Recommendations for RIDEM**
RIDEM, as the primary conservation easement holder, purchases easements through federal programs and state bond monies. While there is a general consensus of purchasing easements as better than not, conservation easement purchases by the state could improve even with their lack of resources.

**Improving Monitoring**

In order to improve monitoring with limited resources, three potential options exist. First, RIDEM could accrue a volunteer troop through public service announcements and have the volunteers monitor the easements, in the same manner local agencies do (Gregg Cassidy, Personal Communication, November 13, 2013). Second, as RIDEM has purchased conservation easements from NGOs, such as The Nature Conservancy and South Kingstown Land Trust, RIDEM could add monitoring requirements to the conservation easement deeds for these organizations. RIDEM could require that organizations owning land under conservation easement must monitor other conservation easement properties as a stipulation of the contract. Lastly, RIDEM could partner with interested organizations and purchase an aerial imaging service. Whether or not the cost would be too expensive is unknown. However, as a relatively cheap and efficient method of quickly monitoring easements for any severe violations, it is a potential option RI ought to consider.

**Reducing Fragmentation**

Because landowners are usually the first to inquire about an easement on his or her property, easement purchases may not be located in the most strategic areas. RIDEM could save funds to purchase a conservation easement in a more strategic area that protects more acres than
spend limited funding on land with less ecological value. However, a tradeoff exists. Because conservation easements require landowner participation, waiting to pursue more strategic options runs the risk of losing less valuable forests. Thus, in addition to subdivision of land and development pressures, strategic conservation easement purchases needs to be addressed to reduce fragmentation of private forestland.

Efforts are already being made to more strategically purchase conservation easements. RIDEM already partners with local municipalities and NGOs to determine if there are any properties in which conservation easements are a worthwhile purchase (Gregg Cassidy, Personal Communication; Lisa Primiano, Personal Communication). Yet, this communication can be utilized more often. Especially in regards to applying to the FLP, a lengthy process, starting communication early to find landowners who may be interested in participating together to conserve a greater area will not only benefit landowners, but it will also increase the probability of Rhode Island’s FLP application being granted funding. Having land trusts talk with landowners, who they’ve already garnered trust and relationships with, would improve conservation of key properties that abut already protected land.

Secondly, landowner awareness of conservation options for their forestland would increase the amount of inquiries RIDEM receives, increasing the pool of applicants to purchase easements from. Working alongside local organizations, a greater probability for spreading information about the FLP, FFOS-P and forest stewardship to private landowners exist. As many landowners chose not to enroll in FFOS-P because they believed it would be a poor economic investment, greater educational efforts can aid in increasing FFOS-P participation (RIDEM, 2004). Moreover, many more suggested they lacked enough information about the FLP or FFOS-
P to even consider enrolling/applying (RIDEM, 2004). Thus, informational brochures and educational pamphlets would greatly aid participation.

Lastly, GIS technology can effectively prioritize resources for NGOs and governmental agencies. Data from RIGIS can determine conserved properties in RI and data from local town tax assessors can highlight property owners that own forest property near or abutting conserved land. These would be key focus areas that land trusts and governmental agencies should allocate time towards. Increasing the acreage of contingent forestland would reduce the effects from fragmentation and better preserve inner forest habitats. RIGIS data can also determine key forest areas by underscoring areas with many resource values, such as water protection, ecological habitats, etc.

As productive as GIS use would be, more frequent data collection, especially for tax parcelization and land use, is required to ensure accuracy. Educational institutions, such as URI and Brown, have completed GIS work for the State in the past and currently, URI is the State’s main data collector. URI and RIDEM ought to coordinate efforts, determining which data is most necessary and delegating data collection between the two organizations. While the start up cost may be high, the amount of time and resources that would be saved from the data would be significant enough to make up for the initial loss.
C. Conclusion

The report examined the extent to which conservation easements in the state of Rhode Island has been utilized to protect the State’s extant forests. Forest conservation rose out of the 1850s when people realized the shift in habitat structure due to forest loss (Nash, 1982). Pioneers of the movement, such as Henry David Thoreau and James Perkins Marsh, led to the first federally protected wilderness area in 1872, Yellowstone National Park (Nash, 1982). With continuing land acquisitions for conservation purposes, the federal government recognized in the 1980s the need for new conservation measures and many valuable lands lay in private hands. Thus, the use of conservation easements became readily used (McLaughlin, 2005).

Forest conservation efforts occurred in similar fashion in Rhode Island. By the 1980s, Rhode Island purchased its first conservation easement and currently, RIDEM holds 59,262 acres under an easement. Out of the 18% of forestland under conservation easement, 79% of it is held by RIDEM. Local municipalities and NGOs hold 14% (6,553 acres) and the federal government holds 7% (3,236 acres). While much progress has been made in preserving forestland and while
the State has made large improvements in maintaining 54% of the State as forestland, around 1,350 acres are lost annually due to development pressures (Butler, 2013; Burdett et al.).

Alongside fee simple acquisitions and conservation easements, the General Assembly passed the Farm, Forest and Open Space Act in 1980, establishing a conservation program that economically incentivizes such landowners to conserve their farm, forest or open space (RIDEM, 2002). All of the methods of conservation have been effective in preserving the State’s forests, however, in focusing on the use of conservation easements, two key necessities required improvement for greater success: fragmentation and monitoring.

The current method of purchasing conservation easements could be improved upon to reduce the effects of fragmentation, which could further forest loss. Moreover, the lack of active monitoring in part by RIDEM requires attention to evaluate proper assessment of protected forests. As the recommendations section have outlined, both state and local agencies would gain the most benefit from collaborating and sharing resources. Pooling efforts can improve the frequency of monitoring, increase public awareness of forest importance and available forest conservation options, and allow for more technological assistance to be used. Through these efforts, the use of conservation easements to protect private forestland in Rhode Island has the potential to become a more effective conservation tool for the State.
**Works Cited**


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R.I. Gen. Law § 34-39

R.I. Gen. Law § 44-27


