Refining the Watershed Forest Management Planning Program: A Focus on 480-a

WATERSHED AGRICULTUAL COUNCIL (WAC)
2017 FILTRATION AVOIDANCE DETERMINATION (FAD) RECOMMENDATIONS

Prepared by:
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Forestry Program
nycwatershed.org

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Executive Summary

Forest management planning has been part of the WAC Forestry Program since its inception in 1998. After an evaluation of the Watershed Forest Management Planning (WFMP) Program, WAC has confirmed that plans educate landowners. However, there's no indication that this education translates into the implementation of BMP's or sustained yield management. The protection of water quality and the promotion of economic viability are key aspects of WAC's mission. If forest management plans aren't protecting water quality with BMP's or promoting economic viability through sustainable management, what does the WFMP Program provide?

Over the past 13 years, the WFMP Program provided forest management plan funding for 73% of properties in the Watershed region that are enrolled in the Forest Tax Law Program (480-a). New York helps forest landowners lower their property taxes through 480-a. The Watershed Forest Management Planning Program increases 480-a enrollment by removing a key barrier to participation - the upfront cost for a landowner to get a forest management plan. But forest landowners aren't the only ones who benefit from the funding WAC provides. WAC also receives four benefits from greater 480-a participation in the Watershed.

BENEFITS

1. Minimal subdivision and development without purchasing property rights - keeping forests as forests.
2. Sustainable forest management that promotes economic viability.
3. Increased participation in our BMP Program - protecting water quality
4. Lower annual cost for the WFMP Program.

WAC can increase the effectiveness of the WFMP Program by only funding 480-a eligible properties. This ensures that WAC resources are only used on properties that provide the four benefits identified above. In addition, restricting WFMP Program participation to 480-a eligible properties will focus WAC's outreach and education resources on the fewest landowners who own the most forest land. 8.6% of landowners who own property in the Watershed region are eligible for enrollment in 480-a. But this 8.6% of landowners owns approximately 380,000 acres, or 60% of all family forest land.

The purpose of the Filtration Avoidance Determination (FAD) is to prescribe conservation tools to protect water quality for 9 million New York City residents. The 480a Forest Tax Law is a tool that can conserve a significant portion of 380,000 acres of family forest in the Watershed by minimizing subdivision and development. Protecting water quality by minimizing subdivision and development is the foundation of New York Cities Land Acquisition Program (LAP). In effect New York's forest tax abatement program (480-a) functions as a term easement, complementing the LAP. In light of the benefits associated with increased 480-a enrollment WAC recommends the following changes to section 4.5 of the FAD:

- In section **4.5 Watershed Forestry Program** under the **Activity and Reporting Requirements** replace "*Continue to enroll landowners in WAC forest management plans" with "Increase awareness of and encourage participation in New York's forest tax abatement program in the NYC Watershed*"*

  *WAC is recommending FAD language that does not refer specifically to the 480-a Tax Law in the event this forest tax abatement program is replaced or enhanced in the future.

The Problem: Lack of Results in the Watershed Forest Management Planning Program

The Watershed Agricultural Council's (WAC) Forestry Program started funding forest management plans in 1998. Since then, over $1 million has been spent on plans, over $85,000 in 2012 alone. More than 1,000 plans covering 200,000[1] acres have been written for landowners in the Watershed. In 2009 the WAC Forestry Program evaluated the Watershed Forest Management Planning (WFMP) Program. This evaluation identified two problems - forest management plans 1) don't result in the implementation of Best Management Practices (BMP's), and 2) they don't result in sustainable forest management. The protection of water quality and the promotion of economic viability are key aspects of WAC's mission. If forest management plans aren't protecting water quality with BMP's or promoting economic viability through sustainable management, what do plans provide?

The Opportunity: 480-a

Although the WFMP Program evaluation identified two problems it also brought one advantage to light. Sustainable forest management is more likely to occur on properties enrolled in the 480-a Tax Law. The WFMP Program increases 480-a enrollment by removing a key barrier to participation - the upfront cost for a landowner to get a management plan. As a result of the WFMP Program, 480-a enrollment inside the Watershed is 23% of eligible forestland - twice as high as it is in the rest of the State. There are 54,000 acres of 480-a enrolled forestland in the Watershed[2]. WAC-funded forest management plans account for 40,000 of these acres.

The funding that WAC provides for forest management plans allows family forest owners to enroll in 480-a. The 480-a Tax Law helps family forest owners because they are able to lower the property taxes for their woodlot. After all, taxes are the greatest concern for New York family forest owners (USFS 2009). But WAC also receives four benefits from greater Watershed 480-a participation:

BENEFITS

1. Minimal subdivision and development without purchasing property rights - keeping forests as forests.
2. Sustainable forest management that promotes economic viability.
3. Increased participation in our BMP Program - protecting water quality
4. Lower annual cost for the WFMP Program.

WAC can magnify these benefits by increasing enrollment in 480-a. Increased enrollment in 480-a can be achieved by focusing WAC resources on 480-a eligible forestland. Since 1998, WAC has spent $585,000[3] on forest management plans that are not eligible or not enrolled in 480-a. If the resources devoted to creating plans for this forestland are focused on eligible properties, WAC can increase 480-a enrollment beyond 23%. Higher 480-a enrollment means the conservation of more forestland and an improvement in sustainable forest management. The conservation of forestland protects water quality and sustainable forest management promotes regional economic viability - the two fundamental components of WAC's mission.

[1] WAC WFMP's cover 203,143 total acres. WAC has funded 157,114 forested acres.
[2] At the time of this report 480-a enrollment data was only available for Delaware, Greene and Sullivan Counties.
[3] Based on WFMPs and data from Delaware, Greene and Sullivan Counties. WAC paid $841,553.95 for WFMP's in Delaware, Greene and Sullivan Counties. WAC paid $256,229.35 for WFMP's, Upgrades and 480-a incentives that are enrolled in 480-a in Delaware, Greene and Sullivan Counties. WAC paid $585,254.12 ($841,551.95 -$256,229.35) for plans that are not enrolled in 480-a in Delaware, Greene and Sullivan Counties. 480-a data for the remaining Watershed counties was unavailable at the time of this analysis. In all likelihood the amount WAC has spent on ineligible and un-enrolled property is greater.

Goals and Objectives: Building on a Success

WAC's evaluation of the WFMP Program identified two problems, but it also pointed out an opportunity to build on a success - 480-a. WAC can take advantage of this opportunity by adopting goals and objectives that build on the benefits of encouraging and supporting 480-a participation.

1. Goal: Increase family forest owner awareness of the 480-a Tax Law Program.
   a. Objective: Equip landowners with the unbiased information necessary to make an informed decision regarding 480-a enrollment and the tools they need to overcome obstacles to enrollment.
      i. Action: Use a variety of tactics to market 480-a to eligible landowners in order to increase landowner participation in education methods.
      ii. Action: Use a variety of education methods to provide landowners with unbiased information about 480-a.

2. Goal: Increase the cost-effectiveness of the WFMP Program.
   a. Objective: Lower the annual cost of the WFMP Program.
      i. Action: Limit eligibility for Program funds to properties that are enrolled in 480-a.
   b. Objective: Properties with WFMP's will have higher levels of sustained yield management than properties without forest management plans.
      i. Action: Support the implementation of sustained yield management on 480-a properties through the Management Assistance Program.
   c. Objective: Properties with WFMP's will have higher levels of BMP implementation than properties without forest management plans.
      i. Action: Support the implementation of BMP's on 480-a properties through the BMP Program by using 480-a work schedules to proactively engage landowners prior to required harvests.

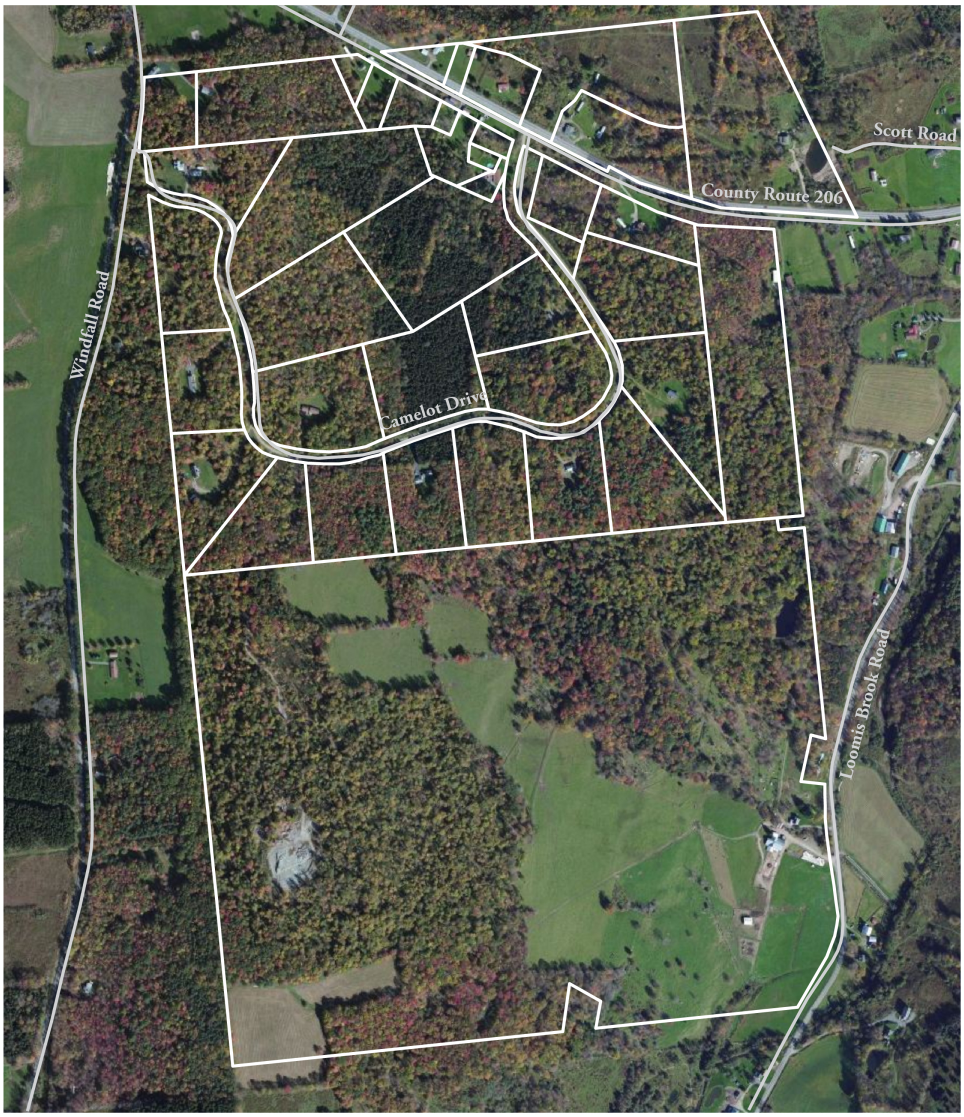
Background: Property Taxes, Development, and the Forest Tax Law

WAC has the opportunity to increase the effectiveness of the WFMP Program by encouraging and supporting 480-a enrollment. But in order for WAC to benefit from refining the WFMP Program it's necessary to understand the complex interaction between property taxes, forest landowners and the 480-a Tax Law.

Taxes & Forest Landowners

Property taxes are the greatest concern for family forest owners in New York (USFS 2009). This trend also applies in the Catskill/Delaware portion of the New York City Watershed, where financial pressure, specifically from property taxes, is the most common reason family forest owners subdivide their land (Stone and Tyrrell 2012).

Making matters worse, when subdivision occurs in the New York City Watershed, the development impact is striking. Within 20 years of subdivision, an average of 3,200 square feet of impervious surface area is added to each subdivided parcel as new owners build homes, garages, driveways and septic systems (Anderson et al. 2012).



39 parcels

195 acres

Impervious surface: 125,000ft²

1 parcel

195 acres

Impervious surface: 5,000ft³

0 500 1,000 2,000 3,000 Feet

N

From 1984 to 2010, subdivision resulted in the addition of 640 acres of impervious surface in the Catskill/Delaware Watersheds (Anderson et al. 2012). This change represents an irreversible shift from forest, which is beneficial to water quality, to impermeable surface, which is detrimental. Even more worrisome, the rate of subdivision in the Catskill/Delaware Watersheds exceeds the national average, and the average parcel size is already below the national average (LaPierre and Germain 2005).

The rapid subdivision and development of forest coupled with the development of non-forestland will degrade water quality far into the future. Recent studies have found water quality is degraded when as little as 2.4% of the land area is impervious surface (Conway 2007, Schiff and Benoit 2007, Dietz and Clausen 2008). The danger is so severe that New York State identified "keeping forests as forests" as its first priority issue in its Forest Resource Assessment and Strategy (DEC 2010). In light of the threat subdivision and development pose to forests, it is logical that WAC turn to an effective tool for keeping forests as forests - the 480-a Tax Law.

The 480-a Tax Law Program

New York helps landowners lower their property taxes through the Forest Tax Law Program (480-a). 480-a typically exempts up to 80% of an enrolled property's assessed value. Enrolled acreage may not be developed, and any subdivisions must be over 50 acres. Landowners who wish to enroll must meet certain eligibility criteria, including:

1. A minimum of 50 contiguous acres of forestland
2. A 15-year management plan written by a professional forester that must be followed
3. An annual recommitment to ten years of forest management

Landowners who meet the eligibility requirements can voluntarily enroll in 480-a. When a landowner enrolls in 480-a, they commit to the following:

1. Adhering to their Department of Environmental Conservation (DEC)-approved forest management plan for the duration of their ten-year commitment.
2. Recommitting annually to ten years of forest management in order to receive that year's exemption.
3. Finishing their ten-year commitment without the benefit of the 480-a tax exemption if they choose to un-enroll.
4. Leaving enrolled acreage undeveloped.
5. Limiting any subdivisions to over 50 acres in size.

Although 480-a ostensibly reduces enrolled acreage's assessed value by 80%, actual tax savings vary considerably from town to town. In addition, a yield tax levied at the time of harvest further reduces tax savings. Even so, savings from 480-a enrollment can be substantial.

County	Town	Acres	Tax	Tax in 480-a	% Savings
Delaware	Middletown	87	$2,849	$660	77%
Delaware	Tompkins	530	$7,678	$1,917	75%
Delaware	Delhi	90	$3,529	$2,230	37%
Delaware	Andes	257	$7,434	$2,405	68%
Delaware	Stamford	57	$1,228	$619	50%
Schoharie	Conesville	197	$6,699	$4,331	35%
Greene	Windham	54	$3,565	$1,937	46%
			Average % Savings		**55%**

Among similar programs nationwide, 480-a has some of the highest noncompliance penalties. Landowners who are found non-compliant are subject to the following penalties:

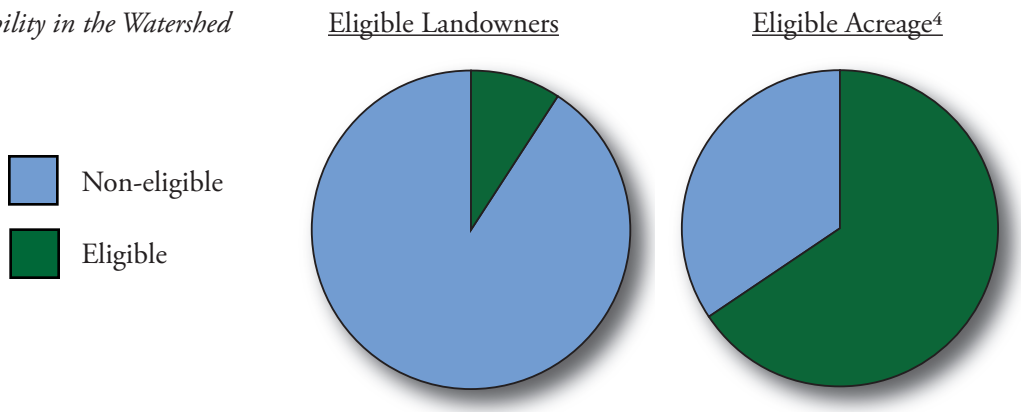
1. For property-wide noncompliance, the landowner pays 2.5 times the tax amount saved, plus interest, for the past ten years.
2. For partial non-compliance (for example, building a structure), the landowner pays five times the tax amount saved, plus interest, for the past ten years on the non-compliant acreage.

Combined with the rolling ten-year commitment, the steep penalties mean that 480-a acts essentially as a term easement, all but preventing development and subdivision for ten years each year the landowner enrolls.

480-a Eligibility in the Watershed

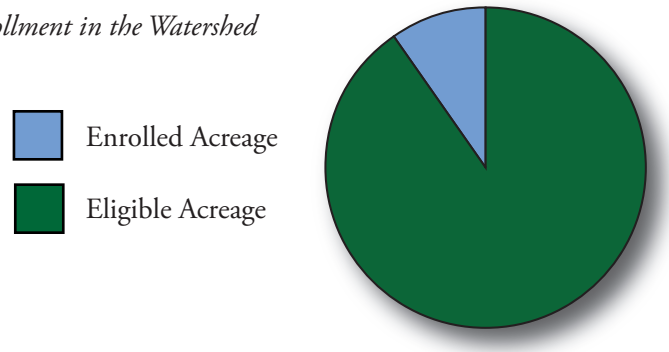
There are approximately 2,600 landowners who own property eligible for enrollment in 480-a out of a total of 31,000 family forest owners in the Watershed. These individuals represent 8.6% of the total family forest owners. This 8.6% of landowners own approximately 380,000 acres or 60% of the total family forest land in the Watershed.

Fig. 1 480-a Eligibility in the Watershed



Exact data on statewide 480-a enrollment are not available; however, an estimate by Sloane Crawford of the DEC puts statewide enrollment at 10% of eligible land. There are approximately 840,000 acres enrolled in 480-a statewide out of a total of 8.7 million acres.

Fig. 2 480-a Enrollment in the Watershed

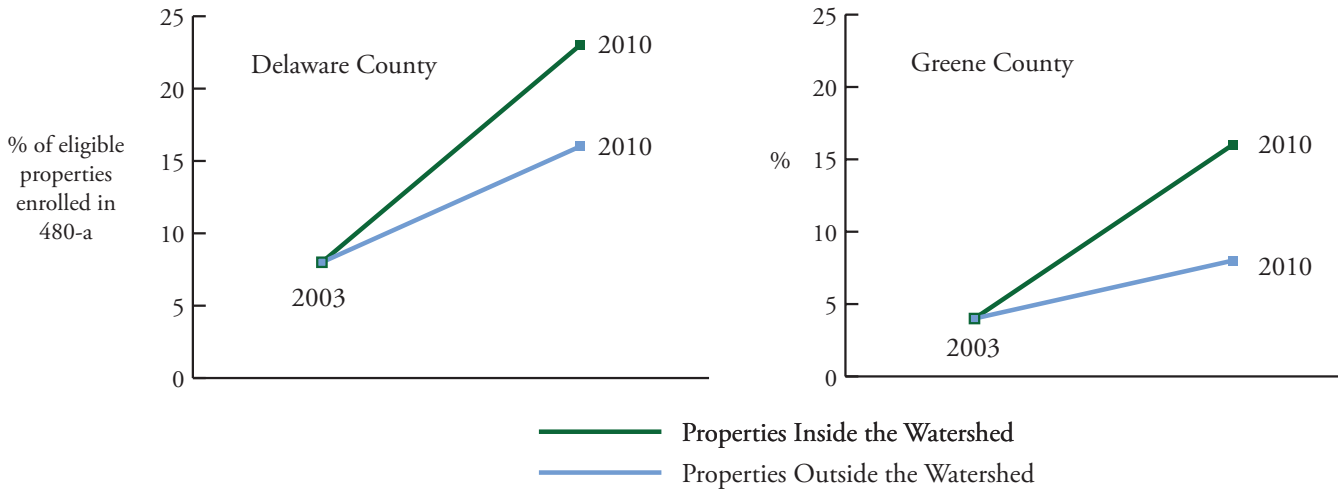


[4] To be eligible for 480-a, there must be at least 50 contiguous acres of forest on a parcel.

For the Catskill/Delaware Watersheds, comprehensive enrollment information at the time of this report was available for two counties: Delaware and Greene. Since these two counties represent the bulk of private land in the Catskill/Delaware Watersheds, they provide a good proxy to compare enrollment. In 2000, 480-a enrollment in Delaware and Greene Counties was 8% and 4%, respectively (Canham 2003). Coincidentally, this timeframe roughly corresponds with the beginning of the WAC Forestry Program's management planning efforts.

By 2010, 480-a enrollment in Delaware and Greene Counties doubled to 16% and 8% of eligible acreage. Inside the Watershed, however, the pace of enrollment was faster. In 2010, enrollment was 23% in Delaware County and 16% in Greene County. These percentages are 44% and 100% higher, respectively, than their "out of the Watershed" counterparts. These data show that WAC's current strategy of providing free plans encourages 480-a enrollment by removing one of the key barriers to 480-a participation – the upfront cost for a landowner to get a management plan.

Fig. 3 480-a Enrollment in Delaware and Greene Counties, 2003 - 2010



<u>The Benefits to WAC of Encouraging and Supporting 480-a Enrollment</u>

Focusing the WFMP Program on 480-a eligible landowners will direct Program resources toward the fewest individuals who own the most private forestland in the Watershed. This focus will allow WAC to realize the four benefits that accompany encouraging 480-a participation:

BENEFITS

1. Minimal subdivision and development without purchasing property rights - keeping forests as forests.
2. Sustainable forest management that promotes economic viability.
3. Increased participation in our BMP Program - protecting water quality
4. Lower annual cost for the WFMP Program.

Minimal Subdivision and Development without Purchasing Property Rights

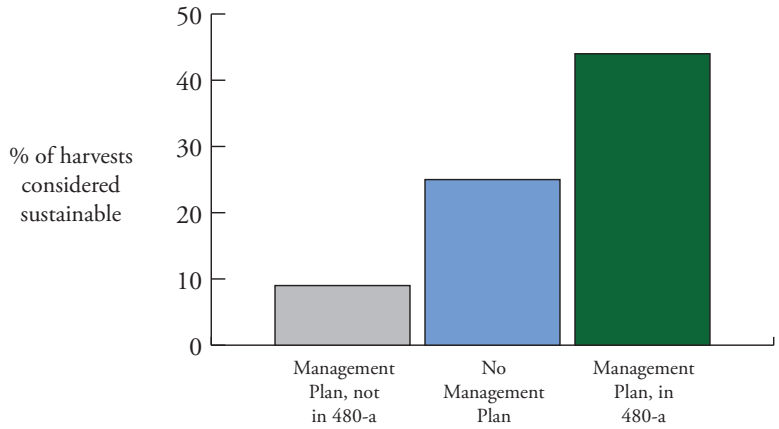
Subdivision represents one of the greatest long term threats to water quality in the New York City Watershed. Within 20 years of subdivision, an average of 3,200 square feet of impervious surface is added to each new parcel as the owners build houses, garages, driveways and septic systems (Anderson et al. 2012).

Currently, WAC and the NYC Department of Environmental Protection (DEP) attempt to counter subdivision and development through the purchase of conservation easements and (in the case of DEP) full ownership of land. Although these initiatives do keep purchased land from development, they also have drawbacks - the cost of stewardship in perpetuity being the biggest of all. Encouraging and supporting 480-a enrollment provides a low-cost method for WAC and its funders to slow subdivision and development in the Watershed, because no property rights need to be purchased. It also allows more time to acquire land, as 480-a enrolled properties are unlikely to be developed for at least ten years. Finally, although 480-a has some controversy around it, it is likely less controversial than land acquisition since the land stays fully in private ownership.

More Sustainable Cutting Practices

The WFMP evaluation indicated that properties enrolled in 480-a were significantly more likely to apply silvicultural practices than properties with plans that were not enrolled. One reason for this is revealed by 480-a policy documents developed by the DEC. The DEC requires that prior to any cutting, timber must be marked and the proposed harvest be reviewed by DEC Foresters to ensure it is done in accordance with the approved 480-a forest management plan.

Fig. 4 Percentage of Harvests Considered Sustainable According to the WFMP Evaluation



This chart identifies an important outcome of the WFMP Program evaluation. As previously stated, properties enrolled in 480-a are more likely to be sustainably harvested than properties not enrolled. But an even more striking outcome is that properties that have no management plan are more likely to be sustainably harvested than properties with a WFMP that are not enrolled in 480-a

Increased Participation in WAC's BMP Program

480-a offers WAC a unique opportunity to proactively engage with family forest owners. 480-a participants must follow the 15-year work schedules included in their forest management plans. WAC can use these schedules to contact landowners in advance of a timber harvest. This will allow WAC to promote its BMP and Management Assistance Programs in advance of the planned activity. Promoting the BMP Program in this manner will help WAC address the deficiency in BMP implementation identified by the WFMP evaluation.

Lower Annual Cost for the WFMP Program

Focusing on 480-a has the potential to save WAC both staff time and money. For a complete assessment of these changes to the WFMP Program, see the "Management and Organization" and "Financial Plan" sections.

Competitive Analysis: Why Don't Landowners Enroll in 480-a?

In order for WAC to realize the four benefits associated with encouraging and supporting 480-a, it's necessary to understand how and why landowners choose to enroll their property. 480-a is a complex program with stringent requirements, and the different attitudes that landowners hold about 480-a affect their decision to enroll.

New York State has one of the lowest enrollment rates in the Northeast for its forest tax incentive program. The tax benefit a landowner receives from 480-a appears to be a compelling reason for enrollment. Unfortunately, that benefit is often outweighed by three prevalent landowner attitudes regarding 480-a:

- Lack of Knowledge
- Concern about Effort
- Fear of Commitment

Lack of knowledge

Stone and Tyrrell (2012) found that 54% of Watershed survey respondents who subdivided their land were unaware of programs that could alleviate the financial burden associated with property taxes- including 480-a. Only 18% of survey respondents indicated that they were very informed about these programs.

The best thing WAC can do to address the lack of understanding among family forest owners regarding 480-a is to disseminate unbiased information. This information will help them decide whether or not enrollment in 480-a is right for them.

Concern about Effort

When landowners consider enrollment in 480-a, they confront numerous barriers that require time and money to overcome. First, they must find a forester who will create their management plan. Then they have to pay for that plan. Once enrolled, they have to pay for the completion of required management activities, annual paperwork, and updating their plan every five years.

The current WFMP Program increases 480-a enrollment by helping landowners overcome the effort involved in enrolling in 480-a. WAC maintains a list of Watershed Qualified Foresters and their profiles to assist landowners with selecting a forester. The WFMP Program funds the completion of a management plan. WAC also offers the 480-a Incentive Payment, which helps landowners cover the administrative cost of maintaining enrollment. Finally, the Management Assistance Program helps offset the cost of conducting Timber Stand Improvement - a common required management activity on 480-a properties.

Fear of Commitment

When landowners enroll in 480-a, they are limiting their ability to subdivide and sell their property in the future. This is a serious commitment since land ownership is often treated as an investment. Even in situations where forestland is not owned as an investment, 480-a limits landowner options. Many landowners consider their forestland a family legacy. The commitment not to subdivide may impact the owners' ability to pass land on to their children.

Unfortunately, WAC can do little to influence the commitments associated with 480-a. 480-a is a law and requires legislative action to change. Lobbying restrictions associated with WAC's funding prevent active support of pending legislation. However, WAC can seek to educate the public and lawmakers about deficiencies in 480-a in hopes of stimulating change.

The Product: A 480-a Focused WFMP Program

Proposed WFMP Program Eligibilty

The new WFMP Program will restrict participant eligibility to 480-a eligible properties in order to focus Program resources. This focus will make it possible for WAC to further address the landowner attitudes above that discourage 480-a participation and thus increase enrollment.

WFMP Program Eligibility	
Current Eligibility	Any private landowner, village, town or school district holding at least ten (10) acres of forestland within the NYC Watershed is eligible for WFMP Cost-Share funding.
Proposed Eligibility	Any private landowner within the NYC Watershed that owns at least 50 contiguous acres of forestland is eligible for WFMP Cost-Share funding.

Proposed WFMP Funding Options

The new WFMP Program will offer cost-share funding to eligible landowners through two options - the **480-a Enrollment Incentive** and the **480-a Update Incentive**. The goal of the 480-a Enrollment Incentive is to encourage the enrollment of new land in 480-a. The goal of the 480-a Update Incentive is to support landowners with maintaining their 480-a enrollment.

480a Enrollment Incentive	The 480-a Enrollment Incentive is provided to eligible landowners with property that **is not** currently enrolled in the 480a Tax Law but will be enrolled upon the completion of a required 480-a Forest Management Plan.
480a Update Incentive	The 480-a Update Incentive is provided to eligible landowners with property that is currently enrolled in the 480a Tax Law.

New WFMP Specifications

Changes to the WFMP program will not stop at restructuring funding rates. The WFMP evaluation showed that the current planning specifications do not deliver the results WAC needs – BMP's and sustainable management. Since the current WFMP Program does not provide effective results, WAC must consider altering its specifications. These changes will ensure that the WFMP Program will provide more effective results in the future and better assist WAC in realizing the four benefits it receives from increased 480-a participation:

BENEFITS

1. Minimal subdivision and development without purchasing property rights - keeping forests as forests.
2. Sustainable forest management that promotes economic viability.
3. Increased participation in our BMP Program - protecting water quality
4. Lower annual cost for the WFMP Program.

The most dramatic changes to the WFMP specifications are - 1) limiting plan content to information required for 480-a enrollment and 2) not requiring a WAC site visit to review forest management plans. Limiting plan content will reduce participant confusion and streamline administration. Reduced participant confusion will translate into higher rates of WFMP Program participation which results in minimal subdivision and sustainable forest management. Staff time saved through streamlined administration can be used to increase participation in the BMP Program and lower WFMP Program costs. In addition, the review of forest management plan content and subsequent site visits by WAC staff are not necessary. This is because 480-a enrollment requires a DEC Forester to review plan content and conduct a site visit. These changes will create a new, simplified WFMP Program that increases participation in 480-a, minimizes WAC's administrative costs and encourages participation in the BMP Program.

Comparison of Requirements for a Watershed Forest Management Plan (WFMP)
and a NYS 480a Forest Tax Law Management Plan (480A)

REQUIREMENT	WFMP	480A
Owner name and contact info	X	X
Name and contact info of preparer	X	X
Owner goals	X	X
Forest type map	X	X
Written narrative of stands	X	X
Description of forest type	X	X
Describe access system	X	X
List rare and endangered species	X	X
Write up work schedule	X	X
Property location	X	
Completed WAC summary sheet	X	
Soil information	X	
Riparian area management	X	
Wildlife habitat management	X	
Fisheries habitat management	X	
Recreation and aesthetics	X	
Forest health, invasive species and fire protection	X	
Management to meet the landowners goals	X	
Landowner signature clause agreeing with goals of plan	X	
Table of contents	X	
Definition of terms	X	
Standards of appearance	X	
Application number		X
Listing of cutting or harvesting of merchantable crops during last 3 years		X
Forester signature, date of preparation and certification that forest land is eligible		X
Notification of commercial harvest with details of silviculture and road system		X
No grazing of domestic animals in eligible stands		X

Marketing Plan: Getting the Right Information to the Right People

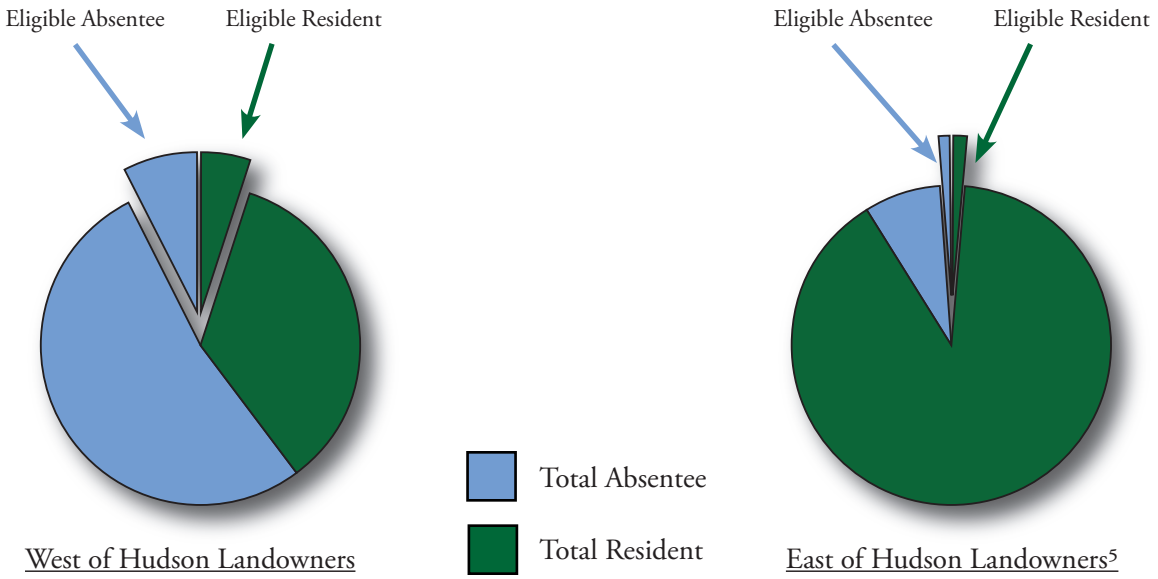
Refining the WFMP Program by encouraging and supporting 480-a participation will require a concerted effort to communicate with family forest owners. This marketing plan identifies the target audiences, presents the value propositions, and identifies the marketing tactics necessary to communicate value to these owners.

Target Audience

There are approximately 31,000 family forest owners in the Watershed, and 2,600 of them are eligible for 480-a. For marketing purposes, these 2,600 must be further broken down based on where they live, because residency status will affect the marketing tactics used to engage them. For this plan, we subdivide these 2,600 into two target audiences based on where they live. Absentee landowners own land in the Watershed, but do not have their primary residence in it. By contrast, resident landowners do have their primary residence in the Watershed[5].

There are 1,686 (57%) absentee family forest owners who are eligible for 480-a in the Catskill/Delaware and Croton Watersheds. Absentee owners represent the majority of 480-a eligible landowners in the Watershed. But resident family forest owners still matter. There are 1,270 (43%) 480-a eligible resident owners in Watershed.

Fig. 5 Residency Status of 480-a Eligible Landowners in the NYC Watershed



Absentee landowners own more 480-a eligible land in the Watershed than residents do – 240,731 acres (56%). Although absentee owners control a majority of 480-a eligible land in the Watershed, resident landowners play an important role. Resident landowners in the Watershed own the remaining 182,921.5 acres (44%) of eligible land.

[5] Absentee and resident landowners were identified using the broad definition identified above. A more in depth and time consuming GIS analysis of zip codes can yield specific residency information useful in developing a detailed marketing plan should the Forestry Committee elect to move forward with refining the WFMP Program.
[6] Data used in Figures 5 and 6 are for landowners with 50+ forested acres. This data does not account for the 50 *contiguous* forest acres that are required for 480-a eligibility. The use of this data allows for the identification of trends while investing an appropriate amount of staff time.

Fig. 6 Residency Status of 480-a Eligible Forestland in the NYC Watershed

Value Proposition

A value proposition forms the centerpiece of any marketing endeavor. It is the reason why a consumer will purchase a product or participate in an activity. In the context of the new WFMP Program, the consumers are 480-a eligible landowners. Our value propositions are the reasons 480-a eligible landowners should enroll. Two value propositions have been identified for the refined WFMP Program.

1. 480-a helps landowners lower their property tax burden
2. 480-a offers landowners the opportunity to conserve their forest land without selling it or entering into an easement.

Value Proposition 1: Lower Property Taxes

Property taxes are the greatest concern for family forest owners in New York (USFS 2009). This trend also applies in the Catskill/Delaware portion of the New York City Watershed, where financial pressure, specifically from property taxes, is the most common reason forest owners subdivide their land (Stone and Tyrrell 2012).

The idea of saving money through lower property taxes could appeal to a range of landowners. However, less affluent landowners may find this value proposition particularly persuasive. The current system of property taxation assumes that those with a lot of land must have the wealth to pay for it. This assumption ignores the reality of "land rich, cash poor" owners such as farmers and retirees living on a fixed income, both common in the Watershed. In the Watershed, farmers and others with low incomes are overwhelmingly more likely to subdivide than people in careers with higher incomes, such as finance. In light of this information, the "lower property taxes" value proposition should be pursued when marketing 480-a to resident landowners who are more likely to be farmers, retirees, or individuals with fixed incomes.

Value Proposition 2: Forest Conservation

Family forest owners in New York are concerned with forest conservation. Scenery, privacy, and the protection of biologic diversity are their top reasons for owning forestland (USFS 2009). In light of this information, the "forest conservation" value proposition may be more appealing to the more affluent, non-resident forest landowners less likely to be swayed by Value Proposition 1's financial argument.

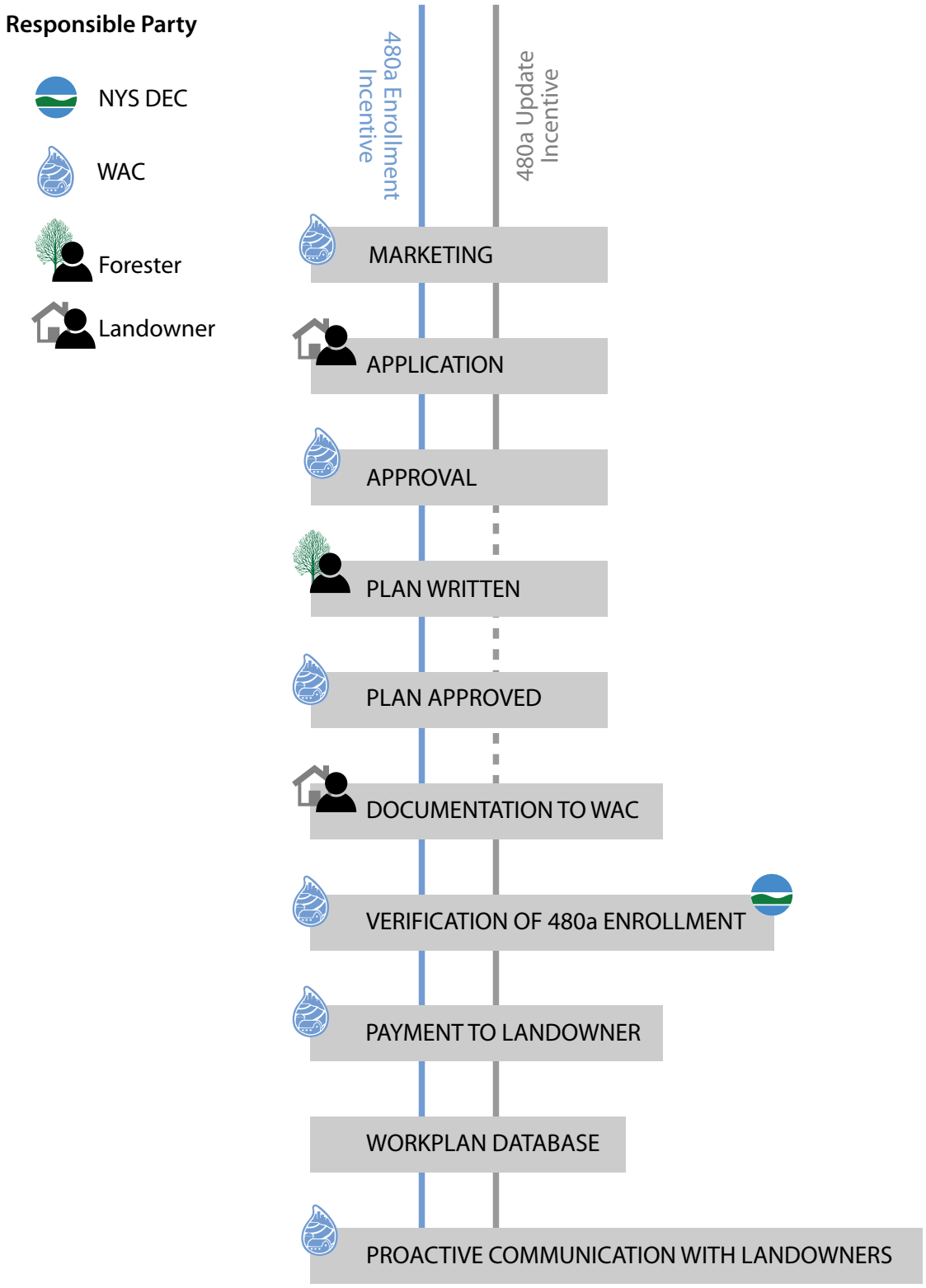
Marketing Tactics

The new WFMP Program will use both traditional and online marketing tactics to introduce landowners to 480-a. There is a need to equip landowners with the unbiased information necessary to make an informed decision regarding 480-a enrollment. Marketing alone will not be able to provide landowners with this information. Rather, marketing tactics should focus on using the two value propositions to increase landowner participation in education programs where the complexity of 480-a can be communicated in an appropriate manner. The following marketing tactics will be used to engage target audiences:

Traditional Marketing Tactics	Online Marketing Tactics
Direct Mailing	Search Engine Optimization
Press Releases	Google Adwords
Co-promoters	e-newsletters
Magazine Advertisements	Social Media
Event Attendance	

Management & Organization: Saving Staff Time by Streamlining the Process

Although marketing is crucial to make landowners aware of the opportunities 480-a provides, the management and organization of the new WFMP Program will influence participation as well. The new WFMP Program must have an administrative structure that makes participation easy for landowners. The diagram below identifies the components of the proposed administrative structure for the new WFMP Program.



1. **Marketing:** WAC will provide unbiased information to landowners that will allow them to make an informed decision about enrolling in 480-a.
2. **Application**: WAC will continue to use the current WFMP Program application because it requests all necessary information.
3. **Approval**: A WAC Watershed Forester will review and approve all applications in accordance with eligibility standards.
4. **Plan Written**: Landowners will receive a letter notifying them of the approval of funds, and they will be given 12 months to have their 480-a plan completed. The landowner will work with a Watershed Qualified Forester to have their plan written to DEC 480-a specifications.
5. **Plan Approved**: Upon plan completion landowners will provide WAC with their 480-a certificate, 480-a plan and work schedule. The date on the 480-a certificate must be within 12 months of the payment date. WAC will not disperse funds without these three items. WAC will no longer field check forest management plans. This is unnecessary because DEC conducts periodic field checks of all 480-a plans in order to ensure compliance with NYS law.
6. **Verification of 480-a Enrollment**: WAC will check with DEC to confirm 480-a enrollment. WAC will not provide incentive payments to landowners who are in violation of their 480-a plan.
7. **Payment issued to Landowner**: WAC will issue the payment directly to the landowner. With the payment WAC will include information about riparian areas, BMP's and protecting water quality. WAC will also provide a custom map identifying riparian areas on the property.
8. **480-a Work Plan Database**: A Watershed Forester will continue to track applications from approval to completion using the same Forestry Program Access Database that is currently used. In addition, the Watershed Forester will continue to track approved and completed projects using the current Program geographic information system (GIS). A new database will be created and maintained to track WFMP 480-a work plan tasks.
9. **Proactive Communications**: WAC will use the WFMP 480-a work plan database proactively engage landowners in the MAP and BMP Programs prior to their scheduled 480-a activities.

Staffing

Focusing the WFMP Program on encouraging and supporting 480-a participation will provide WAC with the opportunity to create additional efficiency in its staffing model. Since the changes include altering the WFMP specifications to mirror DEC 480-a requirements, there will no longer be a need for a WAC forester to review management plans. As a result, the WFMP Program will become a purely administrative endeavor.

Task	Position	Time
Review and approve applications	Watershed Forester	2%
	Support Staff	6%
Distribute funding for completed projects	Support Staff	6%
Maintain WFMP Access & GIS databases	Watershed Forester	12%

The new WFMP Program will require a total staff investment of 26% of one Full Time Employee (FTE). This time commitment is divided between the Watershed Forester (14% FTE) and the Forestry Program Support Staff (12% FTE). The current WFMP Program, which includes the review of forest management plans, requires a total staff investment of 56% of one FTE. By refining the WFMP Program to support and encourage 480-a enrollment, WAC will save 30% of one professional FTE. This is in addition to increasing the overall effectiveness of the WFMP Program through the realization of the four benefits associated with encouraging and supporting 480-a participation.

Financial Plan: Saving Money by Focusing on Effectiveness

Financial projections compare costs between status quo and shifting to encourage 480-a participation (called the "480-a Solution" in this section) over ten years. These projections account not only for cost-share payments but also the organizational costs of staff time, vehicles, and marketing.

Scenarios Examined

Financial projections analyzed three scenarios to assess potential cost changes under varying conditions. The scenarios were:

1. Business As Usual (BAU) Scenario – status quo; no changes made
2. 480-a Solution Low Cost Scenario – the 480-a Solution is implemented, but enrollment in 480-a stays at the same pace as under the BAU Scenario. Annual program participation is equal to the current number of annual plan participants that enroll in 480-a.
3. 480-a Solution High Cost Scenario – the 480-a Solution is implemented, but enrollment in 480-a greatly accelerates as a result of marketing. Annual program participation is equal to the current number of annual plan participants that are eligible for 480-a. The High Cost Scenario represents an over three-fold increase in the rate of Watershed 480-a enrollment.

The High and Low Cost Scenarios do not represent different options. Rather, they provide a measure of uncertainty in pursuing the 480-a Solution as described in this business plan by establishing cost bounds. Actual cost savings are anticipated to fall between the values determined by these scenarios.

Summary of Assumptions

Assumption	Amount	How Determined
Inflation	3%/year	Standard used for financial analyses
Full-time Employee (FTE) cost	$73,000/year	Average of salary and benefits for a professional position
Mileage rate	$0.565/mile	Federal reimbursement rate
Staff time under BAU Scenario	0.56 FTEs	Forestry Program work plan items related to management planning
Staff time under 480-a Solution Scenarios	0.26 FTEs	Forestry Program work plan items related to management planning, excluding plan reviews

Analysis Methods

Payments to Foresters under the BAU Scenario

Payments to foresters under the BAU Scenario were broken down into annual payments for each of the four types of plans currently in existence: new plans, upgrades, 10-year updates, and 480-a incentives. These payments were further divided into managed acres and riparian acres. BAU cost projections were determined for each plan type using cost-share payments from the past five years. Plan costs from years prior to the latest cost-of-living increase were raised to compensate for it. Once all the plan cost-share amounts were adjusted to current WAC funding levels, total annual plan costs were averaged. These averages became the "Year 1" figures, which were then increased 3% biennially to account for future cost-of-living increases.

Payments to Landowners under the 480-a Scenarios

For the Low Cost Scenario, enrollment in 480-a continues at the same rate it currently does, representing total failure of future marketing to encourage participation. Under this scenario, annual program participation is expected to be limited to those properties that would have enrolled in 480-a anyway. At present, 26% of annual plan acres enroll in 480-a. Accordingly, costs were determined by multiplying the managed-acre averages by 26%. Riparian acres were not included, because payments will be based solely on enrolled forested acres. 480-a incentive payments were kept the same as under the BAU Scenario.

For the High Cost Scenario, enrollment in 480-a greatly increases as a result of marketing. Under this scenario, program participation is maximized. This maximized number was determined by examining past plan participation and assuming that all of those properties would have enrolled in 480-a. At present, 80% of annual plan acres are on properties eligible for 480-a (90% have 50 forested acres or more, but only 90% of those have the 50 contiguous acres needed to enroll in 480-a). This rate represents an over three-fold increase in the pace of Watershed 480-a enrollment. Costs were determined by multiplying the managed-acre averages by 80%. Riparian acres were not included for the same reason as under the Low Cost Scenario. 480-a incentive payments were increased beginning in Year 6 by the difference between the Low Cost Scenario enrollment rate (26%) and the High Cost Scenario enrollment rate (80%) to account for increased enrollment. Accordingly, 480-a incentive payments for the High Cost Scenario are the same as the other scenarios in Years 1-5, but 3.1 times higher than the others in Years 6-10.

Under both High and Low Cost scenarios, cost-share amounts were increased 3% biennially to account for future cost-of-living increases.

Payroll

Payroll cost was determined by multiplying the percent of an FTE used for management planning by the cost of one FTE. This cost was increased annually at the rate of inflation.

Vehicle Cost

Under the BAU Scenario, WAC staff conduct field reviews of all new, upgrade, and 10-year update plans. These reviews require traveling to every property. To determine the cost of that travel in vehicle wear-and-tear, the distance from the WAC office (Hamden for West of Hudson, Yorktown Heights for East of Hudson) to each Watershed town was identified using Google Maps. All plans that received a field review in the past five years then received a mileage amount based on the town where they were located. These mileages were summed for each year and averaged. This total mileage was then multiplied by the federal mileage reimbursement rate to determine annual vehicle cost. This cost was increased annually at the rate of inflation.

Marketing

The Forestry Program does not market its current WFMP Program, so this cost was set at $0 for the BAU Scenario. For the 480-a Solution, which does call for outreach on 480-a, a placeholder of $2,000 per year was inserted. This cost was increased annually at the rate of inflation.

Results

Under the BAU Scenario, WAC will spend over $126,000 funding management plans in Year 1. By contrast, the Low Cost Scenario projects Year 1 costs at $40,797, and the High Cost Scenario projects Year 1 costs at $70,053. Under those conditions, the Forestry Program could expect to save between $56,000 and $85,000 in Year 1 by implementing the 480-a Solution. Over 10 Years, the 480-a Solution could save WAC between $540,000 and $925,000.

	BAU Scenario	Low Cost Scenario	High Cost Scenario
Cost-Share Payments	$83,624	$19,817	$49,073
Payroll	$40,880	$18,980	$18,980
Vehicles	$1,667	$0	$0
Marketing	$0	$2,000	$2,000
Total Year 1 Cost	$126,170	$40,797	$70,053
Year 1 Savings over BAU Scenario	N/A	$85,374	$56,118

Comparison of Year 1 costs for the BAU, 480-a Solution Low Cost, and 480-a Solution High Cost Scenarios.

Major sources of savings from implementing the 480-a Solution are cost-share payments and payroll. Both 480-a Solution scenarios reduce staff time by about one third of an FTE due to ending field visits. These savings do not necessarily represent a budgetary windfall, as a third of an FTE will not be let go as a result of this change. Rather, these savings represent increased capacity within the program.

The second source of cost savings – cost-share payments – comes from reductions in program participation. Even under the High Cost Scenario, over $30,000 of savings accrue annually by excluding properties ineligible for 480-a from receiving cost-share and no longer making riparian area payments. Unlike staffing, these savings do represent budgetary gains.

1. Management Plans and BMP Implementation
2. Management Plans and Sustained Yield Management
3. National Woodland Owner Survey Overview
4. An Overview of the New York State Forest Tax Law Program
5. Calculating and Quantifying 480-a Eligibility in the NYC Watershed
6. 480-a Eligible Land Maps
7. Financial Analysis
8. Frequently Asked Questions (FAQ's)
9. Literature Cited

ANNEXES

Annex 1: Management Plans and BMP Implementation

RESEARCH ARTICLE

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education & communication

Do Forest Management Plans Increase Best Management Practices Implementation on Family Forests? A Formative Evaluation in the New York City Watershed

Joshua D. VanBrakle, René H. Germain, John F. Munsell, and Stephen V. Stehman

Financial incentive programs for forest management plans on private forestland are common in the United States. Few studies, however, have examined the relationship between management plans and "on-the-ground" forest management practices. We used the New York City Watershed as a case study to evaluate the impact of management plans on best management practices (BMP) implementation. We conducted field surveys during 2009 and 2011 and evaluated properties for implementation by comparing postharvest conditions with New York BMP guidelines. We also compared the data with previously published results from 2002. Evaluation scores for properties with plans were significantly better in only two of six BMP categories: skid trails and forest roads. Although not invalidating forest management plans, this case study suggests a need for further evaluation of planning initiatives and a potential shift in funding away from management plans to programs such as logger training and timber sale contract education.

Keywords: management plan, private forest, timber harvesting, policy outcomes, nonindustrial private forestland

Forest management planning on private forestland is a cornerstone practice for promoting long-term stewardship. Management planning support ranks among the most common financial incentive programs (Jacobson et al. 2009). From 1991 to 2006, the USDA Forest Service's Forest Stewardship Program produced more than 270,000 management plans for more than 31 million acres of family forests (USDA Forest Service 2012). Often, management planning is a prerequisite for additional landowner financial assistance. Sixteen states require a written management plan before a landowner can participate in preferential property tax programs for forestland (Hibbard et al. 2003). The effort is understandable, considering that family forest owners collectively control more than 260 million acres of US forestland, representing 35% of the total (Butler 2008).

Despite the extensive time and money-spent promoting and subsidizing management plans, recent studies have questioned their ability to meaningfully affect private forest conservation given their low adoption rate. Butler (2008) found that only 4% of US family forest owners have written management plans, despite decades spent promoting them. With this in mind, Kittredge (2009) predicted that it would take 144 years for all forest landowners in the northern and Lake State region of the United States to adopt management plans.

Beyond concerns of low participatory rates, there is a lack of "on-the-ground" research regarding the effectiveness of these plans in improving management practices. Previous studies evaluating management planning programs have largely avoided field measurements, relying instead on written surveys. For instance, the evaluation by

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Egan et al. (2001) of the Forest Stewardship Program in West Virginia surveyed landowners to find out whether they had implemented activities recommended in their plans. The results indicated that more than half of responding landowners reported implementing management activities recommended in their plans, but there was no follow-up in the field. Similarly, Kilgore et al. (2007) and Jacobson et al. (2009) evaluated the effectiveness of eight federal financial incentive programs (including the Forest Stewardship Program) by surveying forestry officials responsible for administering those programs. Administrators considered the Forest Stewardship Program at least as effective in promoting sustainable forest management and protecting water quality and soil productivity as other federal programs, including the Conservation Reserve Program (which establishes long-term cover crops to reduce soil erosion) and the Forest Legacy Program (which purchases permanent conservation easements). However, neither study verified results with a field component.

To examine the on-the-ground impact of management plans, we used a region with a particularly strong emphasis on forest management planning, the New York City (NYC) Watershed, as a case study. The NYC water supply system is the largest unfiltered surface water system in the United States, providing more than 1.3 billion gallons of water daily to the greater metropolitan area as well as several upstate communities (Galusha 2002). Its primary water supply systems, the Catskill/Delaware Watersheds, are 78% forested, of which 75% is in family forest ownership (Figure 1; Hall et al. 2008). Because of the dominant family forest role, forest management planning has become a foundational method for engaging regional landowners.

The Watershed Agricultural Council (WAC), a nonprofit group based in the NYC Watershed, shares the cost of writing Watershed Forest Management Plans (WFMPs). Available to private landowners with at least 10 acres of forestland, the program offsets costs associated with hiring a consulting forester to develop the plan. In most cases, funding covers the full cost of the WFMP. Beyond providing information about timber resources, WFMPs contain water quality-specific provisions for managing riparian areas and implementing best management practices (BMP). While WAC incentivizes plan creation, implementation is voluntary (WAC 2009a). Between 1996 and 2009, more than 800 plans encompassing more than 140,000 acres, greater than 13% of the Catskill/Delaware Watersheds' total area, received funding (WAC 2009b).

Given the interest in protecting water quality in the NYC Watershed, we compared implementation of water quality BMP after timber harvests between properties with and without written forest management plans. For this project, BMP are defined as techniques that protect surface and groundwater quality while allowing for the accomplishment of other objectives (Wenger 1984). These simple, often low-cost techniques include locating and designing landings, skid trails, forest roads, and stream crossings and the correct installation of water diversion devices, such as waterbars, broad-based dips, open-top culverts, water deflectors, and diversion ditches. Water diversion devices are especially important because they regulate the flow of surface water on exposed soil created by harvest access systems, which have been found to contribute as much as 90% of the sediment generated from logging (Patric 1976, Swift 1984). Although BMP have been shown to reduce soil erosion associated with timber harvesting (Kochenderfer et al. 1997), they are currently voluntary in New York and many other states (Cesa et al. 2004).

Previous research in the region found that forest landowners were knowledgeable about BMP, but implementation quality was often poor, particularly the installation of water diversion devices (Schuler and Briggs 2000, Munsell et al. 2006, Munsell and Germain 2007). However, these studies did not specifically address management planning and had relatively small sample sizes. This case study expands this work by comparing BMP implementation between landowners with and without forest management plans. The results of this evaluation will help inform debate about management plan efficacy and assist organizations and agencies that promote management plans in deciding whether to redirect funding to alternative programs.

Methods

The population for this case study included nonindustrial private forest (NIPF) owners with at least 20 contiguous acres of forestland within the NYC Watershed. Because the study involved private owners, permission was required to visit a property. To obtain permission, we mailed 3,350 trifold brochures with detachable reply cards asking for landowner contact information, confirmation that they were willing to have researchers visit their property, and information on whether a timber harvest (other than firewood for personal use) occurred on their property in the past 5 years and, if so, the year it took place. The harvest requirement was included to facilitate BMP evaluation. A total of 752 cards were received, for a response rate of 22%. Of these, 172 (23%) indicated a timber harvest had been conducted in the past 5 years.

The need to obtain permission from landowners affects the generalizability of research results. It is possible that landowners who feel their job will meet the researchers' approval will be more likely to submit their property for study. Anecdotal conversations with participating landowners indicated that this issue may be less problematic than it appears. Although many landowners were indeed proud of their land and work done on it, others indicated they volunteered because the harvest had not gone well and

Management and Policy Implications

This case study suggests that subsidizing management plans does not meaningfully increase BMP implementation on family forests. For organizations concerned with water quality, particularly in states with voluntary BMP, programs such as logger training, BMP cost sharing, timber harvest contract assistance, and peer-to-peer landowner forums may be more effective for meeting goals than subsidizing management plans. This case study does not invalidate forest management planning as a conservation tool. Indeed, Kilgore et al. (2007) found that landowners in focus groups considered one-on-one interaction with a professional forester the most highly valued assistance incentive programs could offer. The study does, however, highlight the need for evaluation of the results of incentive programs, including management planning. It challenges these initiatives to critically examine "on-the-ground" results, comparing them against desired outcomes and program costs. In addition, it indicates a need for research on the full range of impediments to BMP implementation, such as financial constraints, inexperienced operators, and a lack of regulatory oversight, among others.

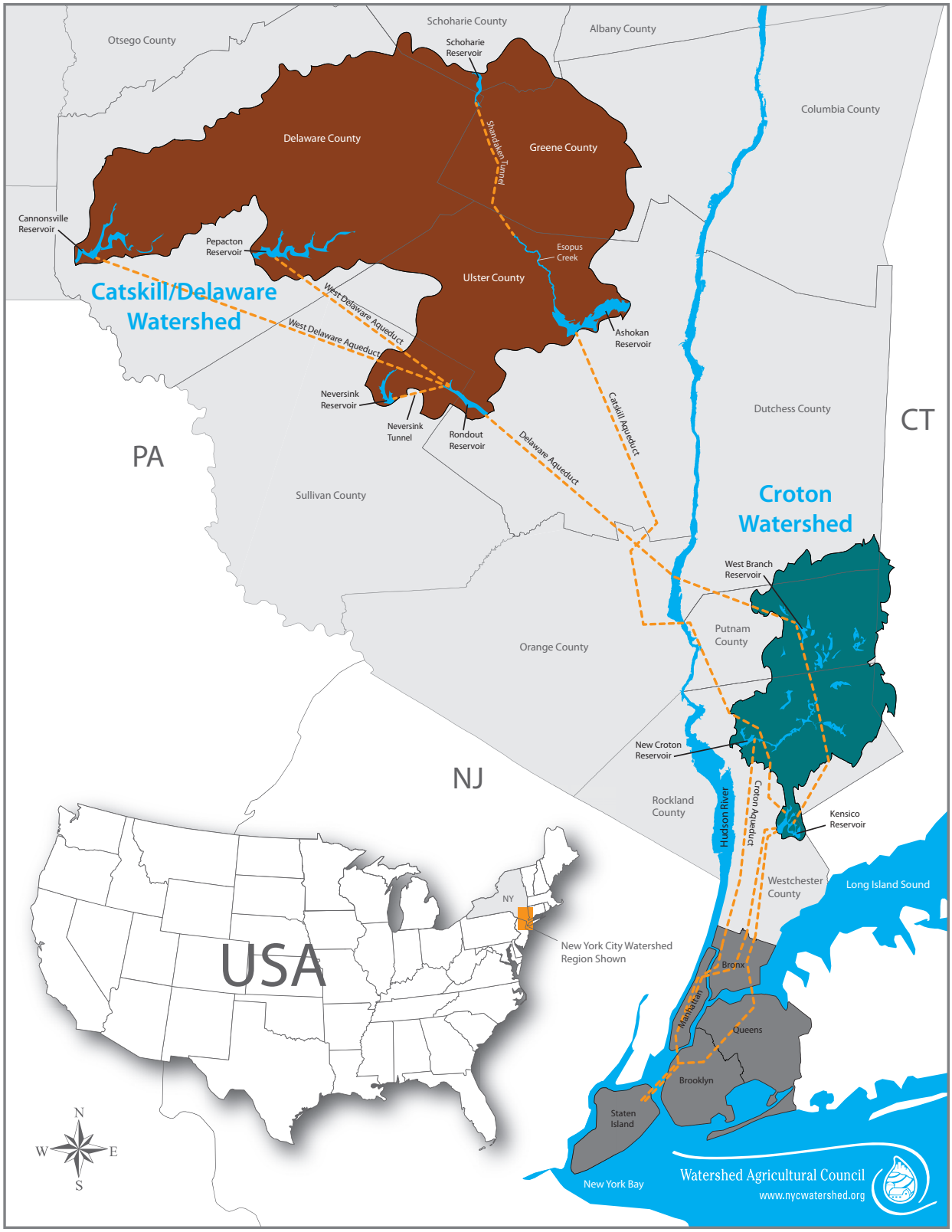

Figure 1. The NYC water supply system. (Image courtesy of Watershed Agricultural Council.)

viewed the project as an opportunity to provide an objective opinion. In addition, because BMP are voluntary in New York and researchers were not affiliated with regulatory agencies, landowners did not need to be concerned with any regulatory reprisals for volunteering their properties. That said, a truly random sample was not possible, and results should be considered accordingly.

BMP implementation was evaluated on 89 properties during the summers of 2009 and 2011. In 2009, 48 properties were examined (26 with and 22 without plans). In 2011, 41 properties were assessed (21 with and 20 without plans). For analysis, the two

assessments are combined and referred to as the "2009/2011" group. Data from Munsell and Germain (2007), which included 31 woodlots sampled in the NYC Watershed in 2002, were added to the analysis. These data were also collected from landowners who volunteered their properties. Combined, the data from the 2002 and 2009/2011 evaluations provided 120 properties for analysis.

To compare BMP implementation in 2009/2011 with observations in 2002, scoring methodology of BMP indicators followed that of Munsell and Germain (2007), which were derived from the New York BMP Field Guide (New York State Department of Environmental Conservation 2007). Six categories of BMP were examined: landings, forest roads, forest road stream crossings, skid trails, skid trail stream crossings, and water diversion devices. Sample sizes differed among BMP categories because not every property had conditions for which all BMP applied (e.g., not every property had a stream crossing). In total, 63 BMP indicators were evaluated: 10 each for landings and skid trails, 15 each for forest roads and forest road stream crossings, and 13 for skid trail stream crossings. The score for the category "water diversion devices" was computed by averaging applicable scores across the other five categories. Applicable indicators included water bars, broad-based dips, water deflectors, open-top culverts, and diversion ditches. Scores for each indicator were based on a 0–3 system, in which higher scores denote better BMP implementation. Regardless of BMP category, scores were defined as follows: 0, BMP not applied; 1, BMP applied with major deviations from New York BMP guidelines; 2, BMP applied with minor deviations from New York BMP guidelines; 3, BMP applied correctly according to New York BMP guidelines; and N/A, BMP not applicable and not scored.

Similar scoring systems have been used in other BMP audits. Montana's BMP monitoring program has a nearly identical breakdown, with an additional level for BMP that "exceed requirements" (Sugden et al. 2012). In the scoring methodology for this study, "minor" deviations included those of small consequence, such as waterbars spaced slightly too far apart but otherwise installed correctly. "Major" deviations were of larger magnitude, such as waterbars that did not extend across the trail. The same principal investigator from 2002 and 2009/2011 ensured consistency in scoring, allowing for objective data set comparisons.

This scoring methodology does not explicitly address BMP effectiveness; instead, it examines prescriptive implementation. Three reasons explain the approach. First, prescriptive scoring better approximates New York's BMP guidelines. For example, guidelines specify that on a given slope, waterbars should be spaced at a certain distance. Second, the case study sought to examine the degree to which management plans, as educational tools, translate BMP recommendations into actual implementation. Finally, adoption of implementation-based methodology allowed for direct comparisons with previous studies.

One BMP not addressed in this study is harvest planning. The New York BMP field guide includes several planning recommendations, such as timing harvests to coincide with dry, frozen, or snow-covered ground. However, field trials were unsuccessful in developing a scoring methodology to assess these recommendations (Munsell and Germain 2007), leading to the decision to exclude evaluation of planning in this study.

The BMP assessment protocol for both 2002 and 2009/2011 included a census of landings, forest roads, and forest road stream crossings on each harvested property. The census was taken by walking all roads. For the 2002 properties, a census of skid trails and skid trail stream crossings was used. For 2009/2011, time constraints required sampling rather than a census. Skid trails were sampled by evaluating the main skid trail (defined as the skid trail by which most logs would have reached the landing) in 300-ft segments until the first fork (other than single entry marks). Other skid trails were sampled using a line-intercept method. Transects through the harvest area were installed, and skid trail intersections were evaluated 150 ft in both directions from the intersection point. Transects were designed to cover as much of the harvest as possible, so that larger harvests had greater distances between transect lines. Distances between transects were as small as two chains for the smallest harvests (less than 10 acres) and as large as eight chains for the largest harvests (more than 200 acres). Transect starting points were located by walking a random number of paces perpendicular to the harvest or property boundary, turning 90° and entering the cut, so that transect lines paralleled harvest or property boundaries whenever practical. Skid trail stream crossings were evaluated when they occurred in sampled sections of the skid trail.

The score for an individual road, trail segment, landing, or stream crossing was calculated as the unweighted average of all applicable indicators. Overall scores for each relevant BMP category were calculated by averaging the scores for individual roads, trail segments, landings, or crossings. A weighted average was used based on the length of each sampled segment (for roads and trails) or area (for landings), whereas an unweighted average was used for stream crossings. Weighted averages were necessary because not all landings, roads, and skid trail segments were the same size. For example, a sampled skid trail segment measuring 200 ft in length would not contribute as much toward a property's skid trail score as a 300-ft-long segment.

BMP category scores were treated as continuous variables. Each BMP category score is an average of the 10–15 scores for the individual indicators within that category. Each individual indicator score is assumed to represent an underlying continuous scale, and the ordered classification of scores (0, 1, 2, and 3) can be regarded as a grouping or approximation of this continuous scale (Snedecor and Cochran 1980, p. 204). Mean scores from properties with plans, those without plans, and those sampled in 2002 were compared using analysis of variance. Because actual plans were not uniformly available for all participants, the presence of a written management plan was treated as a simple "Yes/No" variable.

The BMP data from 2002 were not collected with particular reference to management plans, whereas 2009/2011 management plan properties were deliberately oversampled to obtain roughly equal numbers of properties with and without plans. To compensate for this targeted sampling of management plan properties, a weighted mean was computed for the 2009/2011 data for which the weights for the sample data for properties with plans and those without plans were based on their relative proportions in the study population. Based on data provided by WAC, 30% of the 2009/2011 properties in the target population had plans and 70% did not; therefore, the 2009/2011 population mean was defined as $\mu_{09} = (0.3\ \mu_P + 0.7\ \mu_{NP})$ where μ_P is the population mean for the 2009/2011 management plan group and μ_{NP} is the population mean for the 2009/2011 no management plan group. The 2002 scores and combined

weighted 2009/2011 scores were compared using the following contrast of means:

$$C_1 = \mu_{09} - \mu_{02}; \quad (1)$$

$$H_0 : C_1 = 0,\ H_a : C_1 \neq 0$$

where μ_{02} is the mean for properties in 2002. The null hypothesis, H_0, indicates that there is no difference between the weighted 2009/2011 group and the 2002 group, whereas the alternative hypothesis, H_a, indicates that a difference does exist. In addition to this contrast, pairwise comparisons of the three groups (properties with plans in 2009/2011, properties without plans in 2009/2011, and properties in 2002) were conducted using the Waller-Duncan test. An α level of 0.10 was applied for all tests of significance. All statistical analyses used SAS 9.1.

Results

Overall, mean scores for landings, skid trails, and forest roads were in the "2" range for properties both with and without management plans, for which a score of 2 indicates only minor deviations from BMP standards in these areas (Table 1). In contrast, the mean scores for stream crossings (both on skid trails and forest roads) were closer to 1.5, suggesting moderate BMP implementation. Water diversion device installation was lowest of all the BMP categories, with average scores around 0.5, indicating that on most properties, these BMP are either poorly or not implemented. Properties with management plans in the 2009/2011 group had statistically significantly better BMP implementation on skid trails and forest roads compared with properties without plans (Table 1). BMP implementation for the other four categories did not differ significantly between properties with and without management plans.

The weighted contrast from Equation 1 combines properties with and without plans from the 2009/2011 group and then compares that mean to the mean for properties in 2002. This analysis suggests modest improvements in BMP implementation over time in landings, skid trails, and water diversion devices (Table 2). The landings score was slightly higher in the 2009/2011 group, rising from 1.89 to 2.07, but the mean scores for both groups were close to 2, indicating only minor deviations from BMP standards. The water diversion devices mean the score increased from 0.28 in 2002 to 0.52 in 2009/2011, indicating minor improvement yet still ongoing implementation problems within this category. The skid trail scores were 1.56 in 2002 and 1.92 in 2009/2011, representing the most substantial difference across BMP categories.

Table 1. Mean BMP scores for the six BMP categories for properties sampled in 2002, properties sampled in 2009/2011 without management plans, and properties sampled in 2009/2011 with management plans.

BMP category	Mean BMP score (n) 2002	2009/2011 (no plan)	2009/2011 (plan)	Pooled within group SD (P value for test of no differences among 3 treatment group means)
Landings	1.89^{a} (31)	2.05^{ab} (39)	2.12^{b}(44)	0.50 (0.15)
Skid trails	1.56^{a} (31)	1.87^{b} (42)	2.04^{c}(47)	0.40 (<0.0001)
Skid trail stream crossings	1.83^{a} (8)	1.65^{a} (14)	1.44^{a}(15)	0.88 (0.58)
Forest roads	2.16^{ab} (8)	1.92^{a} (16)	2.32^{b}(28)	0.53 (0.07)
Forest road stream crossings	1.99^{a} (2)	1.84^{a} (6)	1.35^{a}(9)	0.96 (0.53)
Water diversion devices	0.28^{a} (31)	0.44^{ab} (42)	0.70^{b}(47)	0.64 (0.02)

Scores range from 0 (no BMP attempted) to 3 (all BMP implemented according to guidelines). Within a BMP category, means with the same superscript letter are not statistically different, as determined by the Waller-Duncan pairwise comparison test (experimentwise error rate $\alpha \approx 0.10$).

Table 2. Comparison of mean BMP scores in 2002 and 2009/2011.

BMP category	2002	2009/2011	P value
Landings	1.89	2.07	0.10
Skid trails	1.56	1.92	0.0001
Skid trail stream crossings	1.83	1.59	0.50
Forest roads	2.16	2.04	0.58
Forest road stream crossings	1.99	1.69	0.70
Water diversion devices	0.28	0.52	0.09

Scores range from 0 (no BMP attempted) to 3 (all BMP implemented according to guidelines). The 2009/2011 mean is weighted by the proportion of the 2009/2011 study population with and without management plans: 30 and 70%, respectively (see Equation 1).

Discussion

Modest differences between "plan" and "no plan" BMP implementation scores, coupled with minimal differences compared with the 2002 data, indicate that forest management plans may not facilitate meaningful improvements in BMP implementation. Beyond BMP, case study results indicate a need for critical evaluation of forest management planning programs. They may also signal to organizations and agencies promoting forest management plans a need to examine funding priorities.

The significant improvement in BMP implementation on skid trails is potentially heartening, because they are often the largest component of harvest access systems on smaller, family forest properties (Kochenderfer 1977, Germain and Munsell 2005). Similarly, although landings only differed narrowly, the high average scores in that category are also encouraging because landings are a publicly visible side of logging operations.

Despite these encouraging results, stream crossings and water diversion devices, BMP most critical to water-quality protection, had the lowest scores. Furthermore, they did not differ significantly between properties with and without management plans and did not differ significantly compared with data from 2002. These results somewhat overshadow the scores and differences observed in other categories because achievements in access system design and installation are less meaningful from a water quality standpoint if water diversion devices and stream crossings are not properly implemented.

Case study results suggest a disconnection between the documented steps and education provided by management plans and on-the-ground implementation. Numerous studies confirm the value of plans as educational tools (Laford and Parker 1988, Egan et al. 2001, Kilgore et al. 2007). The planning process ostensibly establishes a trusting relationship between the landowner and a professional forester. Plan holders are more likely to participate in educational activities associated with forest stewardship (Munsell and Germain 2004). This finding is noteworthy, because landowner familiarity with

BMP was positively linked to implementation in a study in East Texas (Carraway et al. 2000).

Landowner knowledge, however, does not necessarily translate into management action and stewardship decisions. Stone and Tyrrell (2012) found that the presence of a forest management plan did not influence landowners' decisions about whether to subdivide their property. Similarly, although Caron et al. (2012) found that landowners with management plans had a deeper knowledge of forest management practices than landowners without plans, there was no difference in the quality of forest stocking between the two groups, both exhibiting poor stocking. Specific to BMP, Munsell et al. (2006) argued that a family forest owner's influence on the implementation process may be limited and that foresters and loggers play a more critical role.

The results of these studies and ours suggest that a narrow focus on educating landowners through forest management plans may be inefficient and ineffective in substantively improving private forest stewardship. A better approach may be an integrated model that focuses on the "forest management triangle" comprising landowners, loggers, and foresters. Loggers are vital to BMP implementation, because they are typically charged with installation. How well BMP are implemented, if they are even attempted at all, may largely depend on a logger's knowledge and skill. Carraway et al. (2000) reported the highest BMP compliance when a forester was involved in the harvest, and the logging contractor received formal BMP training. In contrast, the lowest compliance rates were associated with property owners lacking BMP knowledge, coupled with logging contractors without formal BMP training. Expanding the effort to help loggers integrate BMP into their business model is a logical priority. Particularly in states with voluntary BMP, shifting funding from management planning to activities such as logger training and certification as well as cost sharing BMP installation may be a more prudent use of limited resources.

Along the same lines, foresters play a critical role by advocating BMP to clients and including and enforcing BMP provisions in timber sale contracts. Carraway et al. (2000) reported that explicitly mandating BMP in timber sale contracts and having foresters enforce BMP implementation during and after the timber sale were key factors to BMP compliance. These contracts may therefore have a greater potential to affect on-the-ground practices than management plans. In particular, in states such as New York, which has no forest practice law and has voluntary BMP, these contracts may be the only written documents that specifically detail what BMP are called for, who is responsible for their installation, and what penalties result from an unsatisfactory job. Along with support for logger training, programs that assist landowners and foresters with forest harvest contracting could be a more effective use of funding.

Finally, although forest professionals are critical to the BMP implementation process, the landowner's role cannot be completely forgotten. Landowner education and involvement in forest stewardship remain important. However, the results of this case study and the low adoption rate of management plans reported by Butler (2008) indicate that the traditional transfer-of-knowledge focus commonly used for forestry outreach is in need of revision. Some recent studies have called for a paradigm shift in landowner education away from management plans and workshops led by forestry professionals. Van Fleet et al. (2012), for instance, advocated greater use of the Internet and peer learning through landowner discussion forums so that landowners could provide each other with information and support. A pilot approach of this peer-to-peer method in Massachusetts effectively attracted not only landowners with a forestry background but inexperienced landowners as well (Ma et al. 2012). Landowners involved in the forums shared a willingness to spread information gained from the forums, and they also retained knowledge such as correctly identifying foresters, land trusts, and sources for land management advice.

Conclusion

Although management plans are among the most common financial incentive tools used in US private forestry, a growing body of research questions both their ability to reach a majority of landowners and their influence on family forest stewardship practices. In the NYC Watershed, voluntary, subsidized forest management plans represent one tool to encourage stewardship and protect water quality. However, this case study found minimal differences within the NYC Watershed with respect to BMP implementation between properties with and without plans. It also found little difference in BMP implementation over time in that region. These results, combined with the research findings, suggest that for organizations concerned with water-quality protection, subsidizing forest management plans may not be the most prudent use of limited resources. A more integrated approach that engages multiple management stakeholders through logger training, timber sale contract support for landowners, encouragement of foresters to include and enforce BMP provisions in timber sale contracts, subsidizing of BMP installation by loggers, and peer-based learning opportunities for landowners may be a more effective use of funding.

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Annex 2: Management Plans and Sustained Yield Management

Do Forest Management Plans Lead to Sustained Yield Management on Family Forests? A Formative Evaluation in the New York City Watershed

Joshua D. VanBrakle

Abstract

Forest management planning on private forestland is a cornerstone practice for promoting long-term stewardship. Recent research, however, has cast doubt on both management planning's ability to reach a substantial portion of private landowners and its influence on those landowners' behaviors. The Watershed Agricultural Council used a region heavily invested in management planning, the New York City Watershed, as a case study to examine the impact of forest management plans on the implementation of silvicultural practices during timber harvests on family forests. We expanded on field data collected from previous research to evaluate 123 timber harvests over a span of 10 years. We used standing tree and stump data to assess pre- and post-harvest conditions, and then used both a decision-tree and numerical scoring system to evaluate harvest types and whether or not sustained yield management principles were applied. Properties with management plans did not have significantly different management from those without written plans. Combined with previous research, this study suggests that free, voluntary management plans are not effective at improving stewardship practices on family forestland. Even if they were, the current pace of plan adoption cannot keep up with trends in ownership transfer and parcelization.

Introduction

Forest management planning on private forestland is a cornerstone practice for promoting long-term stewardship. Management planning support ranks among the most common financial incentive programs (Jacobson et al. 2009). From 1991 to 2006, the USDA Forest Service's Forest Stewardship Program produced more than 270,000 management plans for more than 31 million acres of family forests (USDA Forest Service 2012). Often, management planning is a prerequisite for additional landowner financial assistance. Sixteen states require a written management plan before a landowner can participate in preferential property tax programs for forestland (Hibbard et al. 2003).

Despite the extensive time and money spent promoting and subsidizing management plan plans, recent studies have questioned their ability to meaningfully affect private forest conservation. Butler (2008) found that only 4% of US family forest owners have written management plans, despite decades spent promoting them. Caron et al. (2012) found no statistically significant difference in forest stocking between properties with and without management plans. Similarly, VanBrakle et al. (2013) found no significant difference in water quality Best Management Practice implementation between properties with and without plans. This result led the researchers to question the value of subsidizing management plans for organizations emphasizing water quality protection.

Although these studies raise concerns about management planning, none specifically examine timber harvesting practices. Do more sustainable harvests occur on family forest properties with written management plans than on properties without plans? To answer this question, we examined the New York

City (NYC) Watershed as a case study. The NYC water supply system is the largest unfiltered municipal surface water system in the U.S., providing over 1.3 billion gallons of water daily to the greater metropolitan area as well as several upstate communities (Galusha 2002). Its primary water supply systems, the Catskill/Delaware Watersheds, are 78% forested, of which 75% is in family forest ownership (Figure 1) (Hall et al. 2008). Because of the dominant family forest role, forest management planning has become a foundational method for engaging regional landowners.

The Watershed Agricultural Council (WAC), a non-profit group based in the NYC Watershed, shares the cost of writing "Watershed Forest Management Plans" (WFMPs). Available to private landowners with at least 10 acres of forestland, the program offsets costs associated with hiring a consulting forester to develop the plan. In most cases, funding covers the full cost of the WFMP. While WAC incentivizes plan creation, implementation is voluntary (WAC 2009a). Between 1996 and 2009, over 800 plans encompassing more than 140,000 acres, over 13% of the Catskill/Delaware Watersheds' total area, received funding (WAC 2009b).

Combining existing datasets with additional field work, we compared the implementation of sustained yield management on properties with and without forest management plans. We defined sustained yield management using the definition from Helms (1998): "The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources without impairment of the productivity of the land." Because of the complexity of evaluating all of the "various renewable resources," for this study we focused on just one of these – timber.

The results of this evaluation will help inform debate about management plan efficacy and assist organizations and agencies that promote management plans in deciding whether to continue current efforts or redirect funding to alternative programs.

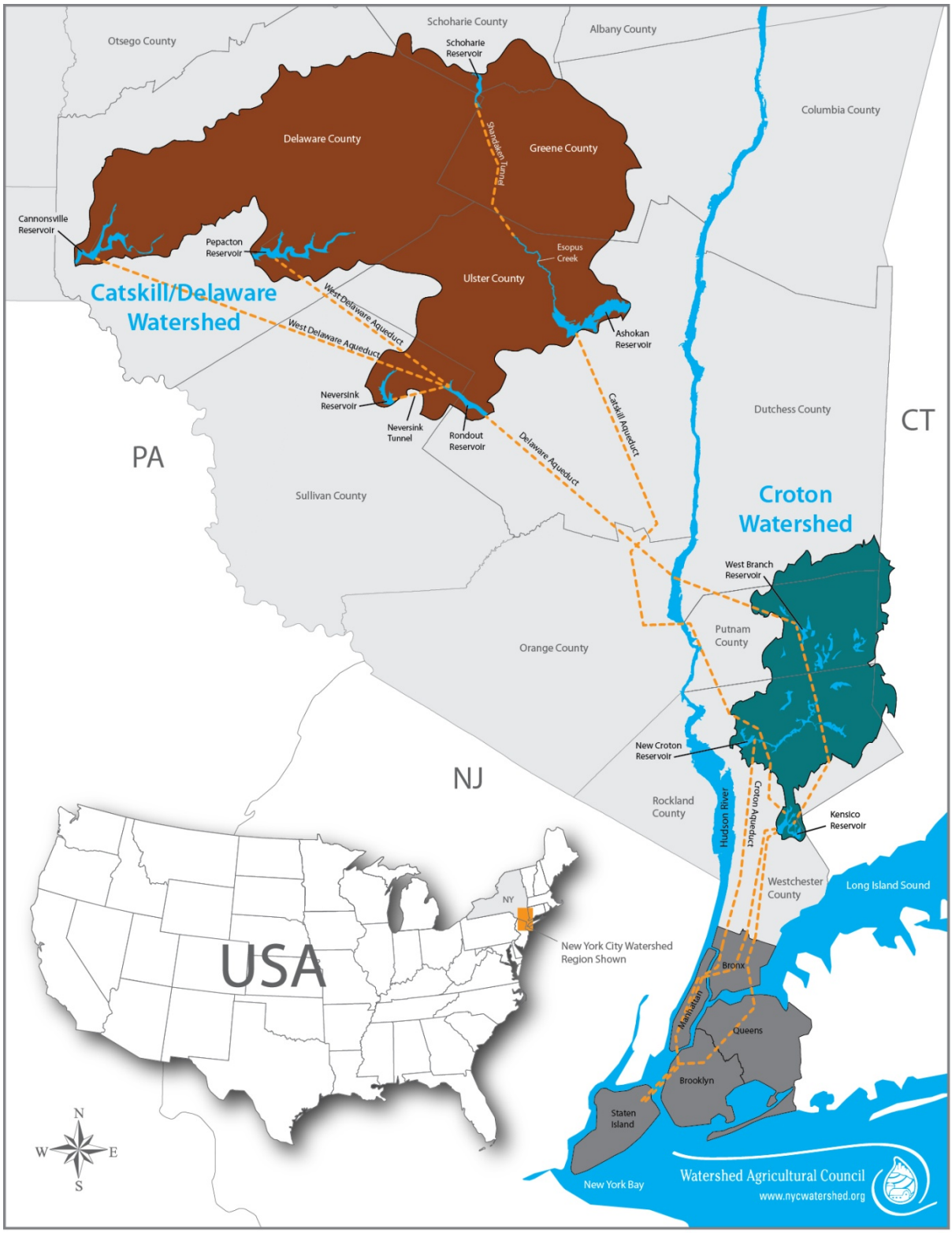

Figure 1. The New York City water supply system.

Methods

The population for this case study included nonindustrial private forest (NIPF) owners with at least 20 contiguous acres of forestland within the NYC Watershed. Because the study involved private owners, permission was required to visit a property. To obtain permission, we mailed 3,350 tri-fold brochures with detachable reply cards asking for landowner contact information, confirmation that they were willing to have researchers visit their property, whether a timber harvest (other than firewood for personal use) occurred on their property in the past five years and, if so, the year it took place. The harvest requirement was included to facilitate evaluation. Seven hundred fifty-two cards were received, for a response rate of 22%. Of these, 172 (23%) indicated they had conducted a timber harvest in the past five years.

The need to obtain permission from landowners impacts the generalizability of research results. It is possible that landowners who feel their job will meet the researchers' approval will be more likely to submit their property for study. Anecdotal conversations with participating landowners indicated that this issue may be less problematic than it appears. While many landowners were indeed proud of their land and work done on it, others indicated they volunteered because they felt the harvest had not gone well and viewed our research as an opportunity to receive an objective opinion. In addition, because New York has no Forest Practice Law and researchers were not affiliated with regulatory agencies, landowners did not need to be concerned with any regulatory reprisals for volunteering their properties. That said, a truly random sample was not possible and results should be considered accordingly.

Our sample built on previous data gathered for Munsell et al. (2008), which included evaluations of 50 properties also from the NYC Watershed region. These properties were harvested between 2001 and 2005. We expanded that dataset by visiting an additional 76 properties in the summer and fall of 2011. Of these, 73 had data collected – the remaining three were disqualified during the visit for a lack of harvest – providing a total of 123 harvests spanning from 2001 to 2011. Of these, 66 had written management plans and 57 did not. We deliberately over-sampled properties with plans relative to the overall population in order to have roughly equal numbers in each group. We determined if properties had written management plans using WAC's database and by asking the landowners when we contacted them to schedule our visit to their property.

Our field methods followed those of Munsell et al. (2008). We used a systematic sampling method, installing transects that covered the harvest. We installed a minimum of ten 1/10th acre fixed area plots. Additional plots were installed if margin of error of basal area per plot was over 20%, according to the technique used in Munsell et al. (2008). To facilitate field work and avoid inconveniencing property owners, we only ever spent one day at any given property.

At each plot, we measured all standing trees six inches or larger, recording species, diameter-at-breast-height (dbh), condition (acceptable or unacceptable growing stock), and either the number of 16-foot logs if the tree had any or 8-foot bolts if it did not. We defined acceptable growing stock (AGS) as a tree of a commercial species that currently or at some point in its life would yield at least one Grade 2 sawlog as defined by the USDA Forest Service. In addition, we measured all stumps six inches and greater located within each plot, recording species and stump diameter. We converted stump diameter to dbh using conversion factors developed for the Catskill region for Munsell et al. (2008).

We assessed the use of sustained yield management by comparing pre- and post-harvest stand conditions. Post-harvest conditions were determined using only standing trees. We determined pre-harvest conditions by combining the standing tree and stump data to extrapolate what our plots would have looked like prior to harvest.

We evaluated whether or not sustained yield management had occurred through two methods. First, we used the "decision tree" framework developed by Fajvan et al. (1998) to evaluate harvests in West Virginia. The decision tree uses pre- and post-harvest inventory data to separate harvests into one of six types divided between two categories. "Shelterwood, low thinning, and seed tree," "crown thinning," and "clearcut" are all considered "silvicultural" cuts. By contrast, "sawtimber potential," (will produce a viable sawtimber harvest in 10-15 years) "fiber potential," (sawtimber potential exhausted, but could yield a viable pulpwood harvest in 10-15 years) and "regenerate stand" (both sawtimber and pulpwood potential exhausted for this rotation) are considered "nonsilvicultural" (Figure 2).

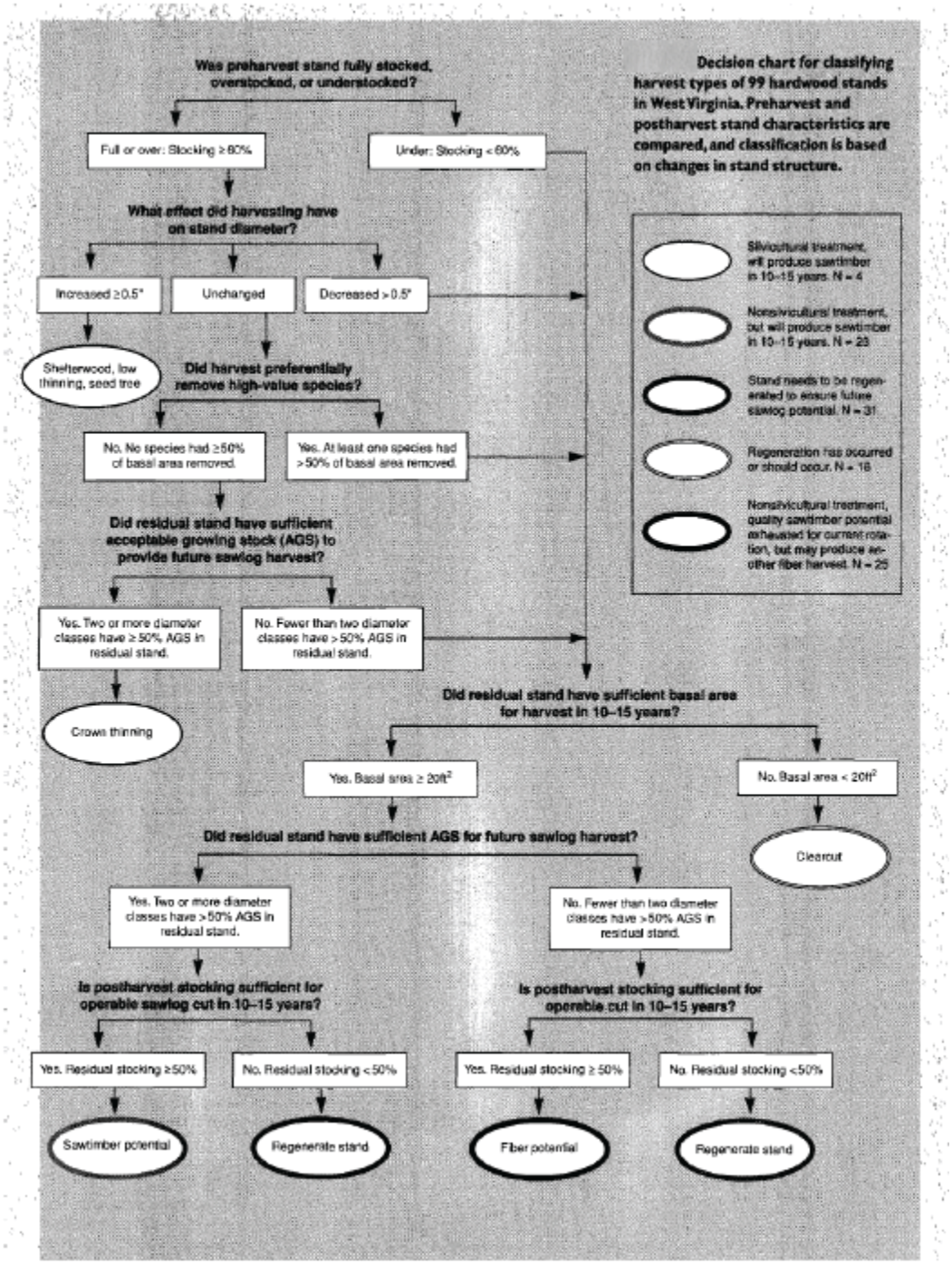

Figure 2. Decision-tree set-up (copied from Fajvan et al. 1998).

Because the decision tree is descriptive, it does not allow for statistical comparisons between groups. To obtain numerical scoring that would allow for such testing, we also evaluated the properties using a system based on that from Munsell et al. (2008). This scoring system assesses seven criteria identified in forestry literature as recommendations when implementing silvicultural operations. The first five criteria came from Munsell et al. (2008) and emphasize pre- and post-harvest relative density, relative density removed, change in quadratic stand diameter, sawtimber removed, and poletimber removed. The two additional criteria further help differentiate between silvicultural operations and those that focus simply on extracting value, such as high-grading. Criterion six assesses change in the stocking of high value species. We defined "high value" as the top six economically valuable species based on regional stumpage prices to follow Fajvan et al. (1998). Criterion seven assesses the stand's future potential by examining the post-harvest relative density in AGS (Table 1). Scores were based on the following system:

0: the harvest did not meet the criterion, indicating a negative change
0.5: the harvest moderately addressed the criterion (not all criteria had a middle level)
1: the harvest met the criterion, indicating a positive change

The score for an individual harvest was the sum of all seven criteria scores. As a result, harvest scores could range from 0 to 7, with 0 representing a worst case and 7 representing a best case. The scoring system was only designed to evaluate even-aged thinning operations, rather than uneven-aged or regeneration cuts. Since no uneven-aged or regeneration harvests were observed, every property could be evaluated using the seven-criteria system.

Scores between groups were compared using analysis of variance (ANOVA). We divided the sample into four groups using a 2x2 factorial format, separating them out by presence or absence of a plan and by year sampled (2005 or 2011). We also conducted a t-test comparing cuts considered silvicultural or unsilvicultural according to the decision tree. We did this as a way of checking the validity of the seven-criteria scoring system. We hypothesized that if the scoring system were robust, we should see significantly higher scores among silvicultural cuts compared with nonsilvicultural ones. Finally, we also conducted a t-test comparing properties with management plans and enrolled in New York State's Forest Tax Law Program (480-a) with properties that had plans but were not enrolled in the program. 480-a enrollment information was not available for properties visited in 2005, so only properties visited in 2011 were evaluated in that comparison. ANOVA analyses were conducted using Statistical Analysis Systems (SAS), while t-tests were conducted using Microsoft Excel. Statistical tests were considered significant if the p-value was less than 0.05.

Criterion	Score of 0	Score of 0.5	Score of 1	Source(s)
Pre-harvest relative density (RD)	< 80%	N/A	≥ 80%	Marquis et al. (1992); Munsell et al. (2008)
Post-harvest RD, and total stocking removed	Post harvest RD < 60%, and harvested RD > 35% of Pre-harvest RD	Post harvest RD < 60%, or harvested RD > 35% of Pre-harvest RD	Post harvest RD ≥ 60%, and harvested RD ≤ 35% of Pre-harvest RD	Marquis et al. (1992); Munsell et al. (2008)
Change in quadratic stand diameter (QSD)	QSD reduced > 0.5 in.	QSD reduced ≥ 0.25 in. but ≤ 0.5 in.	QSD reduced < 0.25 in.	Roach (1977); Munsell et al. (2008)
Sawtimber Removals	> 35% preharvest basal area removed	N/A	≤ 35% preharvest basal area removed	Nyland (1994); Munsell et al. (2008)
Pole Removals	< 20% preharvest basal area removed	N/A	≥ 20% preharvest basal area removed	Nyland (1994); Munsell et al. (2008)
Stocking in High Value Species	At least one high value species had >50% of basal area removed	N/A	No high value species had >50% of basal area removed	Fajvan et al. (1998)
Acceptable Growing Stock (AGS) RD	AGS RD < 35%	AGS RD ≥ 35% but < 45%	AGS RD ≥ 45%	Marquis et al. (1992); Nyland (2002)

Table 1. Scoring criteria and associated levels used to evaluate sustained yield management and the sources used to derive them. Scores of "0" indicate failure to meet the criterion and a negative impact, scores of "0.5" indicate moderate implementation of the criterion, and scores of "1" indicate full implementation of the criterion and a positive impact. Not all criteria had a middle level; these are indicated by "N/A" in the "Score of 0.5" column.

Results

Although the Fajvan et al. (1998) decision tree is only descriptive, a breakdown of harvest types between properties with and without management plans shows minimal differences (Figure 2). About one third of all harvests in both groups were considered silvicultural, and all of those were classified as crown thinning. Neither group had any regeneration cuts – shelterwoods, seed-trees, or clearcuts.

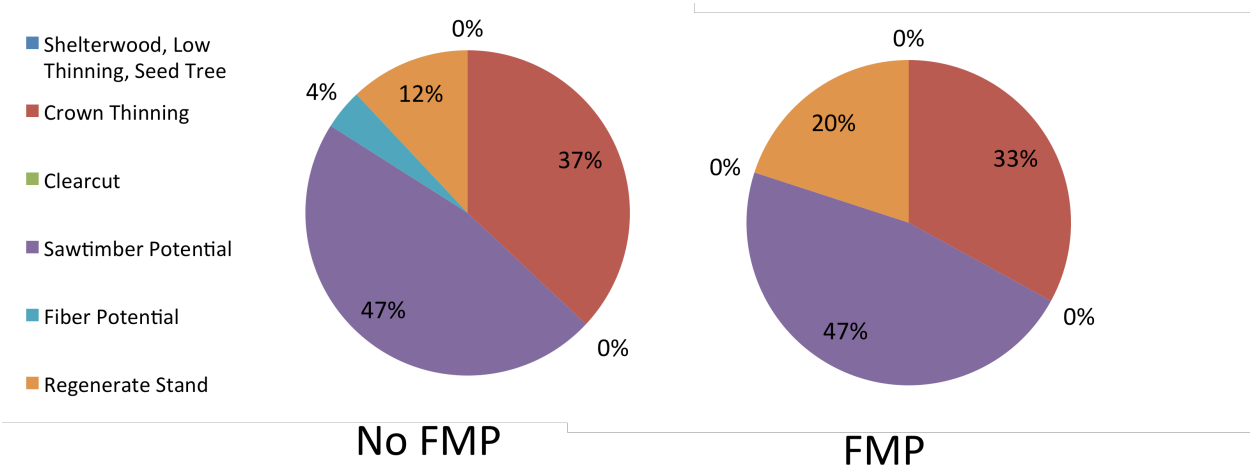

Figure 2. Harvest types based on Fajvan et al.'s (1998) decision tree for properties with (n=66) and without forest management plans (FMPs) (n=57).

The seven-criteria scoring system was effective at differentiating between silvicultural and non-silvicultural operations. The t-test comparing silvicultural and non-silvicultural cuts was highly significant (p-value <0.0001). Mean scores for silvicultural cuts were 4.8, while scores for unsilvicultural cuts averaged 2.6. In addition, no nonsilvicultural cut earned a score higher than 5, and only one silvicultural cut scored below 3. This distribution allows the scoring range to be distilled into three categories:

Score of 0 – 2.9: Unsustainable
Score of 3 – 5: Indeterminate
Score of 5.1 – 7: Sustainable

ANOVA results showed significant improvement in sustained yield management scores from 2005 to 2011 (p-value=0.0109). The mean score in 2005 was 2.9, while the mean in 2011 was 3.7. The biggest change was evident in the "sustainable" range of the scores. While only about 5% of properties evaluated in 2005 scored above 5, in 2011, over 20% met that benchmark, a four-fold increase (Figure 3).

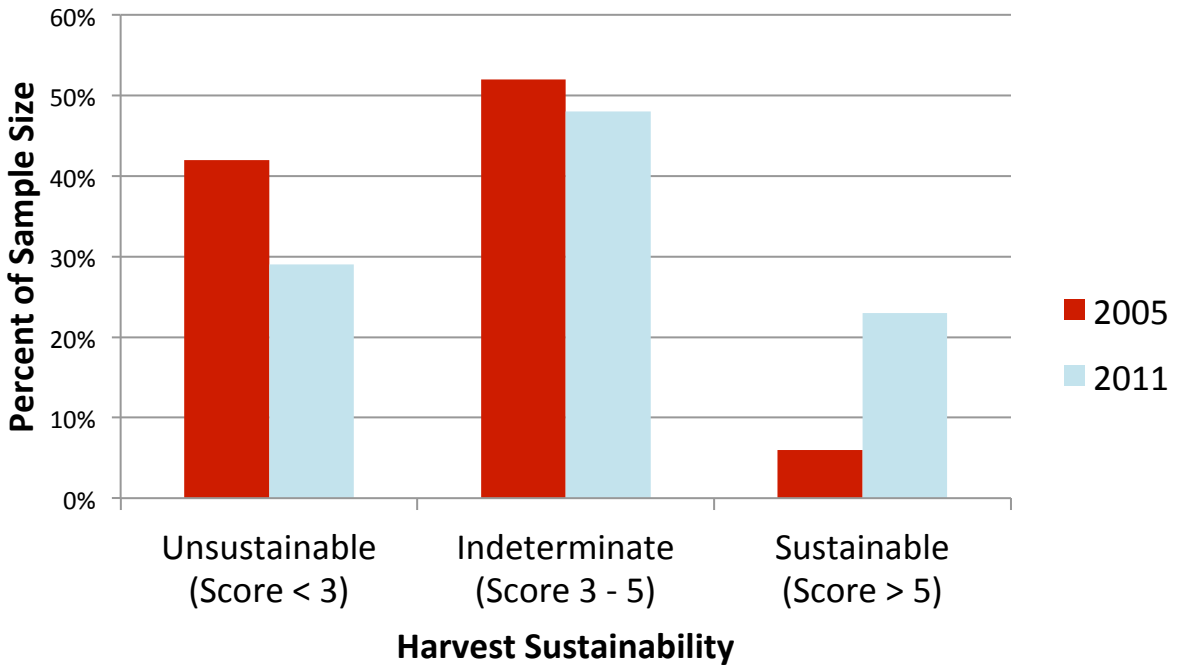

Figure 3. Distribution of seven-criteria sustained yield management scores based on year sampled – 2005 (n=50) and 2011 (n=73).

In contrast to year sampled, there were no significant differences between properties with and without management plans (p-value=0.79). The mean score for properties with plans was 3.3, while the mean for those without plans was 3.4. The distribution of scores among the three levels of unsustainable, indeterminate, and sustainable also indicates a lack of difference (Figure 4). In both groups, slightly less than 20% of properties examined scored in the "sustainable" range.

Although there was no significant difference between properties with and without forest management plans, enrollment in 480-a yielded a significant improvement (p-value=0.017). Properties with management plans enrolled in 480-a had a mean score of 4.4 (n=23), the highest of any group examined in this study. By contrast, properties with management plans but not enrolled in 480-a had a mean score of 2.9 (n=11).

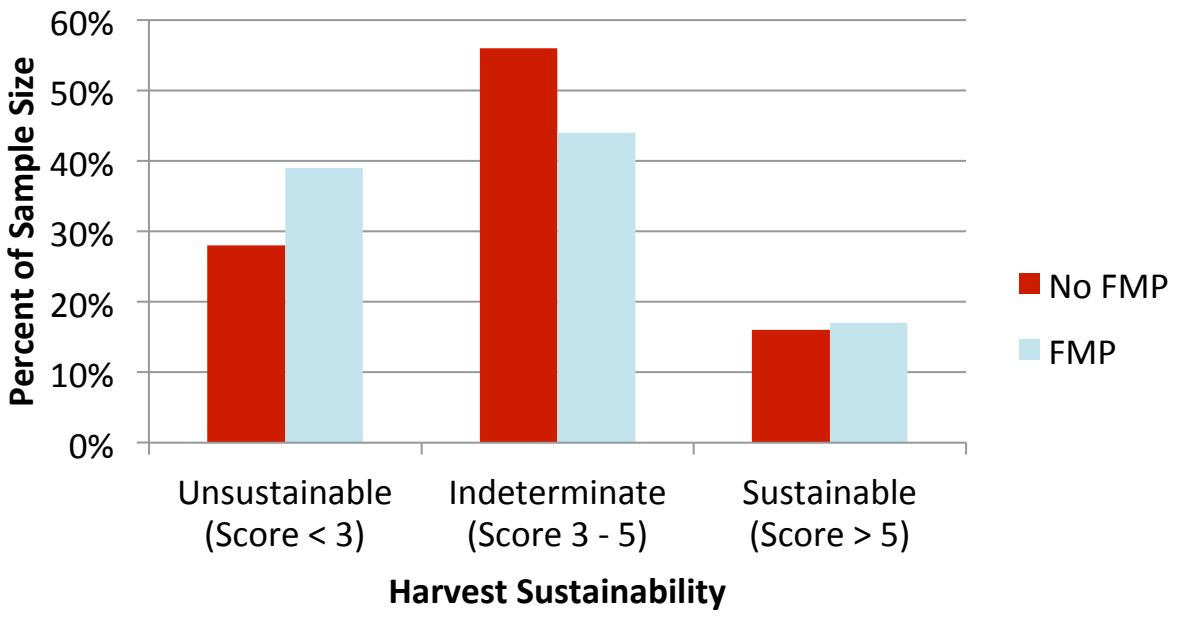

Figure 4. Distribution of seven-criteria sustained yield management scores based on presence (n=66) or absence (n=57) of a forest management plan (FMP).

Discussion

While the data indicate that significant improvement in sustained yield management took place from 2005 to 2011, it is unclear from this study what caused that improvement. There are too many potential factors to consider, among them education efforts by WAC and other environmental organizations, changing public sentiment, and reduced stumpage prices resulting from the housing crisis of 2007-2009. Although the source of this improvement may be an area for future examination, it was beyond the scope of this study to examine.

Whatever caused the improvement from 2005 to 2011, however, management plans do not appear to be the source. There were minimal differences between properties with and without management plans, indicating that these plans were ineffective at improving on-the-ground management practices. That said, properties enrolled in 480-a, which requires a management plan, had the highest scores of any group evaluated. 480-a provides a property tax break to landowners in exchange for those landowners' following an approved management plan and agreeing not to subdivide or sell their property. The law requires a rolling 10-year commitment and has some of the highest non-compliance penalties among similar laws across the U.S.

The higher scores for 480-a properties combined with the lack of significant difference between properties with and without management plans indicates that free, voluntary management plans as currently enacted by WAC do not produce more sustainable timber harvests. Combined with the results of Caron et al. (2012) and VanBrakle et al. (2013), it is clear that management planning as currently conducted is neither helping protect water quality nor improving forest sustainability over what would have happened otherwise.

WAC's forest management planning program as enacted is helpful in one way in that it may encourage enrollment in 480-a. Although 480-a requires a management plan to enroll, landowners must obtain that plan at their own expense – an upfront cost that can easily measure in the thousands of dollars. WAC's management planning program removes that barrier to entry, because its typically free plans satisfy all of 480-a's requirements. One way WAC could improve its management planning efforts is simply by focusing resources on where they are most effective, namely doing more to encourage enrollment in 480-a.

The Regeneration Problem

Although it was not an original goal of the study, an unintentional finding was that a substantial portion of visited stands would be better served by regenerating than trying to continue the present cohort. Based on the Fajvan et al. (1998) decision tree, 16% of properties sampled have been so degraded by poor harvesting that they have exhausted their potential for a sawtimber or even pulpwood harvest and need to be regenerated to become economically viable again. The seven-criteria scoring indicates an even higher percentage based on its measure of post-harvest relative density in AGS. Marquis et al. (1992) recommends that once an even-aged stand falls below 35% relative density in AGS, the landowner is better off regenerating and starting over rather than trying to manage the existing cohort. Nyland (2002) recommends an even high threshold of 45% relative density in AGS as the tipping point for regenerating. Using these thresholds, 44% of properties evaluated need to be regenerated according to Marquis et al. (1992), and 66% according to Nyland (2002).

Despite this need for regeneration harvests, we encountered no such cuts on the over 120 properties examined between 2005 and 2011. This finding is disconcerting not only because of the degraded nature of many Catskills timber stands, but also because of the state of regeneration itself within the region. In their examination of regeneration in New York, Shirer and Zimmerman (2010) found that regeneration of native canopy species was adequate in most of the state – except the Catskill/Lower Hudson region, which had regeneration the researchers considered "fair" or "poor," indicating that regeneration was unlikely absent human intervention. The findings were even more stark when regeneration of desirable timber species was considered – nearly all of the Catskill/Lower Hudson region ranked as "poor" for regeneration of these species (Figure 5). Combined with the findings of the present study, the conclusions of Shirer and Zimmerman (2010) raise doubt on whether or not, given the lack of both regeneration and regeneration harvests, the Catskills will be able to sustain their working forest landscape over the course of the 21st century.

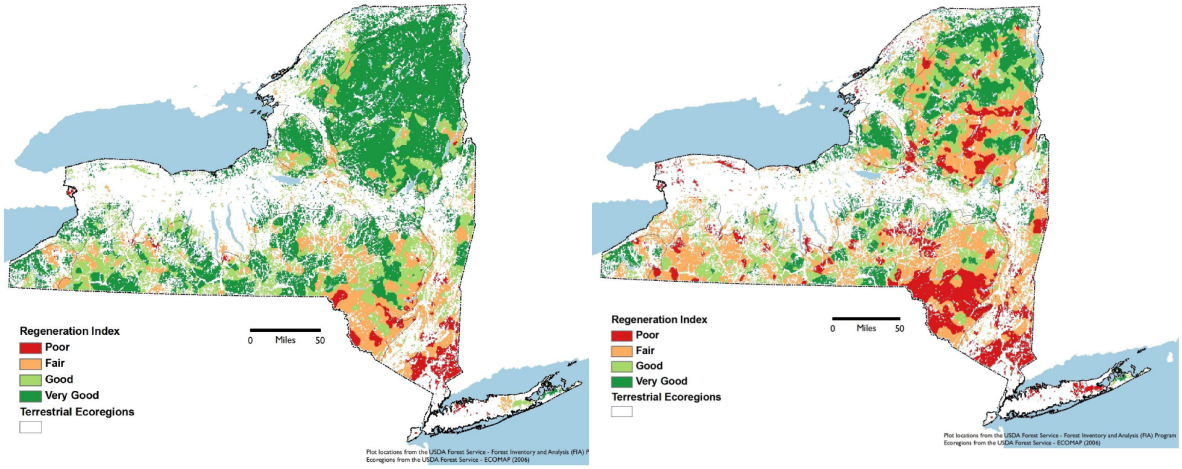

Figure 5. Regeneration index values in New York State for native canopy species (left) and desirable timber species (right) (copied from Shirer and Zimmerman 2010).

Conclusions and Management Implications

Combined with the results of previous studies, this research casts doubt on the ability of free, voluntary forest management plans to meaningfully affect either water quality or forest sustainability. Although management plans have been shown to increase landowner knowledge and interest in forest stewardship (Laford and Parker 1988), that increased knowledge does not appear to translate to better practices on the ground.

Even if management plans had been found to be effective, a shift in forestry's approach to them is still warranted. The traditional model of management planning has yielded plans on only a small fraction of the private forest landscape. Operating under the status quo, Kittredge (2009) estimated that over 140 years will be required to reach every landowner. In the New York City Watershed, even that amount of time is insufficient. Indeed, WAC's current approach cannot plan fast enough to keep pace with the number of landowners and the rate of ownership transfer. WAC geospatial analyses estimate that 9,000 landowners are eligible for the organization's Forest Management Plan Program. Since WAC plans have a ten-year lifespan, WAC would need to fund 900 plans per year in order for every eligible landowner to have a current plan – over a tenfold increase from current expenditures. This rate also does not account for parcelization and ownership transfer, which exacerbate the problem by increasing the number of landowners and requiring a new management plan when a new landowner acquires a property. Already the rate of parcelization in the NYC Watershed surpasses the national average (LaPierre and Germain 2005), and ownership tenure for forest landowners in the region is only 17 years, also below the national average (Caron et al. 2012).

Absent an enormous increase in funding, WAC's existing management planning structure cannot meaningfully impact regional forest stewardship. To increase its effectiveness, WAC will need a paradigm shift in its approach to planning and landowner education that enables it to reach more landowners at a smaller cost per contact.

One bright spot for WAC's existing program is that it does facilitate enrollment in 480-a, which this research found positively impacted forest sustainability. WAC gains other benefits from 480-a enrolled properties as well, such as restricting development and parcelization without having to purchase development rights. Changes to WAC's management planning efforts should strive not to lose this benefit and, if anything, should encourage even greater participation in this program.

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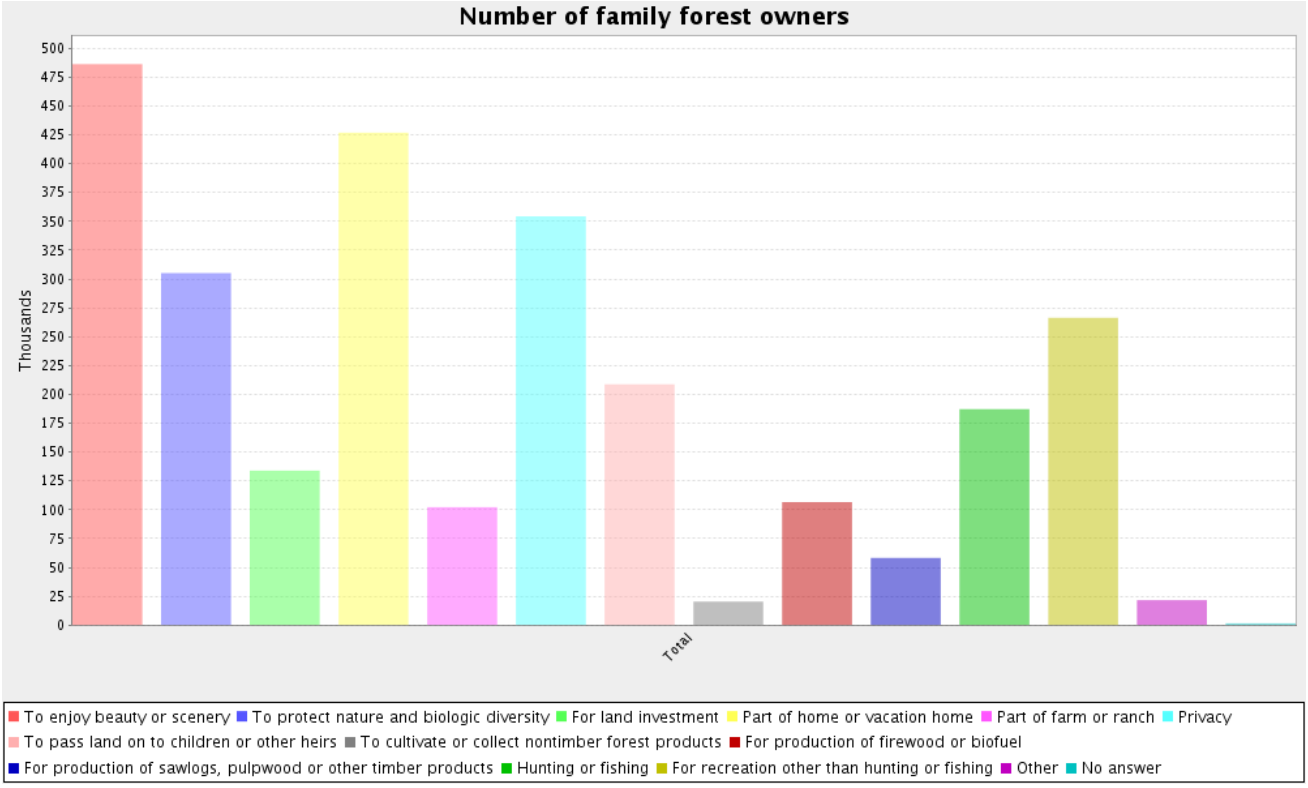
Annex 3: National Woodland Owner Survey Overview

National Woodland Owner Survey – reasons for ownership and concerns

Purpose: To help WAC Forestry staff identify what categories, at a minimum, the mass customized management plan website needs to address.

Rationale: A management plan would address not only how to improve the values of forestland (why someone owns it), but also how to mitigate those areas of ownership that worry landowners (concerns). The planning website should account for both of these aspects. The National Woodland Owner Survey (NWOS) provides state-level information on both of these areas.

Reasons New York family forest owners own land (from the NWOS Tablemaker[1]):

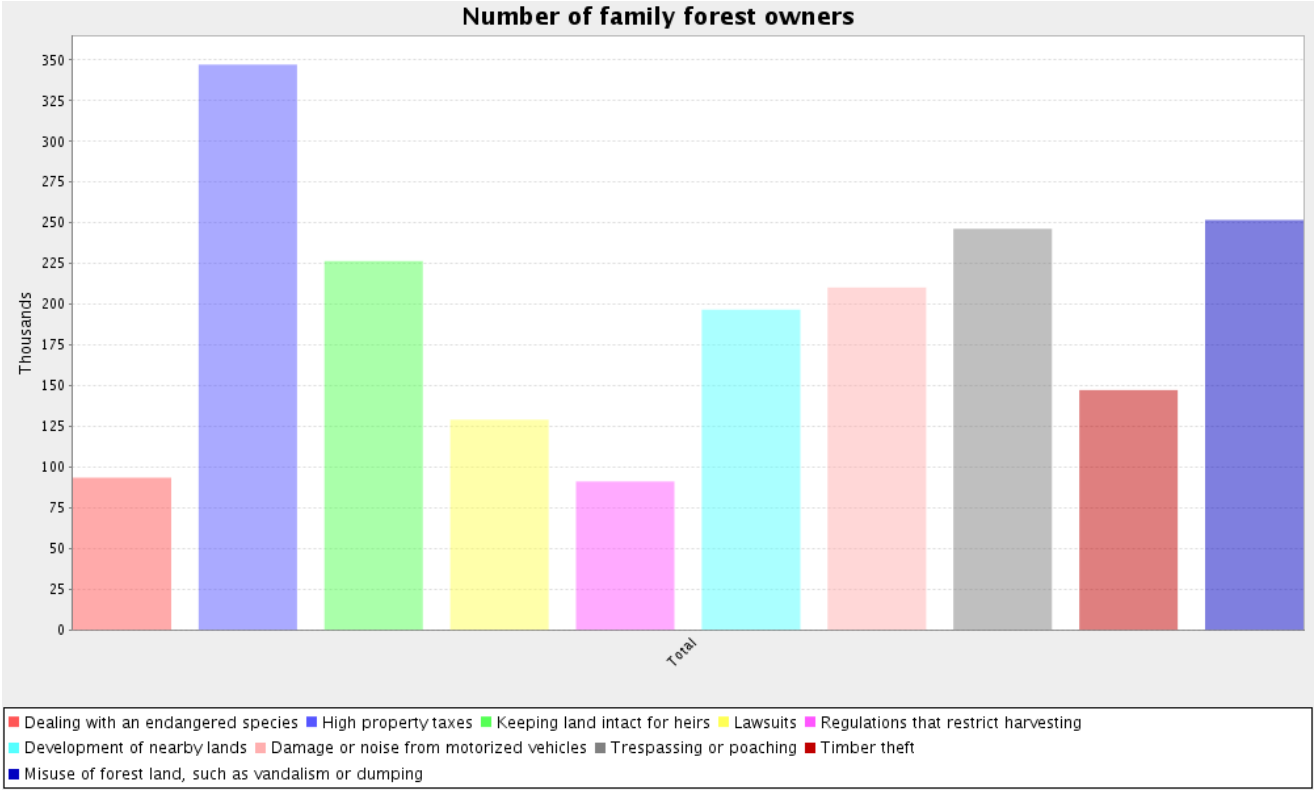


Top reasons:

1. Beauty/scenery
2. Part of home or vacation home
3. Privacy
4. To protect nature and biologic diversity
5. Recreation other than hunting or fishing

[1] I've only included the "owners" versions of these charts (there are also "area" versions). Looking at them, I didn't see any drastic differences between the two, so including just "owners" simplifies the document.

From the NWOS Tablemaker: New York landowners' "sociopolitical" concerns about their forestland

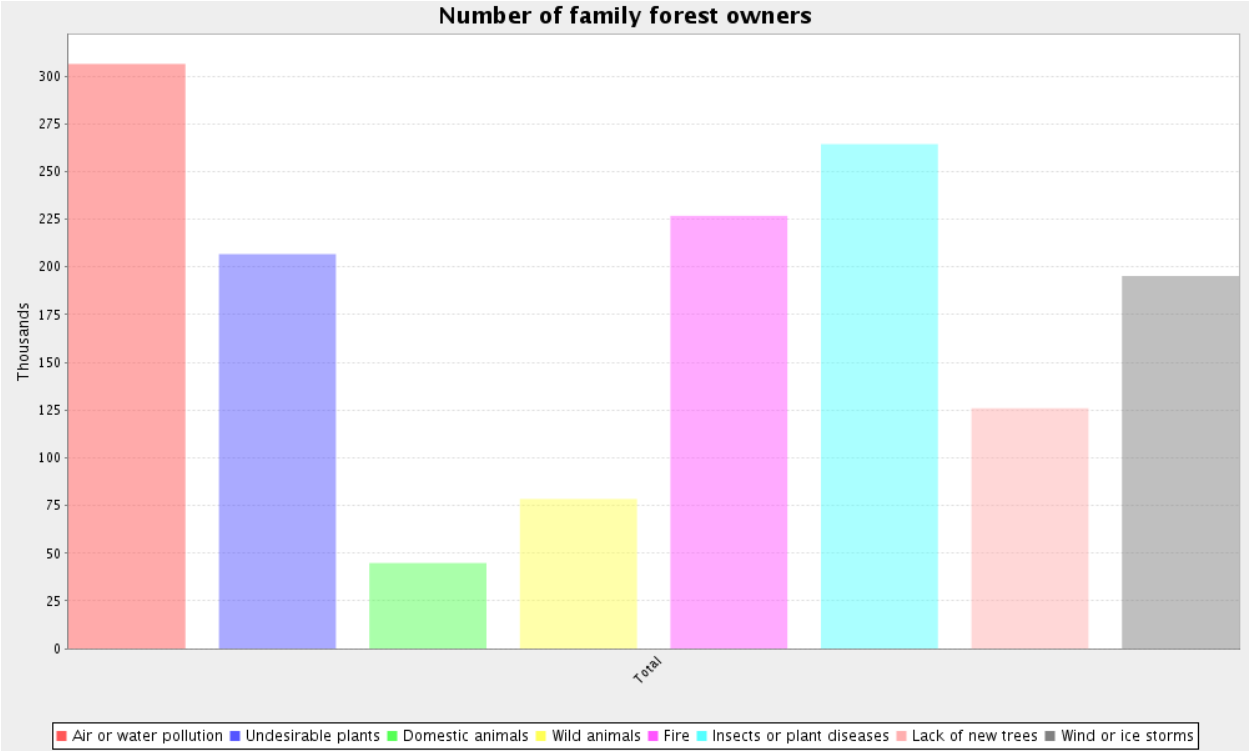


Top 3 sociopolitical concerns of New York landowners:

1. Property Taxes
2. Trespassing
3. Vandalism

Note that although they don't make the top 3, "keeping land intact for heirs," "damage or noise from motorized vehicles," and "development of nearby lands" are also high-level concerns for New York landowners.

Biological concerns of New York landowners:



Top biological concerns for NY landowners include:

1. Air or water pollution
2. Insects or plant diseases
3. Fire
4. Undesirable plants

Combining the two, the top concerns are:

1. Property taxes
2. Air or water pollution
3. Insects or plant diseases

Based on the NWOS breakdown, critical categories for the website to address are:

1. Aesthetics
2. Privacy (ex. boundary marking, tips for reducing noise)
3. Wildlife ("nature protection" sounds weird)
4. Recreation
5. Property Taxes
6. Reducing pollution
7. Insects and diseases ("Woods Health")
8. Fire control

The above categories represent the top reasons for ownership and top concerns of New York family forest owners. That said, the other reasons for ownership and concerns are still prevalent among many family forest owners, so other categories like "keeping land intact" (estate transfer), logging, and nontimber forest products are still relevant, just not as high a priority.

Annex 4: An Overview of the New York State Forest Tax Law Program

An Overview of the New York State Forest Tax Law Program

Prepared for the Watershed Agricultural Council Forestry Committee
September 2012

Purpose

The purpose of this document is to fulfill the Watershed Agricultural Council (WAC) Forestry Committee's July 2012 request for a summary of New York's Forest Tax Law Program, commonly referred to as "480-a" after the portion of the tax code from which the program derives.

Executive Summary

New York was one of the first states to recognize that traditional property taxes hurt forests. The structure of property taxes encourages forest conversion and exploitative logging. Research has shown that Catskill/Delaware landowners subdivide primarily due to financial pressure, including property taxes. This subdivision has negative impacts on both the forest economy and water quality. In the Catskill/Delaware Watersheds, subdivision leads to an average of 3,200 square feet of impervious surface area on each new parcel within 20 years as new owners build homes, driveways, garages and septic systems.

New York helps forest owners offset property taxes through its Forest Tax Law Program (480-a). 480-a typically exempts 80% of enrolled acreage's assessed value. It adds a 6% yield tax, but this tax promotes long-term management. Enrolled acreage may not be developed, and any subdivisions must be over 50 acres. Landowners must meet certain eligibility criteria, including:

1. A minimum of 50 contiguous acres of forestland
2. A 15-year management plan written by a professional forester that must be followed
3. Making an annual recommitment to ten years of forest management

Enrollment in 480-a within the Catskill/Delaware Watersheds is substantially higher than in the rest of the state, indicating the success of WAC's management planning efforts in removing a barrier to 480-a enrollment: the upfront cost of a management plan.

WAC and its funders receive five unique benefits from 480-a enrolled properties, which combine to make a powerful case for WAC supporting increased 480-a enrollment and emphasizing the program in its management planning efforts:

1. Minimal subdivision and development without purchasing property rights
2. A tax structure that incentivizes forest ownership and stewardship
3. More sustainable cutting practices
4. Required forester involvement
5. Opportunities for proactive communication between WAC and landowners

Background – The Impact of Property Taxes on Forests and Water Quality

As early as 1912, New York recognized that traditional *ad valorem* property taxes hurt forests. Under *ad valorem* taxation, land is taxed based on its "highest and best use" – typically development. The practice

encourages conversion of forest to non-forest uses, because forestland can potentially be taxed at higher levels than its financial return justifies. Worsening the problem, standing timber value is often added to forestland's development value. As a result, older stands with larger, more valuable trees are taxed more than stands with smaller, less valuable trees. This practice discourages long-term stewardship, because holding trees longer increases the landowner's taxes. The tax also promotes exploitative logging practices where value is extracted immediately, degrading the forest yet reducing the tax burden.

The Forest Service's National Woodland Owner Survey found that property taxes were the greatest concern for family forest owners in New York. This trend also applies in the Catskill/Delaware portion of the New York City Watershed, according to a Yale University study published in the July/August 2012 issue of the *Journal of Forestry*. The research found that financial pressure, specifically from property taxes, was the most common reason why Catskill/Delaware forest owners subdivided their land or would subdivide it in the future. *Ad valorem* taxation assumes that those with a lot of land must have the wealth to pay for it. This assumption is flawed, as it ignores the reality of "land rich, cash poor" owners such as farmers and retirees living on a fixed income, both common in the Watershed. Indeed, the same *Journal of Forestry* article found that in the Watershed, farmers and others with low incomes were overwhelmingly more likely to subdivide than people in careers with higher incomes, such as finance. Making matters worse, a State University of New York – College of Environmental Science and Forestry study published in the June 2012 issue of the *Northern Journal of Applied Forestry* found that when subdivision happened in the New York City Watershed, the development impact was striking. Within 20 years of subdivision, an average of 3,200 square feet of impervious surface area was added to each subdivided parcel as the new owners built homes, garages, driveways and septic systems. From 1984 to 2010, subdivision directly resulted in an additional one square mile of impervious surface area in the NYC Watershed.

Taken together, these studies confirm the economic argument discussed above that traditional property taxes encourage forestland conversion and discourage long-term stewardship. These impacts have significant negative consequences for forest management due to the loss of economies of scale in harvesting. They also harm water quality. Several recent studies have documented negative water quality impacts when as little as 2.4% of the landscape area is impervious surface. The traditional property tax structure thus encourages an essentially irreversible shift from the best land cover for water quality protection (forest) to the worst land cover for water quality protection (impervious surface).

How 480-a Works[1]

New York has attempted to address the negative impacts from *ad valorem* taxation on forests with several programs, the most recent being the Forest Tax Law Program (480-a). Started in 1974, 480-a is a property tax exemption. Under *ad valorem* taxation, properties are taxed based on their assessed value. Typically, the tax is determined by charging a certain amount per $1,000 of assessed value (this is called "millage"). 480-a lowers property taxes by exempting a percentage of the enrolled acreage's assessed value from taxation, effectively lowering the property's assessed value. Because the assessed value is lower, the amount of tax owed is also reduced. For 480-a, the typical exemption is 80% of the assessed value of enrolled acreage. This

[1] The text of the Forest Tax Law is available at the New York State Department of Environmental Conservation's (DEC's) website: http://www.dec.ny.gov/regulations/2422.html. To read DEC's overview of the program, please visit http://www.dec.ny.gov/lands/5236.html.

exemption is made up, at least partially, through the addition of yield taxes paid at the time of harvest. Landowners pay a 6% tax on the value of any stumpage sold. From an economic perspective, while this tax somewhat offsets the benefits to landowners of reduced property taxes, it is still preferable to *ad valorem* taxation. Long-term stewardship is encouraged because yield taxes are not paid until the landowner harvests timber and receives income. In addition, since the stumpage value is exact (the amount the landowner receives from the buyer), yield taxes are less subjective than property taxes, which rely on the judgment of individual assessors.

Forestland is not automatically enrolled in 480-a. Landowners voluntarily enroll and must meet eligibility requirements. Any landowner except for government entities may apply. The enrolled forestland must be at least 50 contiguous acres. Landowners must obtain at their own expense a 15-year forest management plan, to be updated every 5 years. This plan must be written by a professional forester and followed. Landowners must complete any prescribed commercial logging within two years of the date specified in the management plan, and they must complete any prescribed noncommercial operations within one year of the date specified.

When a landowner enrolls in 480-a, they commit to following their Department of Environmental Conservation (DEC)-approved management plan for ten years. 480-a has a rolling ten-year commitment, meaning that landowners must recommit annually to ten years of forest management in order to receive that year's exemption. Development of enrolled acreage is prohibited, and any subdivisions must be over 50 acres in size.

Among similar programs nationwide, 480-a has some of the highest noncompliance penalties. For property-wide noncompliance, the landowner pays 2.5 times the tax amount saved, plus interest, for the past ten years. For partial non-compliance (for example, building a structure), the landowner pays five times the tax amount saved, plus interest, for the past ten years on the non-compliant acreage. Combined with the rolling ten-year commitment, the steep penalties mean that 480-a acts essentially as a term easement, all but preventing development and subdivision for ten years each year the landowner enrolls.

480-a Enrollment in the Catskill/Delaware Watersheds

Exact data on statewide enrollment are not available; however, an estimate by Sloane Crawford of the DEC puts statewide enrollment at 840,000 acres. This is about 10% of potential enrollment (total eligible acreage is estimated at 8.7 million acres). For the Catskill/Delaware Watersheds, comprehensive enrollment information at the time of this report was available for two counties: Delaware and Greene. Since these two counties represent the bulk of private land in the Catskill/Delaware Watersheds, they provide a good proxy to compare enrollment.

480-a enrollment in Delaware and Greene Counties illustrates the positive influence WAC's subsidizing of forest management plans has had over the years. In 2000, 480-a enrollment in Delaware and Greene Counties was 8% and 4%, respectively, according to a 2003 report to WAC by forest economist Dr. Hugh Canham. Coincidentally, this timeframe roughly corresponds with the beginning of the WAC Forestry Program's management planning efforts. As of 2010, outside the Watershed, 480-a enrollment is 16% and 8% of eligible acreage for Delaware and Greene Counties. Inside the NYC Watershed, enrollment is 23% and 16% of eligible acreage. These percentages are 44% and 100% higher, respectively, than their "out of the

Watershed" counterparts. More impressive, while enrollment outside the Watershed doubled from 2000 to 2010, enrollment inside the Watershed tripled in Delaware County and quadrupled in Greene County. It is clear from these data that WAC's current management planning strategy of providing free plans does somewhat encourage 480-a enrollment. The primary driver for that encouragement may be that WAC's current program removes one of the key barriers to 480-a participation: the upfront cost for a landowner to get a management plan.

Importantly, although the property tax savings for landowners from 480-a are potentially significant, the impact on local government budgets is actually minimal. Dr. Canham's report compared the tax loss due to 480-a with the tax loss to other property tax exemptions. Across all Watershed towns, total 480-a exemptions amounted to just 0.4% of total assessed real property value, and they accounted for a mere 2.7% of total exempted value. Critically, even if Watershed 480-a enrollment were to expand dramatically, it would not have major revenue impacts on regional towns. Dr. Canham's analysis indicated that even if 50% of eligible parcels enrolled in 480-a (far higher than current enrollment), Watershed counties would lose only 3% of total tax revenue. Worthy of note, this reduction could actually be offset, in part if not in full, by 480-a's ability to help keep forestland from being developed. "Cost of community services" studies, designed to assess the impact of various land uses on local government revenues, repeatedly find that open space pays far more in taxes than it demands in services. By contrast, the costs of residential developments typically exceed the tax revenues they generate. For local governments facing tight budgets, the loss of revenue from a property enrolling in 480-a may actually be less than the net loss of revenue that occurs when that property is subdivided, developed, and begins demanding services such as road maintenance.

Benefits to WAC and Its Funders for Promoting 480-a Enrollment

Although 480-a is not perfect, it nevertheless offers a framework to help WAC and its funders achieve their missions for protecting water quality and working landscapes. 480-a enrolled properties provide five key benefits to WAC and its funders that non-enrolled properties do not supply:

1. Minimal subdivision and development without purchasing property rights

Currently, the primary way that both WAC and the NYC Department of Environmental Protection (DEP) directly attempt to counter subdivision and development is through the purchase of conservation easements and (in the case of DEP) full ownership of land. Although these initiatives do keep purchased land from development, they also have drawbacks, with cost perhaps the biggest of all. Regardless of acquisition method, purchasing property rights is time-consuming and expensive. After the sale, stewardship requires perpetual cost, whether to enforce easement terms or to manage new public land. Property taxes must also be paid. In addition, both programs are politically controversial. Finally, it could be argued from an economic perspective that fee land acquisition might actually encourage subdivision and development by increasing land prices and property taxes beyond what would otherwise occur.

Promoting 480-a enrollment helps counter these drawbacks. Primarily, it provides a lower-cost way for WAC and its funders to slow subdivision and development in the Watershed, because no property rights need to be purchased. It also allows more time to acquire land, as 480-a enrolled properties are unlikely to be developed

for at least ten years. Third, although 480-a has some controversy around it, it is likely less controversial than land acquisition since the land stays fully in private ownership. Finally, rather than encouraging subdivision, it discourages it by making forest ownership and stewardship more economically viable, as described in #2 below.

2. A tax structure that incentivizes forest ownership and stewardship

As previously mentioned, the most likely reason Watershed landowners subdivide is because of financial burdens, the most pressing being property taxes. 480-a theoretically lowers these taxes, increasing the return on investment from owning forest. The tax reduction is offset by an additional yield tax, but such taxes favor, rather than discourage, long-term management. By contrast, traditional *ad valorem* taxes incentivize development and exploitative cutting to extract timber value as quickly as possible.

3. More sustainable cutting practices

The research conducted by WAC staff compiling data from both John Munsell's PhD work and field data collected in 2011 clearly indicated that properties enrolled in 480-a were significantly more likely to apply silvicultural practices than properties with plans that were not enrolled. One reason for this is revealed by 480-a policy documents developed by the DEC. The DEC requires that prior to any cutting, timber must be marked (whether to cut or to leave). Marking of a harvest boundary is only considered acceptable in silvicultural clearcuts. Although written designation is possible, it must be approved by the DEC. Critically, the common practice of "logger choice" or "feller knows best" cutting, typical of many exploitative operations (in particular high-grading), is specifically not considered acceptable.

4. Required forester involvement

Along with the requirement for marking trees, 480-a's other requirements such as a current management plan essentially make landowners not only establish a relationship with a forester, but maintain a relationship with one throughout their enrollment. By contrast, the DEP's survey of Watershed Forest Management Plan (WFMP) recipients revealed that barely half (53%) retained the services of their forester by Year 5. One concern that could be raised about the changes WAC staff recommended to WFMPs is that by requiring 480-a enrollment, foresters may lose business. However, the opposite could be true. While foresters may lose subsidization from WAC to write one-time management plans for landowners who have no intention of retaining a forester, they will be more likely to gain long-term clients who can help them sustain their businesses if WAC support were to dwindle. Such a change supports the direction the organization has laid out in its Economic Viability Strategic Plan, which emphasizes helping businesses become more profitable without artificially propping them up through continual WAC subsidies.

5. Opportunities for proactive communication between WAC and landowners

Finally, because 480-a participants must follow their 15-year work schedules, 480-a offers WAC a unique opportunity to proactively engage with landowners at the time when they are most in need of assistance: immediately prior to a timber harvest. WAC could establish a mailing system where it contacts landowners once each year who have work on their work schedules. Although WAC has work schedules for the management plans currently on file, the present system is not well-suited to this proactive approach. Because

WAC's current WFMP's are voluntary, landowners may not be following them or even referencing them. This means that considerable money and staff time would be spent developing mailers to people who will not implement the practices. By focusing on 480-a, however, WAC would have a "captive audience" of sorts, in that WAC would know for certain that those landowners were going to conduct certain operations at certain times.

Annex 5: Calculating and Quantifying 480-a Eligibilty in the NYC Watershed

Calculating and Quantifying 480-a Eligibility in the NYC Watershed

Introduction and Methods

480-a eligibility was estimated using GIS. Tax parcels were merged based on common mailing addresses effectively establishing a shapefile of landowners. Since non-adjacent properties are ineligible for 480-a, the "explode" function was used to break-up non-adjacent properties under common ownership. Landowners were then intersected with all types of forest (greater than 50 acre) as defined by the National Land Cover Database (NLCD). Landowners with less than 50 contiguous acres of forest were removed from the resulting dataset. The final dataset represents landowners who are eligible for 480-a in the NYC Watershed.

Data Limitations

There are known limitations to this process. This process overlooks properties that own adjacent land spanning County boundaries. The data flow was conducted for each County individually.

Another data limitation relates to the NLCD. 480-a is a program intended for productive forest cover only, so the inclusion of all forest cover types may inflate the eligibility statistics. For example, forested wetlands are generally considered to be unproductive forest. This however assumes an inherent accuracy of the NLCD. Staff experience with the NLCD, both in terms of cover classification and the presence of cover, informs us that the NLCD is not a perfect tool. There is also likely to be variation in how individual foresters approach eligible forest cover types. It is for these reasons that all forest types were included in this analysis.

Another data limitation is that tax parcel data was incomplete for Westchester County, and is detailed in the table below. The total area of these omitted municipalities represents 5.1% of the NYC Watershed and is therefore a minor limitation.

Municipality	Total Acres	Watershed Acres	% of NYC Watershed	% of Westchester Watershed	Included in Analysis
Bedford	25,321.3	21,643.5	1.7%	17.8%	Yes
Cortlandt	32,277.9	3,744.1	0.3%	3.1%	Yes
Harrison	11,103.8	788.4	0.1%	0.6%	No
Lewisboro	18,731.4	14,160.2	1.1%	11.7%	No
Mount Kisco	1,979.1	1,979.1	0.2%	1.6%	Yes
Mount Pleasant	20,980.8	2,045.5	0.2%	1.7%	No
New Castle	15,023.9	9,824.1	0.8%	8.1%	Yes
North Castle	16,711.4	4,904.5	0.4%	4.0%	No
North Salem	14,849.8	14,721.6	1.2%	12.1%	No
Pound Ridge	14,788.3	6,039.6	0.5%	5.0%	No
Somers	20,553.6	20,506.6	1.6%	16.9%	No
White Plains	6,322.5	21.6	0.0%	0.0%	No
Yorktown	25,235.8	20,924.1	1.7%	17.2%	Yes

Results and Discussion

The following table shows 480-a eligibility statistics in the NYC Watershed.

County	Eligible Landowners	Eligible Acres
Delaware	1,481	201,309.6
Dutchess	52	8,586.4
Greene	442	63,799.1
Putnam	94	11,110.7
Schoharie	117	14,003.7
Sullivan	131	19,891.8
Ulster	289	54,576.6
Westchester	60	5,946.3
	2,666	**379,224.2**

The following two tables compare 480-s statistics to overall NIPF landowners and to NIPF acres. NIPF is defined as landowners owing at least 1 contiguous acres of forest land as defined by the NLCD.

County	480-a Eligible NIPFs	Total NIPFs	% of NIPF 480-a eligible	NIPF >50ac	% of NIPF >50ac 480 eligible
Delaware	1,481	10,127	14.6%	1,649	89.8%
Dutchess	52	1,307	4.0%	58	89.7%
Greene	442	5,184	8.5%	476	92.9%
Putnam	94	4,363	2.2%	112	83.9%
Schoharie	117	1,131	10.3%	125	93.6%
Sullivan	131	1,016	12.9%	144	91.0%
Ulster	289	3,879	7.5%	322	89.8%
Westchester	60	3,980	1.5%	70	85.7%
	2,666	**30,987**	**8.6%**	**2,956**	**90.2%**

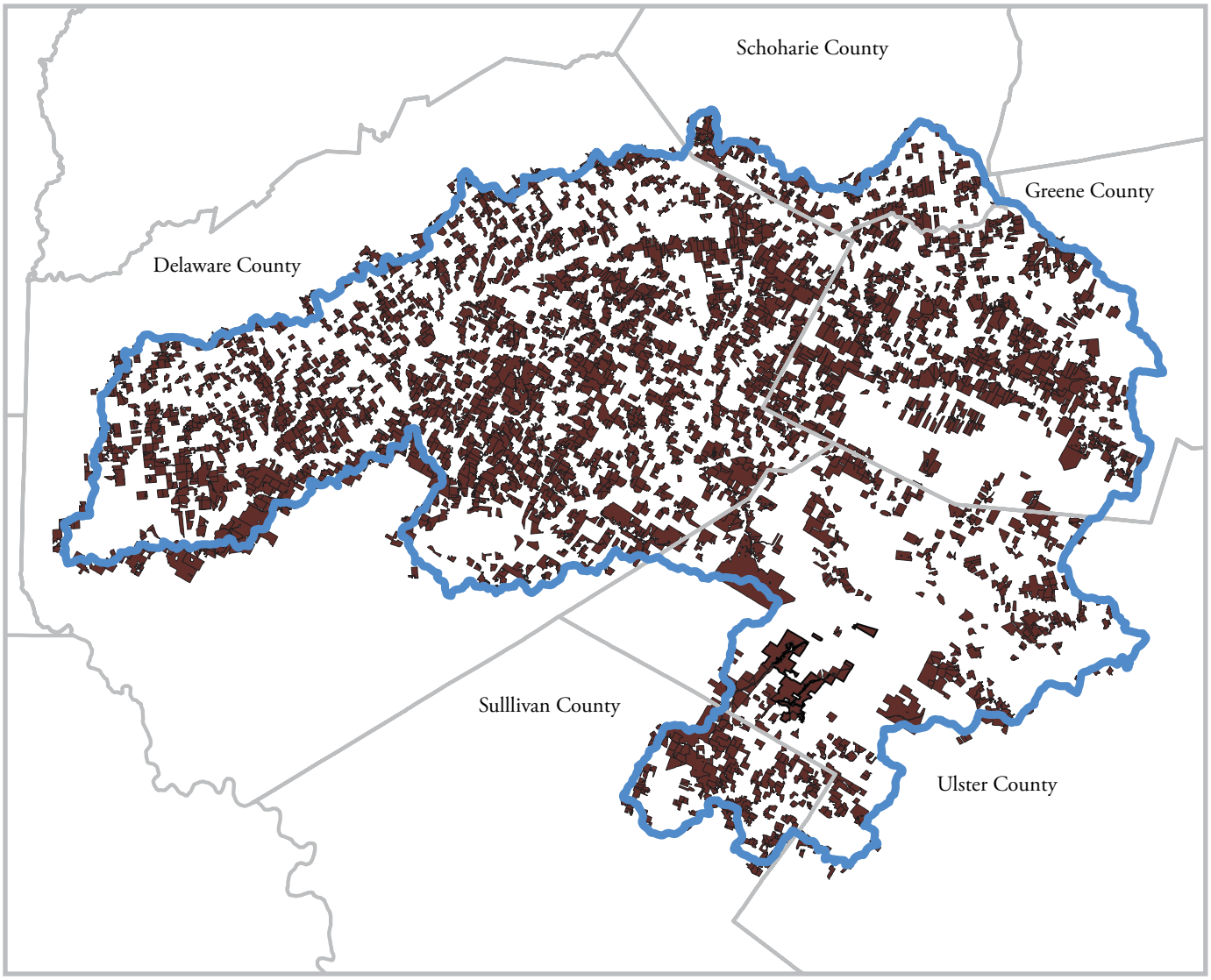
County	480-a Eligible Acres	Total NIPFs Acres	% of Total NIPF acres 480-a eligible	NIPF >50 ac	% of NIPF >50ac 480 eligible
Delaware	201,309.6	321,411.4	62.6%	227,832.3	88.4%
Dutchess	8,586.4	15,914.4	54.0%	9,559.6	89.8%
Greene	63,799.1	105,550.5	60.4%	68,902.8	92.6%
Putnam	11,110.7	32,067.1	34.6%	13,378.6	83.0%
Schoharie	14,003.7	25,102.1	55.8%	15,617.3	89.7%
Sullivan	19,891.8	29,154.8	68.2%	21,842.1	91.1%
Ulster	54,576.6	85,943.2	63.5%	59,224.3	92.2%
Westchester	5,946.3	23,830.2	25.0%	7,295.4	81.5%
	379,224.2	**638,973.7**	**59.3%**	**423,652.5**	**89.5%**

480-a eligible landowners represent 8.6% (2,666) of total NIPF and they own 59.3% (379,224.2) of the forest. The Counties with the highest number of 480-a eligible landowners are Delaware, Greene, and Ulster. The Counties with the highest 480-a eligibility as a percentage of NIPF landowners are Delaware, Sullivan, and Schoharie. The Counties with the highest amount of 480-a eligible acres are Delaware, Greene, and Ulster. The Counties with the highest 480-a eligible acres as a percentage of total NIPF acres are Sullivan, Ulster, and Delaware.

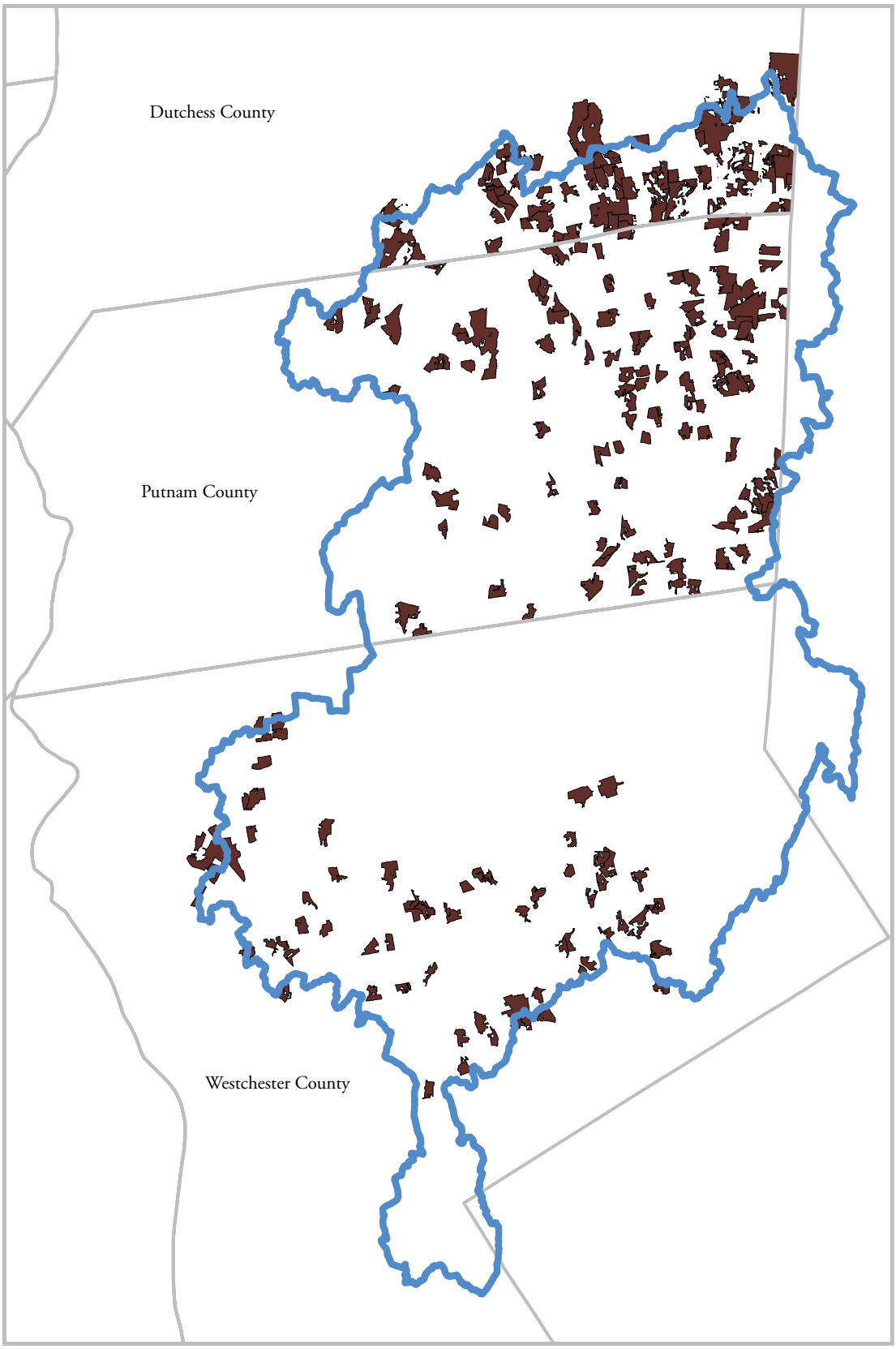
Approximately 90% of landowners with at least 50 acres of woods are 480-a eligible. The remaining 10% do not have 50 contiguous acres of woods. Westchester (81.5%), Putnam (83.0%), and Delaware Counties (88.4%) had the lower proportion, while Greene (92.6%), Ulster (92.2%), and Sullivan Counties 91.1%) had the highest proportion. While Delaware is considered a rural county, these numbers indicate a higher degree of fragmentation. This may be due to the high level of agricultural use that tends to create islands of woods amongst the farm field matrix.

Annex 6: 480-a Eligible Land Maps

480-a Eligible Properties in the West of Hudson Watershed



480-a Eligible Properties in the East of Hudson Watershed



Annex 7: Financial Analysis

480-a Solution Financial Analysis

Annual Payments to Foresters*	
New Plans (managed acres)	$48,121
New Plans (riparian acres)	$13,389
Upgrades (managed acres)	$6,057
Upgrades (riparian acres)	$3,165
10-Year Updates (managed acres)	$5,047
10-Year Updates (riparian acres)	$2,114
480-a Incentives	$5,730
Cost-share inflation (biennial)	3%

Annual 480-a Enrollment	
Percent of current payments eligible for 480-a	80%
Percent of current payments that enroll in 480-a	26%
% increase from payments that enroll to payments eligible	308%

"BAU" Scenario Costs	Year 1	Year 2	Year 3	Year 4	Year 5
New Plans	$61,510	$61,510	$63,355	$63,355	$65,256
Upgrades	$9,222	$9,222	$9,499	$9,499	$9,784
10-Year Updates	$7,161	$7,161	$7,376	$7,376	$7,597
480-a Incentives	$5,730	$5,730	$5,902	$5,902	$6,079
Total Payments to Foresters	$83,624	$83,624	$86,132	$86,132	$88,716
Payroll	$40,880	$42,106	$43,370	$44,671	$46,011
Vehicle Costs	$1,667	$1,717	$1,768	$1,821	$1,876
Marketing	$0	$0	$0	$0	$0
TOTAL BAU Costs	**$126,170**	**$127,447**	**$131,270**	**$132,624**	**$136,603**
480-a Low Cost Scenario					
480-a New Enrollment Payments***	$14,086	$14,086	$14,509	$14,509	$14,944
480-a Incentive Payments	$5,730	$5,730	$5,902	$5,902	$6,079
Total Payments to Landowners	$19,817	$19,817	$20,411	$20,411	$21,023
Payroll	$18,980	$19,549	$20,136	$20,740	$21,362
Vehicle Costs	$0	$0	$0	$0	$0
Marketing	$2,000	$2,060	$2,122	$2,185	$2,251
TOTAL Low Cost Scenario Costs	**$40,797**	**$41,426**	**$42,669**	**$43,336**	**$44,637**
Savings over BAU	***$85,374***	***$86,021***	***$88,601***	***$89,288***	***$91,966***
480-a High Cost Scenario					
480-a New Enrollment Payments***	$43,343	$43,343	$44,643	$44,643	$45,982
480-a Incentive Payments	$5,730	$5,730	$5,902	$5,902	$6,079
Total Payments to Landowners	$49,073	$49,073	$50,545	$50,545	$52,061
Payroll	$18,980	$19,549	$20,136	$20,740	$21,362
Vehicle Costs	$0	$0	$0	$0	$0
Marketing	$2,000	$2,060	$2,122	$2,185	$2,251
TOTAL High Cost Scenario Costs	**$70,053**	**$70,682**	**$72,803**	**$73,470**	**$75,674**
Savings over BAU	***$56,118***	***$56,765***	***$58,468***	***$59,154***	***$60,929***

NOTE: "Low cost" assumes total failure of marketing efforts and that 480-a enrollment will continue at the status quo rate from current management planning efforts.
The "High cost" assumes total success of marketing efforts and that every management plan property that would have been eligible for 480-a under business-as-usual enrolls in 480-a.

Staff Time**	
BAU FTE's	0.56
480a FTE's	0.26

Cost Factors	
Inflation	3%
FTE Cost	$73,000
Mileage Rate ($/mile)	$0.565
Average Total Distance for BAU Field Reviews (miles)	2,950
Average Distance per Field Review (miles)	50

*Payments to foresters are estimated by converting acreages from all plans over the past 5 years to payments based on current rates, and then averaging. Riparian acres are separated out except for 480-a Incentive payments, which do not pay for riparian acres.

Year 6	Year 7	Year 8	Year 9	Year 10
$65,256	$67,214	$67,214	$69,230	$69,230
$9,784	$10,077	$10,077	$10,380	$10,380
$7,597	$7,825	$7,825	$8,060	$8,060
$6,079	$6,262	$6,262	$6,449	$6,449
$88,716	$91,378	$91,378	$94,119	$94,119
$47,391	$48,813	$50,277	$51,786	$53,339
$1,932	$1,990	$2,050	$2,111	$2,175
$0	$0	$0	$0	$0
$138,040	**$142,181**	**$143,705**	**$148,016**	**$149,633**
$14,944	$15,393	$15,393	$15,854	$15,854
$6,079	$6,262	$6,262	$6,449	$6,449
$21,023	$21,654	$21,654	$22,304	$22,304
$22,003	$22,663	$23,343	$24,043	$24,765
$0	$0	$0	$0	$0
$2,319	$2,388	$2,460	$2,534	$2,610
$45,345	**$46,705**	**$47,457**	**$48,881**	**$49,678**
$92,695	***$95,476***	***$96,248***	***$99,136***	***$99,955***
$45,982	$47,362	$47,362	$48,782	$48,782
$18,705	$19,266	$19,266	$19,844	$19,844
$64,687	$66,628	$66,628	$68,627	$68,627
$22,003	$22,663	$23,343	$24,043	$24,765
$0	$0	$0	$0	$0
$2,319	$2,388	$2,460	$2,534	$2,610
$89,009	**$91,679**	**$92,431**	**$95,204**	**$96,001**
$49,031	***$50,502***	***$51,274***	***$52,812***	***$53,632***

**"BAU" stands for "Business As Usual" - keeping the WFMP Program unchanged. "MC" Stands for "Mass Customization" and reflects the changes described in this business plan. BAU Staff time is determined using the 2012-2013 Forestry Program Work Plan. For 480-a FTE's, the work plan is kept the same, but the time required for plan reviews by Josh and Brendan is removed.

***Average New Enrollment Payment only includes managed acres, since under the new paradigm, WAC would not be paying for riparian acres on these plans

Annex 8: Frequently Asked Questions (FAQs)

1. By focusing the WFMP Program on 480-a WAC will assist 8.6% of family forest owners who own 60% of the private forestland in the Watershed. How will WAC help the 91.4% of family forest owners who cannot or will not enroll in 480-a?

   This business plan is intended to explore the opportunity presented by the "480-a Solution". Staff will be creating a second business plan that is intended to explore the potential for creating mass customized forest management plans to service this remaining 91.4% of family forest owners in a cost effective manner. This second business plan will be presented to the Forestry Program Committee in September 2013.

2. Do WFMP's result in properties enrolling in 480-a?

   WAC has funded 199 of 272 (73%) properties in Delaware, Greene and Sullivan Counties that are enrolled in 480-a. Of those 199 plans, 136 were WFMPs and 63 were UPGRADES. 68% (136/199) of enrolled properties received a WAC funded WFMP prior to 480-a enrollment. 32% (63/199) were funded by WAC as UPGRADES which means they were enrolled in 480-a prior to receiving a WFMP. We can conclude that the WFMP Program results in 480-a enrollment because 68% of WFMP's went on to enroll.

3. There's 380,000 acres of 480-a eligible forest land in the Watershed. What happens if the demand for WFMP Program funds exceeds our annual budgets?

   As in the past, WAC retains the ability to approve or deny all applications for WFMP Program funding. Staff can further refine approval criteria in the event application rates increase.

4. How does focusing the WFMP Program on 480-a affect farmers?

   New York's system of property taxation assumes that those with a lot of land must have the wealth to pay for it. This assumption is flawed, as it ignores the reality of "land rich, cash poor" owners such as farmers and retirees living on a fixed income, both common in the Watershed. Research has found that in the Watershed, farmers and others with low incomes were overwhelmingly more likely to subdivide than people in careers with higher incomes, such as finance. Focusing the WFMP Program on 480-a will help farmers address one of their biggest concerns - property taxes.

5. How does focusing the WFMP Program on 480-a affect the WAC Easements Program and participants?

   WAC will continue to provide WFMP Program funding to properties with a WAC easement regardless of their eligibility or enrollment in 480-a. WFMP's written for WAC easement properties will adhere to WFMP specifications outlined in Forestry Program Guidelines.

6. How does 480-a affect local tax revenue?

   While property tax savings for landowners from 480-a are potentially significant, the impact on local government budgets is actually minimal. Dr. Canham's report compared the tax loss due to 480-a with the tax loss to other property tax exemptions. Across all Watershed towns, total 480-a exemptions amounted to just 0.4% of total assessed real property value, and they accounted for a mere 2.7% of total exempted value. Critically, even if Watershed 480-a enrollment were to expand dramatically, it would not have major revenue impacts on regional towns. Dr. Canham's analysis indicated that even if 50% of eligible parcels enrolled in 480-a (far higher than current enrollment), Watershed counties would lose only 3% of total tax revenue. Worthy of note, this reduction could actually be offset, in part if not in full, by 480-a's ability to help keep forestland from being developed.

"Cost of community services" studies, designed to assess the impact of various land uses on local government revenues, repeatedly find that open space pays far more in taxes than it demands in services. By contrast, the costs of residential developments typically exceed the tax revenues they generate. For local governments facing tight budgets, the loss of revenue from a property enrolling in 480-a may actually be less than the net loss of revenue that occurs when that property is subdivided, developed, and begins demanding services such as road maintenance.

7. What is the definition of a resident landowner and absentee landowner?

   Residency, in the context of this business plan, refers to whether or not a landowner lives on the property that they own. For the purposes of this business plan, resident landowners live *within* the group of watershed counties that contains their forestland. Absentee landowners live outside the group of watershed counties that contains their forestland. For example, a landowner living in Wurtsboro (Sullivan County) owning land in Hunter (Greene County) is considered to be resident because both locations are within a West-of-Hudson watershed county, and a landowner living in Yonkers (Westchester County) owning land in Pawling (Dutchess County) is also considered resident because both locations are within an East-of-Hudson watershed county. These definitions are appropriately broad for the purposes of this business plan, enabling us to efficiently identify key trends in residency. Refining the definition of residency to a tighter geographic scale, say to a zip code, is a task best completed if the Forestry Committee elects to proceed with refining the WFMP Program to focus on 480-a.

8. Why do we use Delaware, Greene and Sullivan County GIS data and not data for the whole watershed?

   Unfortunately the NYS DEC and Office of Real Property does not maintain comprehensive 480-a data for New York State or the NYC Watershed region. The data staff has acquired was obtained through freedom of information act requests made to individual counties.

9. What are *forested acres* and *total acres*?

   Total acres represent the area of land contained within a tax parcel. Tax parcels include forested land as well as non-forested land like farm fields. A calculation of total acres includes forested and non-forested land.

   Forested acres represent the area of land within a tax parcel that is forest. This area is determined through the use of Geographic Information Systems (GIS) that categorize land cover through remote sensing like satellites and aerial photography. GIS allows us to subtract the farm fields from a tax parcels.

10. Why are statistics for landowners owning more than 50 forested acres different from the statistics for landowners who are eligible for 480-a?

    The process used to determine the number of forestland owners, categorizing them by the amount of forest they own, and determining residency status is complex and requires the use of GIS and Excel, and was an evolving process that took shape and direction as it was conducted. The book had not previously been written on this process. One side effect of this process was the inability to efficiently determine residency status of 480-a eligible landowners. A quick GIS analysis however did allow us to determine that 90% of landowners owning 50+ acres of forest are eligible for 480-a, meaning that statistics for landowners with 50+ acres of forest sufficiently represent residency patterns of 480-a eligible landowners. Further analysis on this matter will be undertaken if we choose to implement the Business Plan.

Annex 9: Literature Cited

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