

**REGION II**  
**UNIVERSITY TRANSPORTATION RESEARCH CENTER**

**Part 3**

**SUNY-ESF Right-of-Way Vegetation  
Management Program Assessment  
Report for New York State  
Department of Transportation,  
Albany, New York**

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Final Report  
December, 2005

By:

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In cooperation with

University Transportation Research Center, Region 2  
City College of New York

New York State  
Department of Transportation  
and  
U.S. Department of Transportation



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16. Abstract  Performance standards for Integrated Vegetation Management (IVM) can be used to define organizations that manage rights-of-way (ROWs) in environmentally-appropriate, socially-beneficial, and economically-viable manners. Environmentally appropriate ROW vegetation management means maintaining biodiversity, productivity, and ecological processes. Socially beneficial management means helping local people and society at large enjoy long-term benefits. Economically viable means that vegetation management operations are structured and managed so as to be sufficiently cost effective and profitable, without generating financial profit or cost savings at the expense of ROW resources and their sustainability. NYSDOT was assessed for performance of IVM using standards developed in a related study. SUNY-ESF visited four NYSDOT regions in summer 2004 to evaluate the ecological, economic and social aspects of NYSDOT's right-of-way vegetation management, and to determine gaps in the conduct of IVM on NYSDOT rights-of-way. NYSDOT was found to have performed well in Principle 1 (Compliance with Laws), Principle 3 (Community Relations and Workers Rights), and Principle 8 (Accounting for Economic and Ecological Effects). NYSDOT was found to need improvement in performance associated with Principle 2 (Tenure Use Rights and Responsibilities), Principle 4 (Management Planning), and Principle 9 (Site-Specific Implementation of Treatments).					
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# **1 EXECUTIVE SUMMARY**

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## **Overall Project: Assessing New York State DOT's Alternatives to Herbicides, Integrated Vegetation Management, and Related Research Programs**

A set of five research projects on roadside right-of-way (ROW) vegetation management were conducted in 2004-2005 by the State University of New York College of Environmental Science and Forestry (SUNY-ESF) for the New York State Department of Transportation (NYSDOT).

Objectives for the research were as follows (as provided in the problem statement provided by NYSDOT):

- Objective No. 1: evaluate NYSDOT's current vegetation management program and "Alternatives to Herbicide" program
- Objective No. 2: develop recommendations for the vegetation management program and "Alternatives to Herbicide" program
- Objective No. 3: develop a systematic framework and research protocol for identification, evaluation and implementation of environmentally sensitive, lower maintenance, and cost-effective vegetation management techniques that can be integrated into the overall vegetation management program

SUNY-ESF met these objectives over the course of 2004-2005 using the following projects (all reports finalized in December 2005).

### ***Research Project #1***

A thorough search for existing information and knowledge on highway ROW vegetation management policies and techniques, and alternatives to herbicides programs and demonstrations, as applicable to New York State

Final report—PHASE 1:

Alternatives to Herbicides: Literature Review and Annotated Bibliography

### ***Research Projects #2 and #3***

Development of assessment standards (Project #2) and assessment of NYSDOT's vegetation management program (Project #3)

Final report—PHASE 2, Part 1 of 2:

Performance Standards for Assessing Vegetation Management on Rights-of-Way: Case Study of New York State DOT's Roadside Rights-of-Way Vegetation Management Program

Final report—PHASE 2, Part 2 of 2:

SUNY-ESF Right-of-Way Vegetation Management Program Assessment Report for New York State Department of Transportation, Albany, New York

**Research Project #4**

Development of a cost-effectiveness model for evaluating alternative vegetation management techniques for research, development, and application.

Final report—PHASE 3:

Developing a Cost-Effectiveness Model for Research, Development, and Application of Herbicide and Non-Herbicide Vegetation Management Treatments for Roadside Rights-of-Way

**Research Project #5**

Proposition of alternative vegetation management techniques and evaluation protocol for testing, demonstration, and operational application of those techniques.

Final report—PHASE 4:

New alternatives to herbicide techniques for treating roadside vegetation: Recommended techniques for future testing.

Phases of work were ordered according to the progression in project accomplishments, proceeding over time from Phases 1 through 4. All four phases of work and the associated five research projects were related to one or more of the other projects, as follows.

Project #1 was used to:

- collect information needed to develop the cost-effectiveness model in Project #4
- define different treatments as alternatives to herbicides as needed in Project #5

Project # 2 was used to:

- construct the performance standards needed for Project #3

Project #3 depended on results from Project #2

Project #4 depended on Project #1 and was used to

- define different treatments as alternatives to herbicides as needed in Project #5

Project # 5 depended on results from Projects #1 and 4.

All five projects together, and separately, can be viewed as foundations for future research and development work on vegetation management issues (especially those related to non-herbicide alternatives) by NYSDOT.

## **Project #3: SUNY-ESF Right-of-Way Vegetation Management Program Assessment Report for New York State Department of Transportation, Albany, New York**

### ***Study Objective***

Evaluate the ecological, economic and social aspects of NYSDOT's right-of-way vegetation management, and to determine gaps in the conduct of Integrated Vegetation Management on NYSDOT rights-of-way.

### ***Rationale***

Performance standards for IVM can be used to define organizations that manage ROWs in environmentally-appropriate, socially-beneficial, and economically-viable manners. Environmentally appropriate ROW vegetation management means maintaining biodiversity, productivity, and ecological processes. Socially beneficial management means helping local people and society at large enjoy long-term benefits. Economically viable means that vegetation management operations are structured and managed so as to be sufficiently cost effective and profitable, without generating financial profit or cost savings at the expense of ROW resources and their sustainability.

### ***Methods***

NYSDOT was assessed for performance of IVM using standards developed in a related study (Phase 2, Part 1 of 2). SUNY-ESF visited four NYSDOT regions in summer 2004, as follows.

Region 2 (Utica)—June 24 and July 6, 2004  
Region 6 (Hornell)—July 7-8, 2004  
Region 8 (Poughkeepsie)—July 21-22, 2004  
Region 4 (Rochester)—August 3-4, 2004

A series of office and field meetings were conducted in each region with the goal of gathering information on performance of vegetation management and the presence of related management systems. A report was developed to present findings associated with each criteria in the assessment standards, summarize strengths and weaknesses, provide commendations for high performance and recommendations on how to improve in areas of low performance, and assign a score for each Principle.

### ***Outcome***

NYSDOT was found to have performed well in Principle 1 (Compliance with Laws), Principle 3 (Community Relations and Workers Rights), and Principle 8 (Accounting for Economic and Ecological Effects). NYSDOT was found to need improvement in performance associated with Principle 2 (Tenure Use Rights and Responsibilities), Principle 4 (Management Planning), and Principle 9 (Site-Specific Implementation of Treatments). Specific strengths and weaknesses are listed in the attached table.

### ***Future Work***

NYSDOT is left to change as an organization to improve in conduct of IVM. It may be valuable to have NYSDOT re-assessed in 2009 (5 years after the first assessment) to determine the level of improvement and define any residual or newly developed gaps in performance of IVM.

KEY gaps: management planning (P4, P9); dedicated personnel as vegetation managers (P5); ownership and boundaries (P2)/land owner notification (P1); and invasives (P8)

## General Discussion of Findings

In general, NYSDOT is satisfactorily conducting rights-of-way vegetation management, in a manner generally consistent with the performance standards, with many strengths and some weaknesses, as noted below in Table ES-1.

**Table ES-1. Findings by Principle via a listing of general strengths and weaknesses.**

Principle/Subject Area	Strengths	Weaknesses
<p><b>P1: Commitment and Legal Compliance</b></p>	<p>The organizational restructuring that led to increased focus on the environment, including the development of Environmental Specialist and Maintenance Environmental Coordinator positions, has well-supported the organization’s commitment to legal compliance.</p> <p>The Environmental Procedures Manual is a monumental document that includes not only procedures, but an indepth portrayal of organizational mission and policy—it is a model document. It does well to present the organizations commitment to the environment.</p> <p>Unauthorized use of NYSDOT ROWs (low ATV traffic, low illegal dumping) is exceptionally low.</p>	<p>The pending issue of landowner notification in association with herbicide use on ROWs has unsettled vegetation management across New York State.</p> <p>Integrated Vegetation Management is, in general, well practiced by NYSDOT. Yet, IVM is not well portrayed in the agency’s “Environmental Initiative”.</p>

Table ES-1 (cont.)

<b>P2: Tenure &amp; Use Rights &amp; Responsibilities</b>	Long standing working relationship with abutters which has led to a low incidence of problems with land use rights on rights-of-way.	Lack of knowledge and field evidence of the specific location of ROW boundaries.
<b>P3 – Community Relations &amp; Workers’ Rights</b>	Dedicated administrative, technical and professional staff willingly provide service to their communities and look to improve NYSDOT as a safe and productive organization.	Vegetation management workers receive relatively low monetary compensation for work, which has led to a high rate of employee turnover. This means that vegetation on ROWs are often managed by relatively inexperienced workers.
<b>P4: Management Planning</b>	Policy and procedure documentation on matters related to the environment and vegetation management are exceptional and are models for other ROW management organizations.	<p>Strategic and tactical vegetation management plans have not been developed by NYSDOT, with few regional exceptions. These “regional exceptions” may be important building blocks for future work on planning.</p> <p>Organizational infrastructure, and specifically vegetation management equipment associated with both mowing and herbicide treatments, are marginally adequate, and may threaten future safe and productive vegetation management of roadside ROWs.</p>

**Table ES-1 (cont.)**

<p><b>P5: Understanding Pest &amp; Ecosystem Dynamics</b></p>	<p>Employees are well afforded the opportunities to improve their work knowledge and skills through training.</p>	<p>A lack of dedicated, professional vegetation managers/vegetation management researchers at both the regional- and state-levels. While vegetation management and research occurs in each region, it is usually overseen or even conducted by people who have expertise in other arenas.</p>
<p><b>P6: Setting Management Objectives &amp; Tolerance Levels</b></p>	<p>Management objectives and tolerance levels are well defined for both mowing and herbicide use in two public documents: “Mowing Limits Manual” and “New York State Department of Transportation’s Integrated Vegetation Management Program”.</p>	<p>People and groups affected by vegetation management operations are inconsistently apprised of proposed vegetation management activities.</p>
<p><b>P7: Compilation of a Broad Array of Treatment Options</b></p>	<p>A wide variety of different mechanical and chemical treatments are used on NYSDOT ROWs.</p> <p>Prevention of undesirable plants is a featured treatment applied through the establishment and management of desirable plant cover and the use of pavement (which functions as a weed barrier) under guiderails.</p> <p>Since 1998, NYSDOT has had an active research and development program on non-herbicide alternatives for treating ROW vegetation.</p>	<p>None observed.</p>

Table ES-1 (cont.)

<p><b>P8: Accounting for Economic &amp; Ecological Effects of Treatments</b></p>	<p>Written policies and procedures are well developed for protection and conservation of water, wildlife (especially birds), and biodiversity.</p> <p>Ongoing efforts to develop an invasive/noxious/exotic plant program are at the leading edge of vegetation management programs in the country.</p> <p>Chemical use has been greatly reduced by NYSDOT over the past few decades, and herbicides are used to control plants only when non-chemical management practices have proven ineffective or cost prohibitive.</p>	<p>Regional approaches to managing invasive/noxious/exotic plants are presently inconsistent across the State.</p> <p>Regional knowledge of Rare, Threatened, and Endangered species is low.</p>
<p><b>P9: Site-Specific Implementation of Treatments</b></p>	<p>NYSDOT ROWs are well-defined in space with on-the-ground linear distance delineators and GIS mapping.</p>	<p>Operational plans, or written prescriptions, are not used to describe/prescribe treatments on a land unit area basis, nor are treatments justified using ecological, socioeconomic, and administrative opportunities and constraints.</p> <p>Prescriptions and the decision to treat ROWs are not based on contemporary inventories of vegetation and environmental conditions.</p>
<p><b>P10: Adaptive Management &amp; Monitoring</b></p>	<p>Monitoring is conducted across the state to assess the condition of ROWs, environmental and social impacts of operations, and chemical use.</p>	<p>Monitoring is not conducted to assess changes in composition and changes in flora and fauna on ROWs over time.</p>

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## Assessment Criteria: Score and Findings

Table ES-2. A guide to scoring, performance level, and compliance.

Score	PERFORMANCE General Description
N/A	Not an applicable criterion
1	Extremely weak performance; strongly unfavorable or data lacking
2	Weak performance; significant improvement is needed
3	Satisfactory performance
4	Favorable performance
5	Clearly outstanding performance

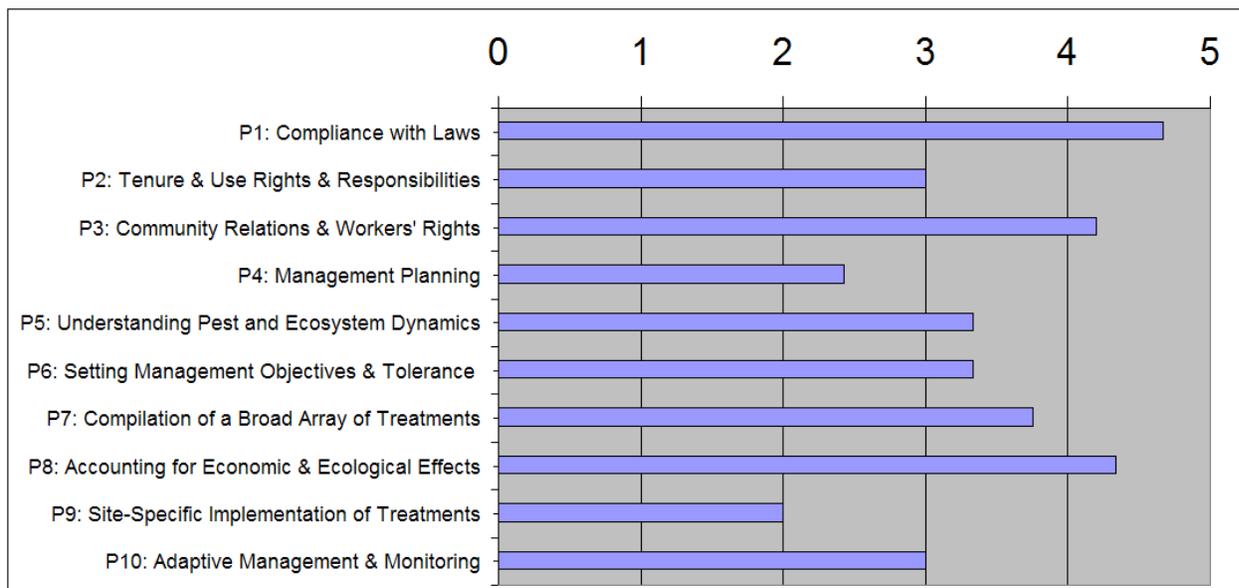


Figure ES-1. Average scores for each criterion associated with each of the 10 principles.



## **2 INTRODUCTION**

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This report presents the findings of an independent assessment conducted by a specialist representing the State University of New York College of Environmental Science and Forestry (SUNY-ESF), Syracuse, New York. The purpose of the assessment was to evaluate the ecological, economic and social aspects of New York State Department of Transportation's (NYSDOT's) right-of-way vegetation management, and to determine gaps in the conduct of Integrated Vegetation Management on NYSDOT rights-of-way (ROWs).

### **ACRONYMS**

DEC	New York State Department of Environmental Conservation
ILO	International Labor Organization
IVM	Integrated Vegetation Management
NYSDOT	New York State Department of Transportation
OSH	Occupation Safety and Health
P&C	Principles and Criteria
ROW	Right-Of-Way (singular)
ROWs	Rights-Of-Way (plural)
SUNY-ESF	State University of New York College of Environmental Science and Forestry



# 3 GENERAL SUMMARY

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## **Name and Contact Information**

**Source Name:** New York State Department of Transportation

**Contact Person:** Laura K. Greninger

**Address:** New York State Department of Transportation, Environmental Analysis Bureau, 50 Wolf Road – POD 41, Albany, New York 12232

**Tel:** 518-485-5316

**Fax:**

**E-mail:** lgreninger@dot.state.ny.us

## **General Background**

### ***Type of operation***

NYSDOT is a State organization responsible to the citizens of New York and other publics that travel on select interstates, parkways, highways, roads, waterways, railroads, and airways.

### ***Years in operation***

NYSDOT has been in operation since 1909 as the New York State Department of Public Works, though roots of the organization can be traced back to 1777 and the reorganization of the Office of Surveyor-General. In 1967, the NYSDOT was formed to deal with the state's complex transportation system and the ever-increasing need to coordinate the development of transportation ([www.dot.ny.us/info/info.html](http://www.dot.ny.us/info/info.html); accessed 12/28/2004).

### ***Latitude and longitude of operation***

71°47'25" W to 79°45'54" W; 40°29'40" N to 45°0'42" N

## **Vegetation Management System**

### ***Vegetation type and land use history***

Vegetation is typical of ROWs along roadsides in the northeastern United States—a complex of 100s of possible species of grasses and sedges, ferns and fern allies, forbs, shrubs and trees. Late-succession vegetation on all land is forest, primarily northern hardwoods (sugar maple, American beech, yellow birch and dozens of associates) in the northern part of the state, and oak-hickory in the southern part of the state and up north and west along the major river corridors. Most of the forest was cleared for agriculture during the 17<sup>th</sup>, 18<sup>th</sup> and 19<sup>th</sup> centuries. Forest cover in 1890 was 20 to 25 percent across New York. Today, the state is over 62% forested as farmland is

allowed to revert back to forest cover. Idle land is rapidly recolonized by shrubs and trees—which is the primary reason why active vegetation management is needed to develop and maintain non-tree plant cover on ROWs.

***General description of details and objectives of the management plan/system***

The New York State Department of Transportation is headquartered in Albany, New York. The organization comprises 11 regional offices and 63 county transportation maintenance residencies. In addition to rail systems, public and private aviation, and major public and private ports, the New York State transportation network includes a state and local highway system that annually handles over 100 billion vehicle miles. The total highway system encompasses over 110,000 highway miles, 17,000 bridges, and 3,000 miles of guiderails.

Vegetation management on highway ROWs is guided by general policy and procedure documents and other directives from the Albany headquarters.

The mission of the NYSDOT is “to ensure our customers—those who live, work and travel in New York State—have a safe, efficient, balanced and environmentally sound transportation systems.” ([www.dot.ny.us/info/info.html](http://www.dot.ny.us/info/info.html); accessed 12/28/2004).

Application procedures and vegetation management practices are unique for each region, sometimes even to a residency level, in response to local variations in environmental and socioeconomic contexts. In each region, a Regional Maintenance Engineer is generally responsible for ROW vegetation management. This person works closely with the Maintenance Environmental Coordinator on issues related to the environment (e.g., herbicide application regulations, wetlands issues) and the Regional Landscape Architect, particularly for design and restoration of vegetation associated with highway construction. A combination of Highway Maintenance Supervisors and Highway Maintenance Workers conduct most of the vegetation management activities. At least one, and often many, of these people are certified to use herbicides within a region. In the winter, these supervisors and workers are often responsible for snow and ice management on roadways. Throughout the year, these workers are commonly used to help in road maintenance and construction, and some may be fully involved in hazard tree removal (a separate component of vegetation management not directly considered in this assessment).

Vegetation on roadside ROWs is managed for multiple objectives: (1) to provide motorists with adequate sight distances; (2) to control visibility of signs and guiderails; (3) to prevent the presence of deadly fixed objects (usually trees that may impact cars that leave the roadway); (4) and to maintain pavement by controlling drainage problems and preventing pavement breakage by plants. Different vegetation management treatments may be used within a roadside ROW to meet these objectives. Mowing is commonly used in areas away from the road surface and guiderails, and herbicides are used along road edges and under the guiderails and near signs where mowing is not possible or safe. Physical barriers are being used in some regions. Biological/ecological controls are broadly achieved by establishing and maintaining low plant cover in certain ROW zones.

Vegetation management is generally cyclic, with mowing conducted as needed within a growing season to maintain grasses and other vegetation in a desired state (height, increasing as a function of distance from centerline) and controlling trees and other deadly fixed objects behind guiderails. Some areas of ROW may only be mowed once a year, others are mowed more frequently depending on the growing conditions and weather. Over 100,000 acres of ROW are mowed by NYSDOT each year. Herbicides are used sparingly under the guiderails, in certain areas of pavement, and around signposts.

## **Environmental and Socioeconomic Context**

Because ROWs are long-linear features, they are set in the landscape to interact with a wide variety of physiographic features and socioeconomic settings, especially water course areas such as rivers and streams (roads have regularly been constructed in the flattest terrains associated with valleys). There are nearly 7,000 natural ponds, lakes and reservoirs of one acre or more across the state, as well as over 70,000 miles of streams and rivers.

New York has an important agricultural land base. The Finger Lakes have orchards producing apples. Both Long Island and the Finger Lakes have vineyards that make the state famous for its wines. The state produces other, diverse crops, especially grapes, strawberries, cherries, pears, onions, and potatoes. New York is the third leading U.S. producer of dairy goods. New York's mineral resources include crushed stone, cement, salt, and zinc. In spite of significant declines, New York has retained some important manufacturing industries, and, by virtue of New York City, it has strengthened its position as a commercial and financial leader. Although the largest percentage of the state's jobs lie in the service sector, its manufacturers are extremely diverse.

Roads are central to commerce and get people to where they live and work. Nearly 20,000,000 people live in New York. Active commerce and high presence of people and their travels cause them to interact with highway ROWs each and every day. All of these gross features and interactions heighten the importance of roads in the environment and for society.



# 4 ASSESSMENT PROCESS

## Assessment Dates

December 2003-May 2004	Development of assessment system and protocol
June-August 2004	Field assessment
August 2004-January 2005	Finalized assessment metric
January 2005	Draft assessment report produced
February 2005	NYSDOT review of draft assessment report
March 2005	Final assessment report

## Assessment Team

Dr. Christopher A. Nowak, Certified Forester/Silviculturist. PhD, MS, and BS in Forest Resources Management from State University of New York College of Environmental Science and Forestry (SUNY-ESF)—Syracuse; AAS in Forest Technology from SUNY-ESF—Wanakena. Experience: Associate Professor of Forestry at SUNY-ESF (6½ years, current); 5½ years as a Research Forester at U.S. Forest Service’s Forestry Sciences Laboratory, Irvine, PA; 6 years as a Research Scientist with Research Foundation of SUNY—Syracuse. Research and teaching on subjects related to vegetation management and plant ecology. FSC certification experience since 1997: peer reviewer, auditor, team member, or team leader for 19 (4 ongoing) Resource Manager or Forest Management Organization assessments across the eastern hardwood region. This is his first assessment of a transportation organization.

## Assessment Process

### ***Step 1. Select visitation sites***

Site selection was completed in spring 2004. Chris Nowak, from SUNY-ESF, was to visit four regions in summer 2004. Regional representatives were contacted in late spring 2004 to set up one and one-half day site visits.

- Region 2 (Utica)—June 24 and July 6, 2004
- Region 6 (Hornell)—July 7-8, 2004
- Region 8 (Poughkeepsie)—July 21-22, 2004
- Region 4 (Rochester)—August 3-4, 2004

**Step 2. Site visit preparation**

Assessment documentation was sent to regional personnel at least 2 weeks prior to the site visits, including: (1) quarterly project report (dated May 24th, 2004) that placed the assessment in context of the overall research program; (2) description of the assessment process; (3) a list of documents useful in the assessment; and (4) the assessment metric.

**Step 3. Site visit—Day 1**

The assessor met with the regional representative the afternoon before the field visit to: (1) discuss the assessment process and review all Principles and Criteria in the assessment metric; and (2) set the agenda for the following full-day field visit.

**Step 4. Site visit—Day 2**

At the beginning of the second day, the assessor met personnel at the regional office to discuss and plan for the remainder of the assessment. The rest of the day was spent in the field reviewing standard operating practices, vegetation conditions, field performances, site challenges, vegetation management innovations, while conversing with vegetation managers and other field personnel.

**Step 5. Report development**

The current confidential report was developed to present findings associated with each criteria in the assessment metric, summarize strengths and weaknesses, provide commendations for high performance and recommendations on how to improve in areas of low performance, and assign a score for each Principle.

**Timeline**

May-June 2004	Step 1
June-July 2004	Step 2
June-August 2004	Step 3-4
September 2004-March 2005	Step 5

**Table 1. People consulted during this audit.**

<b>Person Interviewed (Region)</b>	<b>Position</b>
Al Agrasto (R8)	Design/Landscape
Pauline Burnes (R6)	Landscape Architect
Kevin Bush (R4)	Regional Maintenance Engineer
Ed Frantz (R2)	Regional Landscape/Environmental Manager
Dave Gardner (R4)	Highway Maintenance Supervisor I
Scott Hubbard (R8)	Assistant to the Region Construction Engineer
Elisabeth Kolb (R8)	Maintenance Environmental Coordinator
Charlie Lewis (R8)	Tree Pruner Supervisor
Mary McNeill (R8)	NYSDOT Maintenance
Kevin Miller (R4)	Regional Landscape Architect
Joseph Noval (R8)	NYSDOT Maintenance
Mary Ellen Papin (R4)	Maintenance Environmental Coordinator
Bill Peckham (R8)	Design/Landscape
Mario Piccolo (R4)	Highway Maintenance Worker
Gene Pinto (R8)	Regional Transportation Maintenance Engineer
Sandra Rapp (R6)	Maintenance Environmental Coordinator
George Robertaccio (R2)	<i>Bridge Maintenance Engineer</i>
Roderic Sechrist (R6)	<i>Regional Transportation Operations Engineer</i>
Larry Soeller (R8)	<i>Assistant Resident Engineer</i>
Craig Stenske (R2)	<i>Highway Maintenance Supervisor II</i>
Pete Teliska (R8)	<i>Regional Transportation Maintenance Engineer</i>
Mike Temple (R8)	<i>Program Manager</i>

***NYSDOT documents reviewed during the assessment:***

- 1) “NYSDOT Environmental Procedures Manual”, dated February 2001, accessed on 10/11/2005 (and prior) at [www.dot.state.ny.us/eab/emp.html](http://www.dot.state.ny.us/eab/emp.html)
- 2) “Mowing Limits Manual”, by Nagel and Clarke, dated December 1999
- 3) “New York State Department of Transportation’s Integrated Vegetation Management Program”, anonymous author, undated
- 4) “Environmental Handbook for Transportation Operations”, anonymous author, dated January 2002
- 5) “Environmental Procedures Manual Chapter 4.8 Invasive Species Draft”, anonymous author, dated April 29, 2004
- 6) “Attachment 5 Invasive Species Control Practices for Maintenance & Construction Draft”, anonymous author, dated April 29, 2004
- 7) “Attachment 6 Sample Invasive Species Inventory Methods Draft”, including “Invasive Plant Inventory Form”, anonymous author, dated April 29, 2004
- 8) “NYSDOT Region 6 Transportation Maintenance Division NHS and Major Arterial Quality Assurance Condition Assessment Score Sheet”, anonymous author, undated
- 9) “Frequently Asked Questions Japanese Knotweed *Polygonum cuspidatum*”, anonymous author, dated May 2004
- 10) “Daily Work Summary”, anonymous author, undated
- 11) “D259467 New York State Department of Transportation Region 8 – Poughkeepsie, New York Herbicide Specifications Regional Roadside Vegetation Management Spring 2004 & 2005 PIN. 8806.57”, anonymous author, undated
- 12) “Draft Guidelines for Development of Conservation Alternative Mowing Plans for Interstate, Expressway and Parkway Roadsides”, anonymous author, dated May 16, 2003
- 13) “Establishing Wildflower Meadows & Mowing Requirements”, Region 8, by Agrasto, dated July 18, 2002
- 14) “NYSDOT Regional Herbicide Use Questionnaire”, anonymous author, undated
- 15) “Applicator’s Daily Report Herbicide Operations”, anonymous author, dated January 1979
- 16) “Mowing Guidelines” Region 4, by Button, dated February 8, 2000
- 17) “Herbicide Application Guidelines” Region 4, by Edwards, dated February 14, 2001
- 18) “New York State Department of Transportation – Integrated Vegetation Management: Alternatives to Herbicides Demonstrations and Initiatives, September 2003”, anonymous author, undated
- 19) Region 5’s “Roadside Care Manual – 1<sup>st</sup> Edition”, dated June 2004
- 20) “Notification and Posting Requirements within Pesticide Laws and Regulations”, by R. McKeon and L. Greninger, dated March 2005

## **Standards**

Standards were developed in conjunction with this assessment, as described under a separate report authored by Nowak, Ballard, Greninger and Venner entitled “Operational-Level Performance Standards for Assessing Rights-of-Way Vegetation Management” (Nowak et al. in press). These standards are not sanctioned, but do reflect contemporary ideals from established Environmental Management Systems (ISO14001) (ISO 1996), tried performance standards for certifying sustainable forestry operations (SmartWood 2000), and a recently developed system for operational application of Integrated Vegetation Management on rights-of-way (Nowak and Ballard 2005).

## **Literature Cited**

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# 5 RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

## General Discussion of Findings

In general, NYSDOT is satisfactorily conducting rights-of-way vegetation management, in a manner generally consistent with the performance standards, with many strengths and some weaknesses, as noted below in Table 2.

**Table 2. Findings by Principle**

Principle/Subject Area	Strengths	Weaknesses
<b>P1: Commitment and Legal Compliance</b>	<p>The organizational restructuring that led to increased focus on the environment, including the development of Environmental Specialist and Maintenance Environmental Coordinator positions, has well-supported the organization’s commitment to legal compliance.</p> <p>The Environmental Procedures Manual is a monumental document that includes not only procedures, but an indepth portrayal of organizational mission and policy—it is a model document. It does well to present the organizations commitment to the environment.</p> <p>Unauthorized use of NYSDOT ROWs (low ATV traffic, low illegal dumping) is exceptionally low.</p>	<p>The pending issue of landowner notification in association with herbicide use on ROWs has unsettled vegetation management across New York State.</p> <p>Integrated Vegetation Management is, in general, well practiced by NYSDOT. Yet, IVM is not well portrayed in the agency’s “Environmental Initiative”.</p>

**Table 2 (cont.)**

<p><b>P2: Tenure &amp; Use Rights &amp; Responsibilities</b></p>	<p>Long standing working relationship with abutters which has led to a low incidence of problems with land use rights on rights-of-way.</p>	<p>Lack of knowledge and field evidence of the specific location of ROW boundaries.</p>
<p><b>P3 – Community Relations &amp; Workers’ Rights</b></p>	<p>Dedicated administrative, technical and professional staff willingly provide service to their communities and look to improve NYSDOT as a safe and productive organization.</p>	<p>Vegetation management workers receive relatively low monetary compensation for work, which has led to a high rate of employee turnover. This means that vegetation on ROWs are often managed by relatively inexperienced workers.</p>
<p><b>P4: Management Planning</b></p>	<p>Policy and procedure documentation on matters related to the environment and vegetation management are exceptional and are models for other ROW management organizations.</p>	<p>Strategic and tactical vegetation management plans have not been developed by NYSDOT, with few regional exceptions. These “regional exceptions” may be important building blocks for future work on planning.</p> <p>Organizational infrastructure, and specifically vegetation management equipment associated with both mowing and herbicide treatments, are marginally adequate, and may threaten future safe and productive vegetation management of roadside ROWs.</p>

Table 2 (cont.)

<b>P5: Understanding Pest &amp; Ecosystem Dynamics</b>	Employees are well afforded the opportunities to improve their work knowledge and skills though training.	A lack of dedicated, professional vegetation managers/vegetation management researchers at both the regional- and state-levels. While vegetation management and research occurs in each region, it is usually overseen or even conducted by people who have expertise in other arenas.
<b>P6: Setting Management Objectives &amp; Tolerance Levels</b>	Management objectives and tolerance levels are well defined for both mowing and herbicide use in two public documents: “Mowing Limits Manual” and “New York State Department of Transportation’s Integrated Vegetation Management Program”.	People and groups affected by vegetation management operations are inconsistently apprised of proposed vegetation management activities.
<b>P7: Compilation of a Broad Array of Treatment Options</b>	<p>A wide variety of different mechanical and chemical treatments are used on NYSDOT ROWs.</p> <p>Prevention of undesirable plants is a featured treatment applied through the establishment and management of desirable plant cover and the use of pavement (which functions as a weed barrier) under guiderails.</p> <p>Since 1998, NYSDOT has had an active research and development program on non-herbicide alternatives for treating ROW vegetation.</p>	None observed.

**Table 2 (cont.)**

<p><b>P8: Accounting for Economic &amp; Ecological Effects of Treatments</b></p>	<p>Written policies and procedures are well developed for protection and conservation of water, wildlife (especially birds), and biodiversity.</p> <p>Ongoing efforts to develop an invasive/noxious/exotic plant program are at the leading edge of vegetation management programs in the country.</p> <p>Chemical use has been greatly reduced by NYSDOT over the past few decades, and herbicides are used to control plants only when non-chemical management practices have proven ineffective or cost prohibitive.</p>	<p>Regional approaches to managing invasive/noxious/exotic plants are presently inconsistent across the State.</p> <p>Regional knowledge of Rare, Threatened, and Endangered species is low.</p>
<p><b>P9: Site-Specific Implementation of Treatments</b></p>	<p>NYSDOT ROWs are well-defined in space with on-the-ground linear distance delineators and GIS mapping.</p>	<p>Operational plans, or written prescriptions, are not used to describe/prescribe treatments on a land unit area basis, nor are treatments justified using ecological, socioeconomic, and administrative opportunities and constraints.</p> <p>Prescriptions and the decision to treat ROWs are not based on contemporary inventories of vegetation and environmental conditions.</p>
<p><b>P10: Adaptive Management &amp; Monitoring</b></p>	<p>Monitoring is conducted across the state to assess the condition of ROWs, environmental and social impacts of operations, and chemical use.</p>	<p>Monitoring is not conducted to assess changes in composition and changes in flora and fauna on ROWs over time.</p>

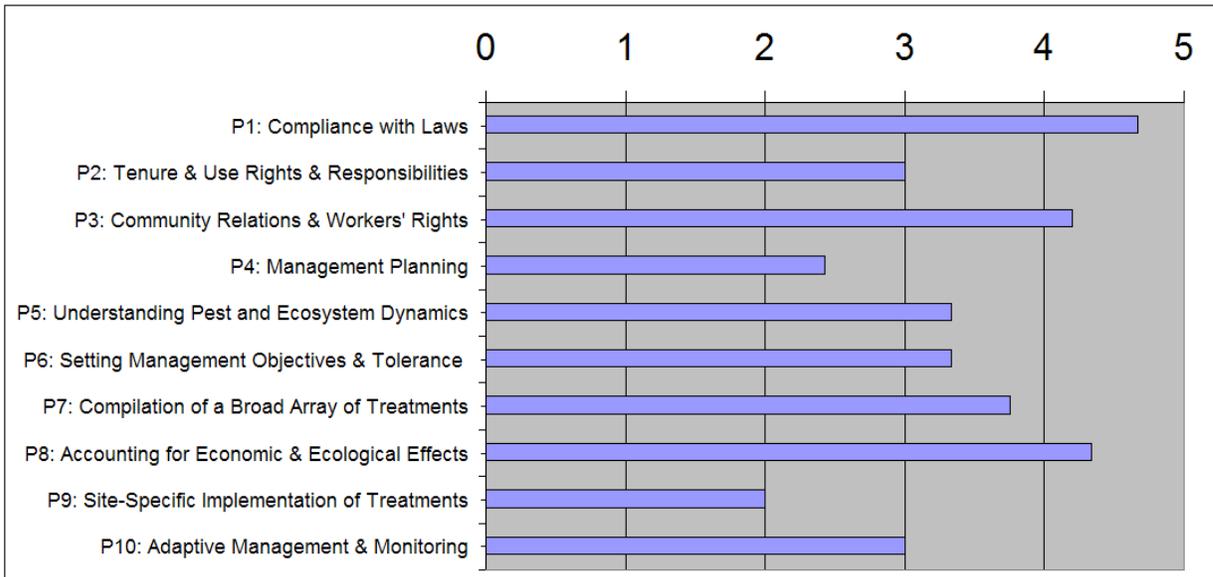
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# 6 ASSESSMENT CRITERIA: SCORES AND FINDINGS

**Table 3. A guide to scoring, performance level, and compliance.**

Score	PERFORMANCE General Description
N/A	Not an applicable criterion
1	Extremely weak performance; strongly unfavorable or data lacking
2	Weak performance; significant improvement is needed
3	Satisfactory performance
4	Favorable performance
5	Clearly outstanding performance



**Figure 1. Average scores for each criterion associated with each of the 10 principles**



# 7 PRINCIPLE-BY-PRINCIPLE PERFORMANCE OF VEGETATION MANAGEMENT ON NYSDOT RIGHTS-OF-WAY

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## Principle #1: Compliance with Laws

*Laws and regulations are constructs developed to protect natural resources and associated benefits and values accruable to society. IVM practitioners meet or exceed all laws, regulations, and guidelines related to vegetation management on ROWs.*

**Criterion 1.1. Vegetation management shall respect all national and local laws and regulations, for example, use of pesticides by certified applicators, Best Management Practices, and other protective measures for water quality that exist within the state or other appropriate jurisdiction(s) in which the operations occur.**

**Findings.** NYSDOT follows all laws and regulations in general, and specifically those related to vegetation management. Maintenance Environmental Coordinators in each region are largely responsible for making sure that environmental law is followed in each residency. Each region has at least one certified pesticide applicator and systems for filing appropriate year-end reports on herbicide usage to the New York State Department of Environmental Conservation (DEC). No violations were observed in spraying of herbicides near wetlands or open water. In fact, no violations were observed in any areas of law and regulations. NYSDOT has a detailed procedural text entitled “New York State Department of Transportations Environmental Procedures Manual”. All laws, regulations, and guidelines are listed by categories, along with detailed position papers, contact information (agency that governs the law, etc.), and guidance on practice.

In the course of the assessment, the assessor discussed the following general areas of work and the law with various NYSDOT workers: air quality, farmland protection, protection of historic properties, endangered and threatened species, erosion and sedimentation control plans, invasive species, federal and state waters and wetlands, Adirondack Park Agency, and the New York City Watershed. All of these areas of work are well described and supported in the Environmental Procedures Manual.

**Score:** 5

**Observation.** Each of the regions visited has different systems for reporting annual herbicide usage; some regions have the pesticide applicator submit the report, while in other regions the reports are developed at the region level and submitted by the Maintenance Environmental

Coordinator. NYSDOT management system might benefit by instituting a consistent approach to accounting for and reporting on the amounts of herbicides used across the state.

**Observation.** The development of Environmental Specialist and Environmental Coordinator positions as part of the organizational structure of NYSDOT is to be commended as it appeared that these people are responsible for making sure that this criterion is fully executed, and that the laws and regulations are followed with regard to vegetation management.

**Observation.** NYSDOT's Environmental Procedures Manual is exceptional in its level of detail and support for vegetation management and other environmental issues related to transportation. It is a valuable document that should be highlighted by the organization and supported in terms of future development.

**Observation.** Erosion of shoulders associated with the use of pre-emergent herbicides raised some concern. The herbicides effectively maintain a vegetation-free zone, but the lack of vegetation and associated roots (which stabilize some shoulders) can lead to high levels of erosion and sedimentation. NYSDOT could investigate whether this observation is of environmental importance.

**Observation.** Discussions between NYSDOT and DEC have recently occurred regarding the applicability of notification by applicators of occupants of any dwellings on the premises of the applications to be sprayed on NYSDOT ROWs. It was a source of consternation for vegetation managers across the state. In many residencies, the use of herbicides was halted this past summer because of these discussions. It is imperative that clear directives on this law be developed by the Albany office and appropriate procedures provided to the regions.

***Criterion 1.2. Vegetation management areas should be protected from unauthorized activities.***

**Findings.** Little unauthorized use was observed on highway ROWs. Only a small amount of ATV use (50 feet or less) was observed on a single ROW. Refuse (trash) was observed, but the amount was small compared to the acreages and miles of ROWs observed in the assessment. Minor, nuisance problems associated with non-permitted/illegal ROW crossings, culverts for driveways and forest roads, signage, and ditch maintenance were described by vegetation managers, but these were usually handled on a case-by-case/personal-scale basis and have not amounted to a large, state-wide problem.

**Score:** 5

**Criterion 1.3 Managers and practitioners shall demonstrate a long-term commitment to adhere to the IVM Principles and Criteria.**

- a) **Where opportunities afford, IVM Principles and Criteria are explicitly supported in the public arena.**
- b) **Commitment is well defined via environmental policy.**

**Findings.** Since IVM principles and criteria are somewhat new, the NYSDOT has not had the opportunity to explicitly support them in the public arena. NYSDOT has had an IVM procedure document for some time now, entitled “New York State Department of Transportation’s Integrated Vegetation Management Program” (anonymous author, undated). This public document presents most of the key elements of an IVM approach to vegetation management.

The assessor observed that most of the criteria associated with IVM, as outlined in the performance standards used in this assessment, were generally well met in policy, procedure and practice, and were well received and conducted by the vegetation management workers. Therefore, in practice the NYSDOT is publicly supporting IVM principles and criteria.

A public commitment to environmental quality in vegetation management is embedded in the organizational mission and policy statements, as follows (NYSDOT Environmental Policy document, Code 1.6-3, dated 6/20/2000).

**NYSDOT MISSION STATEMENT**

It is the mission of the New York State Department of Transportation to ensure our customers—those who live, work and travel in New York State—have a safe, efficient, balanced and environmentally sound transportation system.

**POLICY STATEMENT**

As New York State’s largest public works agency, the Department of Transportation has an obligation to the people of New York State to preserve, protect and enhance the environment. Strict regulatory compliance is only a part of the Department’s environmental stewardship responsibility.

In keeping with this mission and responsibility, the Department should use it’s organizational strengths to help advance State and Federal environmental policies.

By working with environmental agencies and groups to enhance the environment as part of our normal work, the Department is acting in the spirit of environmental law, the wishes and needs of our customers and

values we hold as public servants. This is the right thing to do for both transportation and the environment.

Thus, it is the policy and the practice of the Department to:

- Plan, design, construct and maintain facilities that meet transportation needs while proactively protecting, conserving, restoring and enhancing important natural and man-made resources. Again, project permit and mitigation requirements are only a start.
- Seek opportunities to cooperatively advance Federal, State and local environmental policies, programs and objectives as part of the Department's work through close and systematic coordination with the public and concerned agencies and enhancement.
- Demonstrate leadership by piloting the development and implementation of improved methods for environmental protection and enhancement.
- Employ safe and appropriate Context Sensitive Design measures to ensure that project designs reflect community values as understood through proactive outreach with local stakeholders
- Assist municipalities and others with their environmental projects by allowing them to include their work as environmental "betterments" in Department projects so that their investments can benefit from the economies of scale associated with larger projects

NYSDOT has a well developed agency-wide "Environmental Initiative" (the following is from NYSDOT website: [www.dot.state.ny.us/eab/envinit.html](http://www.dot.state.ny.us/eab/envinit.html), accessed 1/3/2005).

NYSDOT's Environmental Initiative's purpose and goals are to:

- Advance State environmental policies and objectives
- Promote an environmental ethic throughout the Department
- Strengthen relationships with environmental agencies and groups

As an action-oriented agency, DOT can most effectively attain these goals by doing dedicated environmental work in support of its corporate environmental ethic. This, in turn, will advance a shift in attitudes. This will provide real environmental protection, assure staff that the agency has a strong environmental ethic, and provide opportunities to engage the environmental community in positive joint undertakings that will demonstrate the Department's commitment.

The Initiative has three separate approaches:

1. Dedicated Environmental Benefit Projects—NYSDOT will fund and implement a number of environmental benefit projects that are well-suited to the Department's

- mission and capabilities. To program environmental enhancements on property owned by the NYSDOT will be a simple, straightforward and visible demonstration of environmental commitment. These projects will be designed to improve water quality, restore wetlands, protect fish and wildlife, promote eco-tourism, and enhance transportation corridors.
2. Environmental Betterments Program—This program identifies specific environmental projects that can be advanced as part of the NYSDOT's capital construction program. Under this program, environmental projects such as landscaping, park amenities, historic preservation, noise barriers, wetlands, stormwater basins or wildlife plantings that are funded by local agencies or groups will be incorporated into NYSDOT projects. These environmental enhancements will therefore benefit from the economies of scale realized by large public works projects. For example, if an enhancement can be accomplished with the construction personnel and equipment already on site for the larger project, the marginal cost of incorporating that enhancement into the existing contract is far less than the cost of constructing a stand-alone dedicated enhancement project. As part of the NYSDOT's public outreach efforts, municipal governments as well as environmental groups and agencies are being invited to combine the construction of their environmental enhancements with DOT construction projects. NYSDOT will assume all of the contracting and oversight work necessary for the progression of the local environmental enhancements at no cost to the sponsor. This initiative will also encourage more broad-based and long-term public participation in NYSDOT project development. Although many groups in New York State, in addition to numerous local governments and state and federal resource agencies have funds to do environmental enhancements, most have neither the technical expertise nor the wherewithal to implement their management plans quickly and effectively. In other words, money may be available, often as private or public matching funds, but the administrative and technical mechanisms for implementation may be lacking. The NYSDOT can bridge this gap by leveraging private and public funds to do larger, more cost-effective and meaningful environmental improvements.
  3. Strengthen NYSDOT's Environmental Performance—NYSDOT will continue to make every effort to reduce environmental toxins (including reducing herbicide use in vegetation management), improve air quality, increase the use of recycled materials, preserve and enhance New York State heritage.

**Score: 5**

**Observation.** As regional vegetation management programs are developed in the context of the Integrated Vegetation Management standards (as used here in this report), the NYSDOT could advertise this aspect of environmental management as part of the organizational Environmental Initiative—vegetation management should be a central part of that initiative. At present, the only clear reference to the management of NYSDOT ROWs is a passing reference to reducing herbicide use.

## **Principle #2: Tenure and Use Rights and Responsibilities**

*Sustainable land management, including vegetation management, requires that the land be properly vested, clearly owned and demarcated.*

**Criterion 2.1. Clear evidence of long-term land use rights (e.g., land title or lease agreements) shall be demonstrated, including clearly identified, on-the-ground land boundaries.**

**Findings.** Clear evidence of boundaries of ROWs were only found on expressways, arterials, and select highways, e.g., the abandoned fence along Route 17, and some relatively new monuments where there has been road construction over the past few decades. In general, boundaries are not well marked on NYSDOT ROWs associated with highways and streets.

Many ROWs have complex boundaries. And, some of the ROWs are so old and poorly documented that it would be difficult to reestablish the boundaries in a cost effective manner.

NYSDOT commented that “the classification of State ownership of ROWs is also not always readily obtainable and clear. By the nature of how transportation ROWs were acquired prior to the 1950s (less formal, less records, many adjacent property owners technically ‘owning to center of highway’), full ownership in fee may not be present and/or easily determined.”

In practice, boundaries have not been a broad problem as vegetation management has been kept well within the ROW edges. But, the assessor did learn that the zone of managed ROW has shrunk over time as woody vegetation has invaded and spread from the ROW edges (e.g., Taconic Parkway). This may be a problem for vegetation managers as they try to regain control of vegetation to the edge of the ROW, where the ROW boundary is no longer evident in the field.

**Score: 2**

**Observation.** As undesirable vegetation continues to encroach on roadside ROWs, and as surrounding land uses change from rural to suburban, exact knowledge and control of the boundaries will be important. Some NYSDOT workers expressed a concern for encroachments (buildings, other structures). It may be beneficial for NYSDOT to develop a boundary reestablishment and maintenance program to circumvent later landuse problems.

**Criterion 2.2. Appropriate mechanisms shall be employed to resolve disputes over tenure claims and use rights. Resource conflicts with adjoining landowners or other resource users are resolved or being addressed in a systematic and legal manner.**

**Findings.** The assessor was not made aware of any significant disputes over tenure claims and use rights. It may be that the NYSDOT ROWs are now well perceived as having clear tenure claim and use rights. The few instances of problems with encroachments (see findings associated with Criterion 2.1) have been resolved amicably, on a personal level, without the need for lawsuits.

**Score:** 4

**Observation.** NYSDOT could have a written policy and procedure for dealing with disputes over use rights on ROWs.

### **Principle #3: Community Relations and Workers' Rights**

*IVM shall maintain or enhance long-term social and economic well-being of vegetation management workers. A fairly compensated, respected, knowledgeable workforce is critical to long-term, sustainable vegetation management.*

**Criterion 3.1. The rights of workers to organize and voluntarily negotiate with their employers shall be guaranteed as outlined in Conventions 87 and 98 of the International Labor Organization (ILO):**

- a) **managers and their contractors develop effective and culturally sensitive mechanisms to resolve disputes between workers and management.**
- b) **workers are free to associate with other workers for the purpose of advocating for their own employment interests.**

**Findings.** Many NYSDOT workers belong to a union and virtually all are represented, which demonstrates their rights to organize and negotiate with their employers. Formal policies and procedures exist with NYSDOT that define ways of interacting with consultants and contractors (see NYSDOT website for various documents related to consultants and contractors). A formal grievance system is in place within NYSDOT for state employees to define and resolve disputes between workers and other workers, and between workers and management.

**Score:** 5

**Criterion 3.2. The communities adjacent to the vegetation management area should be given opportunities for other professional services from the vegetation manager such as:**

- c) **representation in local civic activities, e.g., Earth Day cleanup, Arbor Day plantings, etc.**
- d) **contribution to public education about vegetation management practices in conjunction with schools, community colleges, and/or other providers of training and education.**

**Findings.** The level of involvement of NYSDOT employees in their communities in matters of professional service ranged from normal (low level, within the confines of the work day) to exemplary (active engagement of community during and after work day hours). Activities included county fair booths, open houses, public meetings, interactions with the Adirondack Mountain Club and the Blue Mountain Lake Museum, and presentations at professional society meetings. For many employees there was clear, personal commitment, but there was significant concern for organizational support, particularly in service outside of the 40-hour work week.

**Score:** 3

**Observation.** An organizational policy and procedure could be developed by NYSDOT to guide employees in their service activities so as to support IVM, Environmental Management Systems, and the Environmental Initiative. An award system could be developed to honor employees with extraordinary service efforts.

**Criterion 3.3. Vegetation management meets or exceeds all applicable laws and regulations covering health and safety of employees, including the development and implementation of safety programs and procedures that include:**

- a) well-maintained and safe machinery and equipment
- b) use of safety equipment appropriate to each task
- c) documentation and posting of safety procedures in the workplace
- d) education and training
- e) contracts with safety requirements
- f) safety records, training reports, and certificates

**Findings.** NYSDOT has a well developed set of health and safety policies and procedures. Semiannual newsletters are provided to all employees on a wide range of health and safety issues, and are posted on the web. Over 60 safety bulletins have been developed over the last 10 years, also available on the web, covering many topics as related to vegetation management, such as vehicle and equipment use, safety footwear, hard hats and high visibility apparel, seat belts, work clothing, chainsaw safety, hearing conservation, working in hot weather, eye protection, and poison ivy. Regions have “Safety Committees” charged with elevating the importance of health and safety of NYSDOT employees, contractors, and consultants. The assessor observed NYSDOT employees conducting themselves within the full policies and procedures of healthy and safe work activities.

The assessor did not check contracts for safety requirements, nor did he check for safety records, training reports, and certificates.

**Score:** 5

**Observation.** While the NYSDOT has strong policy and procedures related to health and safety of employees, it would behoove the organization to consider fully all of the safety programs and procedures listed in association with this Criterion 3.3, especially those related to safety records, training reports, and certificates.

**Observation.** The merit system for safety was perceived by some NYSDOT workers as an important element of the organization. It could be enhanced and expanded to continue to grow a positive, healthy, and safe environment.

**Criterion 3.4. *Appropriate mechanisms are employed for resolving grievances and for providing fair compensation in the case of loss or damage affecting the legal or customary rights, property, resources, or livelihood of local peoples. Measures shall be undertaken to avoid such loss or damage.***

- a) managers attempt to resolve grievances and mitigate damage resulting from management activities through open communication and negotiation prior to legal action.
- b) managers and their contractors have adequate liability insurance.

**Findings.** No concerns, nor findings of any note, were developed by the assessor for this criterion. All regional representatives reacted as if this is not a problem, and indicated that any such needs for resolving grievances and mitigating damage are most often taken care of informally with interpersonal communications. Managers and their contractors apparently have adequate liability insurance. Insurance requirements for consultants and contractors are presented on the NYSDOT website.

**Score:** 5

**Criterion 3.5. *Workers are fairly compensated for work, especially in wage levels as matched to the degree of skill and difficulty in job.***

**Findings.** While the compensation for work is consistent with State law and guidelines, the relatively low pay for vegetation management workers has created problems associated with tenure of employees and morale. Many workers responsible for the practice of vegetation management serve in their jobs for only a few years, then move on to other work in the organization that pays better, if not work outside of NYSDOT. Many of the workers responsible for mowing have second jobs outside of NYSDOT.

**Score:** 3

**Observation.** As an IVM program is further developed and refined, more demands will be placed on the organization to have a knowledgeable, experienced work force. Basic to meeting this need is a stable, well-compensated employee base. NYSDOT's vegetation management program could benefit from an indepth assessment of worker responsibility, tenure and pay scale, with a goal of increasing the levels of all three.

## **Principle #4: Management Planning**

*Documentation of philosophy, principles, procedures and practices are critical to long-term, sustainable management, as embodied by various levels of plans, including resource inventories and maps. Written plans cause managers to be held highly accountable for both successes and failures as judged against stated goals and objectives. Improvement in management practices are predicated on learning from both successes and failures.*

### **Criterion 4.1. A strategic management plan and supporting documents must be in place that provides:**

- a) management objectives**
- b) description of the resources to be managed (e.g., water, soil, wildlife, aesthetics) and socioeconomic conditions, and a profile of adjacent lands**
- c) description of the vegetation management system, based on the ecology of the ecosystem in question and information gathered through resource inventories**
- d) provisions for monitoring**
- e) environmental limitations and safeguards, based on environmental assessments**
- f) plans for biodiversity**
- g) maps describing the resource base**

**Findings.** A strategic management plan does not exist for NYSDOT. At present, management is guided by a set of policy and procedure documents that are interpreted for application on a region-by-region basis.

NYSDOT commented that more planning and program evaluation is occurring than was reflected in this assessment report. Specific reference was made by NYSDOT on: 1) exercise for drainage and vegetation to set uniform Statewide strategies and levels of service; 2) TMD conduct of annual Program Analysis Reviews in each region (vegetation management is included in these discussions as they include reviews of equipment and training needs); and 3) TMD and Equipment Management Divisions monthly and quarterly meetings to discuss issues of mutual concern (these meetings include analysis and discussion of equipment training issues which affect vegetation management). Furthermore, NYSDOT noted that “if we move to strengthen strategic and operational planning, perhaps it can be an incremental step on one of these existing efforts.”

**Score:** 1

**Observation:** NYSDOT should develop a state-wide vegetation management plan that includes, at a minimum, the elements listed in Criterion 4.1. This plan could then be referenced by each region as region-specific tactical plans are developed each year. A statewide vegetation management plan would be useful in communicating with stakeholders, both within NYSDOT (Albany to the regions, and vice-versa) and with outside publics. It would also be useful in resource allocation decisions and would provide the impetus for monitoring and quality assurance.

***Criterion 4.2. Tactical management plans are developed that report local considerations and activity plans on a year-by-year basis.***

**Findings.** In general, NYSDOT does not use written tactical plans. Only three residencies produced a document that resembled such a plan. It described the pending year's (1-year) plan for vegetation management. Another region had a "herbicide specifications" document for a contract for herbicide treatments that contained some of the elements that would be found in a tactical plan.

**Score: 2**

**Observation:** NYSDOT should use tactical management plans for vegetation management, at least at the region-level. These plans would described planned vegetation management for a 1-year period, would be tiered to the state-wide plan in terms of policy and procedure, but would provide much greater detail on practices and site-specific protection and conservation of ROW resources.

***Criterion 4.3. Strategic and tactical management plans shall be periodically revised to incorporate the results of monitoring or new scientific and technical information, as well as to respond to changing environmental, social, and economic circumstances.***

**Findings.** Since there are no strategic or tactical management plans, there has not been a need for revision. It is anticipated that if NYSDOT does develop said plans, they will have mechanisms for revision based on monitoring and other means of gathering information.

**Score: 3**

**Observation.** NYSDOT should anticipate developing a revised strategic plan once every 10 years (see Criterion 4.4). Tactical plans are adjustable on a yearly basis.

***Criterion 4.4. A summary of vegetation management activities is produced annually, and both strategic and tactical management plans are revised at least every 10 years.***

**Findings.** It is not clear if NYSDOT develops a summary of vegetation management activities on a yearly basis. And, since NYSDOT does not use strategic or tactical plans, they are not set to be revised every 10 years. NYSDOT does have a “NYSDOT Regional Herbicide Use Questionnaire”, but the assessor did not see the state-wide summary report associated with this questionnaire.

**Score:** 3

**Observation.** NYSDOT should summarize vegetation management activities across the state on a yearly basis and make such a report available to their publics via the web or other such broadcasting outlets.

***Criterion 4.5. Workers shall receive adequate training and supervision to ensure proper implementation of the management plans.***

**Findings.** NYSDOT workers are generally capable and interested in improving their knowledge and understanding. It has already been noted that NYSDOT has a strong training program. It may be that some areas of IVM work will require some new training of vegetation managers, as noted throughout this assessment report.

**Score:** 3

**Observation.** This report, and the standards for assessment, could be used to guide training needs for the foreseeable future.

***Criterion 4.6 Organization infrastructure, e.g., vegetation treatment equipment, including computers and GPS, is well developed and maintained to ensure proper implementation of the management plans.***

**Findings.** An eclectic mix of equipment was found across regions, some new, most old. It seemed that regions are left to their own devices to develop (cob together) and maintain vegetation management equipment. Since the vegetation on ROWs seemed, for the most part, to be well managed, equipment is apparently effective at present. Many NYSDOT employees expressed concern over the disparity of equipment across regions, and the generally poor/tenuous condition of equipment, especially for the future.

NYSDOT noted that upgrades are produced “incrementally” and in a progressive manner from one region to the next, for example, Regions 3, 7, 8 and 9 received GPS units this past year.

**Score:** 2

**Observation.** NYSDOT could benefit from an overall, state-wide assessment of vegetation management equipment and develop a system of accelerated replacements so that treatment activities, including safety, are not hampered in the future. This emphasis on equipment is even more critical when coupled with the reductions in work force that have occurred within NYSDOT over the past few decades. It is critical for NYSDOT to keep the current work force productively engaged on efficient and effective equipment in order to meet vegetation management needs.

***Criterion 4.7. While respecting the confidentiality of information, vegetation managers shall make publicly available a summary of primary elements of the management plan, including those listed in Criterion 4.1.***

**Findings.** Since NYSDOT does not have a plan, per se, it has not had the opportunity to demonstrate this aspect of IVM. Given the transparent nature of the organization (a state organization whose activities are highly visible, and whose mission, objectives, policies, and procedures are well advertised on the web), presumably NYSDOT could readily make a summary of primary elements of the management plan available to the public.

**Score:** 3

## **Principle #5: Understanding Pest and Ecosystem Dynamics**

*Knowledgeable managers and practitioners are needed. Being able to identify pests and desirable organisms in the managed system, and understanding the ramifications of management based on knowing life histories and ecosystem processes, is foundational knowledge for IVM.*

### **Criterion 5.1. Vegetation managers are knowledgeable about the managed ecosystem, especially with regard to the basic biology and ecology of all organisms in the system, and the environment in which they live.**

**Findings.** All of the NYSDOT workers interviewed during the assessment were very knowledgeable about their arenas of work and were committed to the mission and policy of the organization. Also, most workers were interested in growing in knowledge and experience in their fields.

It was apparent that, in all of the regions visited, there is no one person who singly knew all the basic biology and ecology of all organisms in the managed vegetation system.

**Score:** 3

**Observation.** It may be that the level of needed basic biological and ecological knowledge can be accumulated in each region, or perhaps across state, via the development of interdisciplinary/multidisciplinary teams. Such a model would require a high level of intra-organization communication. Concerns about breakdowns in communication within and among regions were expressed by workers, and would need to be rectified in order to more fully work through this criterion.

**Observation.** Each region could use a dedicated vegetation management specialist that can develop the basic knowledge needed to manage ROW vegetation and the associated environment, particularly as it relates to wildlife habitat, rare, threatened and endangered species, wetlands and other conservation areas, and nonnative invasive plants. A single person could also be held in Albany with the responsibility of overseeing vegetation management across the state. This person could be knowledgeable and experienced to the level of meeting the needs associated with this criterion. This person could lead technology transfer within the organization, internal workshops, on-site interactions, and other means of growing the knowledge and experience base of the organization.

### **Criterion 5.2. Research and development activities are engaged to produce missing basic information on ecology of the managed ecosystem.**

**Findings.** NYSDOT has an active research and development program, but it is mostly aimed at road construction and maintenance. Since 1998, there has been a growing research program on vegetation treatment alternatives to using herbicides (see findings associated with Criteria 7.2

and 8.2), of which the current work—this assessment—is a part of that via a SUNY-ESF research partnership. Cornell University has recently worked with NYSDOT on the development of desirable vegetative cover for ROWs that reduces the need for vegetation management.

Field observation of recent and ongoing research indicated that NYSDOT lacks the staff to conduct in-house research and development activities. Many projects and demonstrations were installed with regard to non-herbicide alternatives, but were not fully evaluated in the context of the full scientific enterprise (simply, the scientific enterprise involves: hypotheses; replicated, manipulative field experiments; rigorous data analysis; strict interpretation of results using logic and rationalism; and publication of results.).

**Score: 3**

**Observation.** NYSDOT could develop greater working relationships with Universities and other research organizations to conduct field research related to biology and ecology of the managed system and socioeconomic sideboards of management, among other areas of inquiry. It may also be of benefit for NYSDOT to develop an in-house team of research and development personnel to conduct the professional business of biological and ecological research and science.

***Criterion 5.3. Vegetation managers and practitioners are provided opportunities to improve their skills and knowledge through training.***

**Findings.** Regional personnel indicated a generally high degree of satisfaction with training opportunities, with positive mention of training in CPR, mowing equipment operator instructions, and joint meetings with other regions (NYSDOT noted that Regions 1, 2, 3, 7, and 9 hold a joint spring “Getting Started” meeting each year). The assessor has worked with many NYSDOT employees with and at Category 6 training in association with certified pesticide applicators, and has observed the agency’s commitment to certified pesticide applicators. Some regions have annual training for herbicide crews that include record keeping, safety procedures, equipment, label interpretation and understanding, environmental regulations, application techniques, and storage. Regions 4, 5 and 6 hold a spring “Get Started” meeting, along with the DEC and the New York State Thruway Authority, to conduct large venue technology transfer and training. The meeting is well received by both administrators and technical staff.

**Score: 4**

**Observation.** Training is a critical element of positive feedback to employees—it shows that an organization is willing to invest in its people, and that they are important. It is critical to continue to afford employees the opportunities and encouragement to improve their skills and knowledge. Individualized, annual training plans may be used by NYSDOT to facilitate and grow this part of business. Opportunities for cross-regional/cross-State meetings and training should be encouraged.

## **Principle #6: Setting Management Objectives and Tolerance Levels**

*IVM, as developed from IPM, depends upon basic elements to function as a system. Tolerance levels are one of the top elements of IVM, whereby vegetation is only treated if critically necessary to meet objectives. Objectives are set in the context of socioeconomics and environmental desires.*

**Criterion 6.1. Management planning, including the development of management objectives, shall incorporate the results of evaluations of social impact. Consultations shall be maintained with people and groups directly affected by management operations (see also Criterion 6.3 and PRINCIPLE #4).**

**Findings.** Management objectives are well-stated in the following documents: “New York State Department of Transportation’s Integrated Vegetation Management Program” (anonymous author, undated) and the “Mowing Limits Manual” (authored by Nagel and Clarke, 1999), among a growing variety of such policy and procedure documents. However, it is not clear how these objectives were developed in relation to social impact.

NYSDOT is a highly visible and communicative organization. The organization is well portrayed on a website. Different regions have different, active ways of working with stakeholders. In one region, at least, there is a Public Information Officer who develops press releases related to vegetation management, manages a phone hotline and an active website on the same topic.

Organic farms are a special land use adjoining NYSDOT ROWs. Vegetation management on these adjoining ROWs are managed in a manner sensitive to the need of the farm owner, which usually means that no herbicides are used.

NYSDOT avoids applying herbicides within 100 feet of an inhabited building. If it is necessary to spray within 100 feet of a dwelling, the property owner is notified by the placement of flags meeting DEC regulations.

In large measure, the Alternatives to Herbicides initiative (see findings associated with Criterion 8.2) was developed in response to stakeholder interest in reducing the use of herbicides on NYSDOT ROWs. Its continuation is a testament to organizational responsiveness to stakeholders.

While management planning does occur, and vegetation management activities are accounted for on an annual, if not monthly, basis, there is no organizational management plan, nor regional plans (see criteria and findings associated with Principle 4).

**Score: 3**

**Observation.** NYSDOT could develop a consistent state-wide approach to formally and informally engage and track stakeholder involvement in the vegetation management arena, specifically as related to the development of management objectives.

***Criterion 6.2. Tolerance levels are used to develop thresholds for when vegetation management activities are applied to control vegetation.***

**Findings.** Tolerance levels have been developed for mowing and the use of herbicides. In the document entitled “Mowing Limits Manual” (authored by Nagel and Clarke, 1999) mowing heights (tolerable vegetation) and zones are presented for various roadway locations. In the document entitled “New York State Department of Transportation’s Integrated Vegetation Management Program” (anonymous author, undated), desired vegetation conditions are presented for each ROW zone (see Table 2 “Recommended tolerance levels and control methods for various roadside zones”). Herbicides are recommended for the “Vegetation Free” zone, specifically under guiderails. Herbicides are also recommended, in conjunction with mowing and handcutting, in the operational and transition zones.

**Score:** 5

***Criterion 6.3. People and groups affected by management operations are apprised of proposed vegetation management activities and associated environmental and aesthetic effects in order to solicit their comments or concerns.***

**Finding.** Some regions are proactive in apprising people and groups of planned vegetation management activities, whereas other regions are not. The issue of landowner notification on herbicide use had caused frustration among NYSDOT employees, and caused some regions to halt herbicide use during 2004; other regions only sprayed herbicides where the NYSDOT clearly owned the ROW.

**Score:** 2

**Observation.** State-wide consistency in apprising landowners of planned vegetation management activity would aid in the long-term implementation of IVM. The NYSDOT could conduct a survey of the different regions to see how the different residencies are dealing with the issue of informing the public. The pending issue of landowner notification may provide the impetus to deal with this on a state-wide basis.

**Criterion 6.4. Significant concerns identified in Criteria 6.1 and 6.3 are addressed in management policies and plans (for example, management activities are modified in response to concerns, or a rationale is provided for not responding to a concern).**

**Findings.** It is clear that the development of policies and procedures is a strength of the NYSDOT organization; many exemplary documents already exist on topics related to the environment and vegetation management. It is expected, as social interests grow and change with regard to the environment and roadside ROWs, the NYSDOT will be able to develop new policies and procedures to adapt management practices to meet social concerns and needs, while continuing to provide for the safe and reliable transport of people and goods.

**Score: 5**

## **Principle #7. Compilation of a Broad Array of Treatment Options**

*IVM does not focus on the use of one treatment; instead, every ROW management situation has a treatment prescribed only after considering all possible treatments. A full “toolbox” of treatments is needed to make this consideration full and robust.*

***Criterion 7.1. A wide variety of different mechanical, physical, chemical, cultural, and biological/ecological treatments are available for use/consideration on all sites.***

**Findings.** NYSDOT depends on a full suite of treatments to prevent and control vegetation on ROWs, including soil removal, herbicides, mowing, and handcutting. Treatments are well described and matched to ROW zones for mowing and the use of herbicides in the documents entitled “Mowing Limits Manual” (authored by Nagel and Clarke, 1999) and “New York State Department of Transportation’s Integrated Vegetation Management Program” (anonymous author, undated).

Biological/ecological control of woody plants is accomplished by the culture of desirable grasses and forbs, as described in the document entitled “New York State Department of Transportation’s Integrated Vegetation Management Program” (anonymous author, undated).

NYSDOT commented that each region works at creating a variety of innovative solutions to treatment needs, including “individual experiments with equipment.” “On a regular basis, DOT regions buy different sized equipment to mow small and hard-to-reach areas. Regions also use considerable ingenuity in acquiring hydroseeding equipment (buy new, borrow, build from scratch, acquire as Federal excess property).”

**Score:** 5

***Criterion 7.2. New treatments are progressively added to the vegetation management program, with emphasis on non-herbicide alternatives.***

**Findings.** As noted in the findings associated with Criteria 5.2 and 8.2, NYSDOT has had an active research and development program in evaluating non-herbicide alternatives. To date, no alternative has proven to be as cost effective as conventional treatment schemes, but NYSDOT continues to conduct research work in the area. It is apparent that if a reasonably cost effective non-herbicide treatment is found, it will be incorporated into the vegetation management program.

Observation. In addition to continuing research and development on nonherbicide alternatives, it is important that NYSDOT continue to explore various synthetic herbicides to either replace those currently in use or to add another treatment method to the management system. This is especially important when weed species are not controllable with conventional treatments, e.g., sweet white clover (see Observation associated with Criteria 8.1).

**Score:** 4

***Criterion 7.3. Where possible, treatments are featured that lead to, directly or indirectly, pest prevention and biological and ecological control of pests.***

**Findings.** By promoting the presence of desirable, low-growing plants on the ROWs, biological and ecological control of pests (undesirable woody plants) is achieved. This pest prevention aspect of vegetation management is a critical element of IVM and is noted in the NYSDOT publication entitled “New York State Department of Transportation’s Integrated Vegetation Management Program” (anonymous author, undated). Another important preventive measure observed on ROWs across New York is the use of macadam pavement under guiderails.

In one region, a practitioner indicated that sweeping treatments are not being well used; this treatment is focused on removing soil and other plant rooting substrate on and near pavement and guiderails so as to prevent plants from germinating and rooting.

**Score:** 4

**Observation.** NYSDOT could investigate the practice of sweeping and determine if its use needs to be expanded across the state. This prevention practice could lead to reduced pest plant populations and concomitant reduction in needed mowing or herbicide treatments.

## **Principle #8: Accounting for Economic and Ecological Effects of Treatments**

*Cost effectiveness of treatments, in its broadest sense, is used as a basis for selecting treatments. A conservative, environmental approach is used that favors prevention. If control is needed, there is an effort to use non-synthetic pesticide alternatives and biological approaches.*

**Criterion 8.1. Vegetation management should strive toward economic viability, while taking into account the full environmental, social, and operational costs of vegetation management. Treatment choices are made with full consideration of cost effectiveness, including a wide array of positive and negative environmental externalities, as follows.**

- a) **water resources: perennial and ephemeral streams, wetlands, vernal pools, seeps (see also Criterion 8.5)**
- b) **wildlife: common plants, animals and their habitats, and imperiled, threatened, and endangered species and their habitats (according to state and federal statutory listings)**
- c) **biodiversity: efforts are made to control invasive, exotic plants; also, if state or federal listings and species databases indicate the likely presence of a rare, threatened or endangered species or plant community type, either a survey is conducted prior to management activities being carried out (to verify the species presence or absence) or the vegetation manager manages as if the species were present. If an applicable species and plant community type is determined to be present, its location is reported to the manager of the applicable database, and necessary modifications are made in both the management plan and its implementation.**
- d) **aesthetics: visual impacts of treatments are assessed.**

**Written guidelines shall be prepared and implemented to address management of these resources.**

**Findings.** Written policies, procedures and some guidelines are well developed for water resources, wildlife, biodiversity and aesthetics (see “NYSDOT Environmental Policy document, Code 1.6-3”, dated 6/20/2000, and “Environmental Handbook for Transportation Operations”, dated July 2001).

### Water resources

Erosion, sediment control, and water quality are addressed in the mowing guide (“Mowing Limits Manual” authored by Nagel and Clarke, 1999) with a brief on the use of vegetation as a stabilizer and filter. Wetlands are not mowed so as to conserve soils and plant community structure and function. A suggested “best management practice” is to leave a minimum of 10-foot unmowed buffer strips along the edges of all streams and wetlands. Designated wetlands are visibly marked so that mowers can see the boundaries during mowing treatments. Herbicides are

applied near wetlands in compliance with DEC regulations. Maps are available to show all designated wetlands. Required DEC permits are obtained before spraying within 100 feet of a regulated wetland. A buffer zone of 100 feet of no herbicide application is established around any known water wells located in or near the ROW. In areas of special water concern, such as near the New York City Water Supply System, the ROWs are not sprayed with herbicides.

### Wildlife

Wildlife is protected by avoiding mowing during bird nesting season in select areas (“Mowing Limits Manual” authored by Nagel and Clarke, 1999). Designated wildlife nesting areas are not to be mowed before July 1. Habitat is to be conserved for protected and declining populations of ground nesting birds, including eastern meadowlark, bobolink, savanna sparrow, song sparrow, grasshopper sparrow, Henslow’s sparrow, and upland sandpiper (“Draft Guidelines for Development of Conservation Alternative Mowing Plans for Interstate, Expressway and Parkway Roadside”, anonymous dated 5/16/03).

### Biodiversity

Protecting rare, threatened and endangered species is well supported in policy, but the level of knowledge of RT&E species was somewhat lacking at the regional level. Few, if any, RT&E species were known by NYSDOT employees in any region. Programs for the control of non-native and noxious invasive plants are currently being developed by NYSDOT, with draft documents on inventory methods, control practices, and policy. In general, the invasives program is currently a source of confusion for workers across the regions. Some regions are very active in controlling some invasives and noxious plants, such as Japanese knotweed, *Phragmites*, and giant hogweed, whereas other regions have little or no control activities. Transfer of invasive or noxious plants through seed or other plant propagules is a concern being addressed in some regions, but not all. The ongoing development of a policy and procedure document on the management of invasives is clearly in line with organizational need.

It was unclear to what extent landscape-level consideration is given to conserving biodiversity, specially with respect as to how ROWs affect ecosystem functions by fragmentation or connectivity.

### Aesthetics

Visual values and other elements of aesthetics are addressed in the mowing guide (“Mowing Limits Manual” authored by Nagel and Clarke, 1999) with a brief on the importance of maintaining appearance of the managed ROW. Landscape plantings are covered in the same text, especially in terms of their conservation during mowing operations. Areas of established wildflower meadows are treated specifically in terms of mowing requirements in order to promote their long-term presence on ROWs.

NYSDOT is in the process of developing a decision support system useful in comparing different treatments for full environmental, social, and operational costs of vegetation management (ongoing Delphi study with SUNY-ESF). It is NYSDOT's plan to grow in its ability to make treatment choices with full consideration of cost effectiveness, including the widest possible array of positive and negative environmental externalities.

**Score:** 4

**Observation.** While water, wildlife, biodiversity, and aesthetics are covered well in policy and documentations related to other controlling agencies (e.g., DEC, U.S. Army Corps of Engineers, New York Natural Heritage Program), NYSDOT could improve practices at the regional-level by providing clear guidance on the step-by-step approach to managing these resources. Some of these explicit guidelines exist for mowing and songbirds, for example, and some are being developed for invasive species. The protection of rare, threatened and endangered species has not been procedurally developed for application at a residency level, or, if the information exists, it is not reaching that level.

**Observation.** NYSDOT might enhance their vegetation management program by specifically developing policy and procedure on aesthetics as related to their IVM program.

**Observation.** The special emphasis on birds in relation to wildlife management could be specifically expanded to other wildlife that use ROWs as habitat, including insect, amphibians, and reptiles. NYSDOT could generally expand their wildlife considerations for vegetation management.

**Observation.** NYSDOT could develop a program of systematically considering landscape-level issues of biodiversity, including how vegetation management affects fragmentation and connectivity.

**Observation.** The assessor observed a non-native, moderately invasive plant growing profusely around guiderails that were both treated and untreated with herbicides over this past year—sweet white clover (*Melilotus alba* Descr.). Many NYSDOT workers commented on its increased presence and possible resistance to herbicide treatments. NYSDOT could examine this species as a possible problem for ROW vegetation management.

**Criterion 8.2. Management systems shall promote the development and adoption of environmentally-sensitive, non-chemical methods of pest management and strive to minimize the use of chemical pesticides. If chemicals are used, proper equipment and training shall be provided to minimize health and environmental risks. (see also Criterion 1.1)**

**Findings.** As described in a September 2003 internal document entitled “New York State Department of Transportation – Integrated Vegetation Management: Alternatives to Herbicides Demonstrations and Initiatives, September 2003”, NYSDOT:

“issued a request in December 1998 for information on possible methods or products that could control vegetation without herbicides. Representatives from the Environmental Advocates, New York Coalition for Alternatives to Pesticides (NYCAP), and the New York Public Interest Group (NYPIRG) worked with the NYSDOT to assist in pursuing and evaluating alternatives. In addition, RAMP (Rochesterians Against the Misuse of Pesticides) has participated in the Rochester area NYSDOT to promote non-herbicide alternatives. From this request and continuing proposals and information sources a number of alternative projects and initiatives were developed and initiated to demonstrate, evaluate, and implement potential alternatives. Demonstrations have included mechanical methods (alternative mowers that could cut under the guiderail), natural chemical[s], alternative vegetation, and physical barriers.”

Non-herbicide alternatives evaluated to date include the following: vegetation control strip (pavement), mulch mats, weed fabric, wildflowers, natural herbicides, “Polecat” or “Alamo” alternative mowers, vegetation ground cover, and thermal options.

Evaluation and incorporation of alternatives into a broader systematic approach directly coordinated with the IVM program was continued with a new research project, awarded in August 2003 to SUNY-ESF. The project has included this assessment of the IVM program using an IVM/Environmental Management System (EMS) approach and development of a systematic framework and research protocol for identification, evaluation, and implementation of environmentally sensitive, lower maintenance, and cost effective vegetation management techniques that can be integrated into the overall vegetation management program (adapted from “New York State Department of Transportation – Integrated Vegetation Management: Alternatives to Herbicides Demonstrations and Initiatives, September 2003”, anonymous author, undated).

NYSDOT has significantly reduced its use of herbicides over the past few decades (following statement is from the document entitled “New York State Department of Transportation – Integrated Vegetation Management: Alternatives to Herbicides Demonstrations and Initiatives, September 2003”, anonymous).

NYSDOT strives to reduce the use of herbicide and pursues alternatives to the use of herbicides for controlling vegetation. Since the early 1970's, NYSDOT has greatly reduced its use of herbicides (approximately 90%). The formerly used practice of broadcast herbicide spraying along a broad band width (approximately 15 foot width) of roadside to control vegetation for vehicle recovery and operational needs was eliminated with mechanical methods (i.e., mowing) used as the primary methods where feasible. The primary remaining use of herbicides by NYSDOT is for control of vegetation under the guiderails and around signs than can not be accomplished using conventional mowing.

**Score: 5**

***Criterion 8.3. Chemicals are used to control plants only when non-chemical management practices have proven ineffective or cost prohibitive.***

**Findings.** The “Alternatives to Herbicides” research and development program, which began 6 years ago, has provided NYSDOT with a means to evaluate non-herbicide alternatives for controlling vegetation in select areas of ROW. No suitable alternatives to herbicides have yet been found, but the research and development program continues to the present. It is the assessor’s opinion that NYSDOT does use chemicals only when non-chemical management practices have proven ineffective or cost prohibitive.

**Score: 5**

***Criterion 8.4. When chemicals are used, a section is included in the prescription that fully describes the risks and benefits of their use and the precautions that workers must employ. Records are kept to document the occurrence of pests, measures to control them, and incidences of worker exposure to chemicals.***

**Findings.** NYSDOT apparently does not write prescriptions (operational plans) for treating vegetation. In some regions, tactical plans are developed for a residency and vegetation is treated on schedule, contingent on the weather and other circumstances, such as personnel availability and equipment. Risks and benefits of use have not been specifically developed or reported on. Records on pest, etc., are not developed. Herbicide applicators do keep records of herbicide usage as required by DEC using NYSDOT form R306 “Applicators Daily Report of Herbicide Operations” and the DEC “Commercial Applicators Annual Report” form.

**Score: 2**

**Observation:** NYSDOT should develop site-specific prescriptions that are based on contemporary measures (qualitative or quantitative) of existing vegetation, statements of desired conditions, and ecological and socioeconomic justification of the vegetation management treatments. These types of records would be useful in some aspects of long-term monitoring, including assessing the success of vegetation management treatments (see also PRINCIPLE #9).

***Criterion 8.5. Broken and leaking equipment and parts are repaired and removed from a right-of-way as they may contaminate a site with fuel, oil, or other chemicals; discarded parts are taken to a designated disposal facility. Equipment is not parked in riparian zones or near groundwater supplies where fluid can leak into them.***

**Findings.** Equipment is often parked in the shade of trees or in some otherwise out-of-the-way manner so as to minimize the interaction of parked equipment and errant vehicles traveling on the road corridor. Equipment was generally observed to be parked in non-sensitive areas, except in one case where two mowers were parked near a wetland.

**Score:** 3

**Observation:** NYSDOT could develop a brief policy and procedure document for parking of vegetation management equipment on ROWs.

***Criterion 8.6. Chemicals, containers, and liquid or solid wastes, including fuel and oil, shall be disposed of in an environmentally appropriate manner at off-site locations. (see also Criterion 1.1)***

**Findings.** Neither chemicals, containers, nor liquid or solid non-organic wastes, including fuel and oils, were observed as waste on any NYSDOT ROWs. NYSDOT has a recycling policy that is consistent with meeting this criterion. Additionally, mowing personnel are required to pick up refuse found along the roadside when they are treating a ROW.

**Score:** 5

***Criterion 8.7. Use of exotic species in planting is carefully controlled and actively monitored to avoid adverse ecological impacts. Furthermore, use of exotic plant species is contingent on peer-reviewed scientific evidence that any species in question is non-invasive and does not diminish biodiversity. If non-invasive exotic plant species are used, the location of their use is documented, and their ecological effects actively monitored.***

**Findings.** Plants are artificially introduced onto ROWs after road construction and associated disturbance of the ROW proper. NYSDOT uses standard seed mixes of various grasses and forbs, and may plant some shrubs and trees. Apparently, some of the species used are exotic, but it is not clear whether these plants are invasive.

**Score:** 3

**Observation:** NYSDOT could develop a brief policy and procedure document for use of exotic plants in planting on ROWs.

***8.8. Special cultural, ecological, economic or religious resources shall be clearly identified, recognized and protected by vegetation managers.***

**Findings.** Apparently, few such areas (other than those associated with ecological, which are considered for protection under Criterion 8.1) exist on ROWs. Historic trees are well known and protected, and are specifically managed under a separate vegetation management program at NYSDOT. One special type of resource that is spiritual/religious in nature, but not of official status, is the personal, temporary monuments (flowers, small crosses) that are sometimes placed in ROWs where a person was killed in a vehicular accident. NYSDOT personnel indicated that they were sensitive to these special areas, and generally conserved them as best as possible.

**Score:** 5

## **Principle #9: Site-Specific Implementation of Treatments**

*ROWs should be divided into ecologically- and socioeconomically-sensible management zones. These zones have operational vegetation management plans (prescription) that are contemporaneous in development and benchmarks for future evaluations of treatment success.*

***Criterion 9.1. Land management units are designated within right-of-way for areas that warrant different management treatments, for example, buffers to protect water resources, conservation areas, and vegetative communities that may cause a change in successional directions or rate.***

**Findings.** NYSDOT has exemplary spatial control of their ROWs with all ROWs in a GIS system and with regular distance markers (delineators) present along each roadway. It was apparent that the different regions have used the spatial system in different ways to develop land management units. It seemed that all regions had federal- and state-designated wetland delineated. Some regions had hand-drawn maps of organic farms where there was a no-herbicide use policy. Vegetation is zonally managed from the pavement to the edge of the ROW. Land management units, though, are not specifically used in the sense that different plant communities were mapped across the ROW.

**Score:** 2

**Observation.** NYSDOT could develop a land management unit map that divides the ROW, both in length and width, into different plant community types and special management areas. Such designations would facilitate prescription writing, treatments, and monitoring of vegetation.

***9.2. Written prescriptions (or, operational plans) are used to describe/prescribe treatments on a land management unit basis, and justify treatment choices using ecological, socioeconomic, and administrative opportunities and constraints.***

Prescriptions should include:

- a) Land management unit designation
- b) Description of current vegetation and environmental conditions
- c) Desired future conditions
- d) Definition of treatment
- e) Justifications for treatment based on tolerance thresholds (also see PRINCIPLE # 6) and ecological, environmental, socioeconomic, and administrative considerations
- f) Site-specific maps that detail land management units and show important cultural and environmental features

**Findings.** Written prescriptions are not used by NYSDOT vegetation managers, so there are no pre-treatment permanent records. Vegetation managers do keep daily logs of activity, as directed by the Resident Engineer (or other supervisor). These logs do provide some record of activity that can be used to monitor treatment effects and long-term response of the ROW plant community to vegetation management treatment.

**Score:** 2

**Observation:** NYSDOT should use prescription (operational plans) for vegetation management on ROWs. These prescriptions would document current vegetation and environmental conditions, desired future conditions of the site and plant community, and definition and justification of and for the prescribed treatment. Site, or land unit specific, maps of the treatment area are needed to spatially document the location of the treatment activity. Electronic inventory and prescriptions coupled with the GIS database (e.g., like systems used by some NYS electric utilities) would facilitate efficient use of resources and improve the vegetation management program overall; for example, streamlining the process of compiling and reporting annual work completed, productivity, etc., planning for subsequent years, prioritizing work to be done, efficiently evaluating treatment costs and overall effectiveness, tracking pest problems (e.g., exotic invasives)—see also Criterion 9.3.

***Criterion 9.3. Prescriptions and the decision to treat are based on contemporary inventories of vegetation and environmental conditions.***

**Findings.** For the most part, NYSDOT does not base decisions to treat vegetation on contemporary inventories of vegetation and environmental conditions. Most vegetation is treated on a cyclic basis, generally one or more times a year. An exception may be sight clearance work on taller, encroaching woody vegetation along ROWs. Inventories in this case were observed to be qualitative, with the vegetation management supervisor making treatment decisions based on assessments developed during routine travel of roads.

**Score:** 2

**Observation.** NYSDOT could develop a more objective, quantitative approach to inventorying vegetation for vegetation management decisions. A system of vegetation categories (density and height classes, life form groups such as grasses, forbs, shrubs, short trees, tall trees, making note of dominant species, or known problem species, e.g., exotic invasives) could be used to class sections (land management units) of ROWs. This type of inventory can be used to support vegetation management treatment decisions, and would be useful in monitoring long-term changes in vegetation with different treatments and in different environments.

## **Principle #10: Adaptive Management and Monitoring**

*IVM has a self-improvement mechanism: vegetation management objectives are used to evaluate whether management outcomes are acceptable. Monitoring is the collection of appropriate data to judge successes and failures of vegetation management. Monitoring procedures should be consistent and replicable over time to allow comparison of results and assessment of change.*

### **Criterion 10.1 Implementation of the strategic and tactical management plans are periodically monitored to assess:**

- a) The degree to which the management vision, goals, and objectives have been achieved**
- b) Deviations from the plan**
- c) Unexpected effects of management activities and other disturbances**
- d) Social and environmental effects of management**

**Findings.** As presented in association with various criteria in PRINCIPLE #4, the NYSDOT does not yet have strategic or tactical management plans. As such, the plans have not been periodically monitored for various elements of vegetation management. It is expected, given the level of effort in IVM to date, that NYSDOT will invest in monitoring of any management plan implementation.

**Score:** 3

### **Criterion 10.2. Vegetation management should include the research and data collection needed to monitor, at a minimum, the following indicators:**

- a) Condition of the right-of-way**
- b) Composition and changes in the flora and fauna**
- c) Environmental and social impacts of operations**
- d) Chemical use**
- e) Cost, productivity, effectiveness, and efficiency of vegetation management**

**Findings.** NYSDOT does have a system of monitoring that meets this criterion, in part—for example the “NYSDOT Region 6 Transportation Maintenance Division NHS and Major Arterial Quality Assurance Condition Assessment Score Sheet”. It is the assessor’s understanding that each region is evaluated using this form each year. The form includes categories for evaluation of: (1) traveler’s perspectives (appearance, aesthetics); (2) conditions of signs, delineators, and reflectors; (3) generic guide rail; (4) operational zone turf height; (5) general vegetation appearance (aesthetics); (6) clear zone – fixed objects; (7) litter and debris; and (8) graffiti. This form addresses only those elements associated with (a) and (c) above. Chemical use (c) is monitored through daily work logs and annual reporting to the DEC. Costs and productivity are indirectly monitored via daily work logs. Apparently, NYSDOT does not monitor composition and changes in the flora and fauna. NYSDOT noted that “there is currently a roadside QA/QC assessment – random 1 mile assessment which includes vegetation management conducted along ROWs in each region.”

**Score:** 3

**Observation.** A system could be developed, consistent with Criteria 9.2 and 9.3, to document ROW composition and changes in the flora and fauna.

***Criterion 10.3. Results of monitoring shall be incorporated into the implementation and revision of the management plan.***

**Findings.** See findings associated with Criterion 10.1.

**Score:** 3

***Criterion 10.4. While respecting the confidentiality of information, vegetation managers shall make publicly available a summary of the results of monitoring indicators, including those listed in 10.1.***

**Findings.** Since NYSDOT does not have a plan to monitor, it has not had the opportunity to fully demonstrate this aspect of IVM. Given the transparent nature of the organization (state organization whose activities are highly visible, and whose mission, objectives, policies and procedures are well advertised on the web), it is expected that NYSDOT will readily make a summary of monitoring results publicly available.

**Score:** 3