

# **A Brief Survey of Strategic Planning Elements for Department of Transportation Vegetation Management Programs**

Final Report

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## **DISCLAIMER**

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16. Abstract: Strategic planning, as with all levels of planning, is important for organizations to efficiently and effectively meet their missions and achieve their goals and objectives. In planning, a variety of plan, decision making, and management implementation components are assembled in one or more documents. With documentation, the plan becomes accessible to stakeholders so that shared visions and understanding of organizational management can develop at present, but most importantly across scales of space and time. Sustainable management is predicated on having full and robust management plans. In the current study, strategic vegetation management plans from Departments of Transportation across the country, including New York State, were examined for structure and completeness. A management planning "checklist" of core planning elements was developed for the study, and used to both evaluate and assess existing plans. DOTs and other organizations can use the results of this study to self-organize their own plans and associated accounts, processes and procedures to define where they are strong, and where they are weak in planning. And with that, future organizational resources can be directed to fill necessary shortfalls. Results of the study indicate that DOTs (including New York) are consistently strong in providing direction for management via statements of mission, goals and objectives, and also in clearly defining desired conditions of the management system. Most significantly and consistently short are descriptions of the current system, and details on monitoring as a basis for management evaluation.			
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# 1 EXECUTIVE SUMMARY

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## **Overall Project: Integrated Vegetation Management Program Enhancements**

Five research tasks related to roadside right-of-way (ROW) vegetation management are being conducted by the State University of New York College of Environmental Science and Forestry (SUNY-ESF) for the New York State Department of Transportation (NYSDOT).

General objectives for the research are as follows (as presented in the problem statement provided by the NYSDOT / University Transportation Research Center [UTRC] RFP [RFP Number: C-06-24; dated April 2, 2009] [shortened from original text]) (NOTE: there are only four objectives, generally one for each of the first four Tasks – Task 5 is about reporting and technology transfer and did not have a specific objective other than to write and provide other accessible research materials, e.g., workshops, factsheets, presentations at meetings).

- Objective No. 1: Update the Department’s Integrated Vegetation Management Plan to reflect changes in work practices.
- Objective No. 2: Develop simple decision support tools that NYSDOT roadside vegetation managers can use to decide which vegetation management treatments are most suitable for their roadsides/transportation assets and to help schedule treatments for maximum effectiveness.
- Objective No. 3: Undertake field research on the effectiveness of alternatives to herbicides in controlling unwanted roadside vegetation on a sample of State highways.
- Objective No. 4: Undertake research on whether cut stump applications of glyphosate-based herbicides, such as Accord and Roundup, control Oriental bittersweet (*Celastrus orbiculatus*) in a manner that is efficacious, consistent with regulations and safe to workers and the environment.

SUNY-ESF began meeting these objectives in 2010 by working on five tasks, each with a sequence of sub-tasks and associated deliverables. The current report is the first of two Final Reports associated with Objective No. 1.

## **Task 1: A Brief Survey of Strategic Planning Elements for Department of Transportation Vegetation Management Programs**

The goal of current research was to elevate understanding and awareness of strategic planning for DOT vegetation management in general, and for NYSDOT in specific.

## **Study Objectives**

Three objectives were set to complete the task:

Objective No. 1: Define core, basic elements of a vegetation management strategic plan and logically organize them into both a rubric and model for planning.

Objective No. 2: Apply the planning rubric and model to all available state departments of transportation (DOT) plans in the 50 states. Assess in detail those plans that were most complete with reference to accounting for core, basic planning elements. Present highlights of each, to affirm and illustrate the meaning and value of each planning element.

Objective No. 3: Account for those core, basic elements of strategic plans that NYSDOT is currently using to guide vegetation management work on roadside rights-of-way, and conversely, define which elements are missing from NYSDOT work.

## **Study Benefits**

This task will elevate understanding and awareness of the value of strategic planning for DOT vegetation management. This could lead to more informed vegetation managers, and improved interactions with publics and regulators.

## **Rationale**

Strategic planning, as with all levels of planning, is important for organizations to efficiently and effectively meet their missions and achieve their goals and objectives. In planning, a variety of plan, decision making, and management implementation components are assembled in one or more documents. With documentation, the plan becomes accessible to stakeholders so that shared vision and understanding of organizational management can develop across scales of space and time, and with that, among various people. Sustainable management is predicated on having full and robust management plans.

## **Methods**

A set of core planning elements was assembled from the literature and the experience of the Principal Investigator (C. Nowak). These core elements are common across many professions and disciplines, and were assembled in this report so that existing vegetation management plans from State DOT's from across the country, and with a focus on New York State Department of Transportation, could be assessed and evaluated for completeness and opportunities for improvement. These core planning were assembled into a checklist to both evaluate and assess strategic vegetation management plans for all DOTs across the United States.

## **Outcome**

Three plans were found to be most complete for core elements (aside from NYSDOT's plans, which are similarly complete) – Montana, Nebraska, and Washington State. These three plans could be used as models for other DOTs who do not have strategic vegetation management plans. However, these plans are not complete themselves and improvements are possible, especially in developing more SMART objectives, providing full management context as a basis



for management planning, decision making and implementation, and formalization of a program in monitoring and evaluation.

NYSDOT's planning documents were found to be relatively complete compared to other DOTs. NYSDOT has strong planning components in place for management direction and activity, including standards and guidelines. NYSDOT also has some important elements of planning in place for both "desired condition" and "monitoring" elements. This coverage of planning elements is similar to other DOTs across the country.

### ***Future Work***

Planning takes time and effort, and presents the developer with the challenges and opportunities of being open and accountable for decision making and planning with vegetation management.

Yet, a complete plan with all elements—or as many elements as possible—developed and codified in writing is an important tool. It helps focus agency management and staff on constraints and opportunities with vegetation work and to have a shared understanding of the future. It provides a tool for communicating vegetation management goals and objectives with stakeholders. It demonstrates that an organization is progressive and sustainable. It is only with this effort that the full benefits of planning can be secured.

If time and staff resources are a constraint, one approach might be to prepare a strategic plan with as much information as is on hand included. As more information is gathered, this could be added in subsequent editions of the plan.

A variety of published sources are available to aid NYSDOT and other DOTs in their development and presentation of these missing or partially fulfilled elements of planning, including the DOT vegetation management plans from Montana, Nebraska and Washington State. Specific to DOTs, a variety of DOT-specific "how to plan" documents are available from various national organizations, including the American Association of State Highway and Transportation Officials' and the National Roadside Vegetation Management Association.

The National Forest Systems planning at all levels, including strategic, is excellent and is probably the best model of natural resources management planning in the world. While National Forests are not roadside rights-of-way, much can be learned by comparing and contrasting what has been done with plan writing on National Forests with what can be done with DOTs.



## 2 INTRODUCTION

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Vegetation management along roadsides requires planning. Some reasons to plan include:

1. surface, discuss and solidify goals for vegetation management, including safety, infrastructure protection and environmental sustainability;
2. understand the trade-offs when goals conflict;
3. comply with local, state and federal regulations regarding ownership and use;
4. encourage thinking about long-run implications of roadside action (sometimes it takes a long time for the consequences of vegetation management decisions to become apparent);
5. efficiently and effectively schedule roadside right-of-way activities;
6. help make the best use of the roadside right-of-way environment in meeting goals;
7. demonstrate the sustainability of conditions and outcomes to stakeholders;
8. provide a basis for securing support from agency management, elected officials and the general public for vegetation management treatments and budgets, staff and equipment; and
9. learn the capabilities of the right-of-way system.

Planning has hierarchies in time, space and within an organization. Site-specific roadside management decisions, e.g., when to mow or use herbicides, are linked to whole-ROW-system decisions using planning that has a spatial hierarchy. The key link between site and the system is the prescription. A prescription is an operational plan that is applicable only in the short-term and at a small scale. It has nearly all the basic elements of a strategic plan, but is based on information from local sites (possibly as small as a 100-foot section of roadside right-of-way) with explicit direction as to what management treatment is needed to move that part of the right-of-way from its current state to some more desired condition. It is intended to be applied in the same year (or less) that it was created,

Strategic planning is viewed as the top of the hierarchy, and prescriptions—or operational plans—as the bottom. Tactical plans link strategic and operational plans.

Strategic, tactical and operational plans are defined as follows.

- Strategic planning is long-term, and covers the “whys” for using vegetation control treatments. Strategic plans provide management direction and include general approaches (specifics are left to tactical and operational plans). This planning and management helps to alert managers to long-term consequences of immediate actions.

- Tactical plans are usually annual plans bundled in 5- to 10-year sets that cover such things as overall scheduling of management activities and facility development.
- Operational plans are short term, usually covering one to 24 months. They include specific details about how to accomplish an objective, are often at the site-level (which is what makes them possibly the same as a prescription).

While plans have clear reasons and values, many organizations do not have complete plans, especially at the strategic level. For example, in 2005 it was found that the New York State Department of Transportation did not have a strategic plan for its vegetation management operations (Nowak 2005). While NYSDOT has developed many needed planning elements, a critical question is: are all of the necessary elements of planning developed?

### **Study Goal and Objectives**

The goal of current research was to elevate understanding and awareness of strategic planning for DOT vegetation management. Three objectives were set to meet this goal:

Objective No. 1: Define core, basic elements of a vegetation management strategic plan and logically organize them into both a rubric and model for planning.

Objective No. 2: Apply the planning rubric and model to all available state departments of transportation (DOT) plans in the 50 states. Assess in detail those plans that were most complete with reference to accounting for core, basic planning elements. Present highlights of each, to affirm and illustrate the meaning and value of each planning element.

Objective No. 3: Account for those core, basic elements of strategic plans that NYSDOT is currently using to guide vegetation management work on roadside rights-of-way, and conversely, define which elements are missing from NYSDOT work.

The report is divided into three sections, one each for each of the three objectives.

# 3 BASIC ELEMENTS OF A STRATEGIC PLAN

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Management plans<sup>1</sup> describe policies, processes, procedures and practices for decision making and planning that should be used to best meet organizational goals and objectives. Managing a system without a written plan can be done, guided only by short-term operational considerations, but this may have long-term, undesirable or unforeseen consequences.

As a result, the plan and planning process is an important aspect of natural resources management. If a management plan is not carefully, thoroughly, and thoughtfully prepared, the activities that are implemented may not produce the desired results.

Plans can productively exist in all kinds of forms, from “back of the envelope” / “in mind only” / “seat of your pants” to detailed or elaborate productions with computer modeling and extensive, stakeholder accessible documentation. Written plans are vehicles to allow the purposes of planning to be most broadly and sustainably met over different people and across time.

Plans of all kinds – strategic, tactical and operational – share the following common elements:

- 1) Management direction as described by **mission, goals and objectives** statements
- 2) Description of what the managed system should resemble (the “**desired future conditions**”)
- 3) Accounting of **constraints, limitations and capacities**
- 4) Description of the current state of the system (“**current conditions**”)
- 5) Definition of possible **management directions and activities**, along with various standards and guidelines, to move the system from its current state to the desired future condition
- 6) Commitment to **monitoring and evaluation** to determine the degree of success of management and provide a basis to improve management decision making and planning

It does not matter what the managed system is, nor its scale – it can be a town park, a forest, or a roadside right-of-way. Plans for these systems and many other are only complete if they include (at a minimum) all of these six elements. And, it is only with a complete plan that the benefits of planning can be fully realized for the organization and its stakeholders.

These basic plan elements can be organized to show the flow of management planning and implementation over time (Figure 1). With completion of management implementation as marked by monitoring and evaluation, the whole planning and management cycle starts again with the information gained from monitoring used to revise the management plan. In full, the management plan is set to produce a continuous improvement loop, with the various elements stepped and repeated overtime, with an accompanying notion that the organization will improve their systems and do better management over time.

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<sup>1</sup> Introductory two paragraphs modelled and paraphrased after: Bettinger, P., K. Boston, J.P. Siry, and D.L. Grebner. 2009. Forest Management and Planning. Elsevier Inc., New York.

This accounting and organization of planning elements is apparent in a wide variety of organizations responsible for land management, including, for example, the New York State Department of Environmental Conservation and their Unit Management Plans, the U.S. Forest Service and their Land and Resources Management Plan, and the electric utility industry in New York as directed in planning by the New York State Public Service Commission (NYS PSC undated; NYSDEC 2007; ANF 2007).

More specific to right-of-way managers, including DOTs, are recently formalized Integrated Vegetation Management Performance standards and best management practices (ANSI 2012; Miller 2014). In these standards and practices, planning and implementing a vegetation management program is portrayed as a six element process (see Figure 2). These elements are nearly the same as those portrayed above as the six core elements, above.

Similarly, the right-of-way industry has ascribed to defining what are the important elements for vegetation management planning in the recently incorporated Right-of Way Stewardship Program ([www.rowstewardship.org/](http://www.rowstewardship.org/)) (ROWSC 2014). The program and associated council was developed as an independent, third-party accreditation body that establishes standards for responsible, sustainable right-of-way vegetation management on powerline corridors. The program promotes the application of Integrated Vegetation Management (IVM) and best management practices to the utility vegetation management industry to maintain power system reliability and address social and ecological concerns.

A set of principles and criteria have been established that defines needed social, economic and environment performance standards in order to conduct sustainable IVM (see the ROW Steward Technical Requirement and the Accreditation Standards for Assessing IVM Excellence; [www.rowstewardship.org/standards](http://www.rowstewardship.org/standards)) (ROWSC 2014). Criterion 4.1 in Principle 4 (Management Planning) details the expected elements of a strategic plan for a sustainable IVM program that is similar, again, the various other accountings of strategic management plan elements (Sidebar 1), including those listed above as part of this study.

## **Descriptions of Each Core Strategic Planning Element**

The core elements of strategic planning listed in the previous section are defined in more detail in this section as a basis for understanding how to implement each element (DOI BOR 2003; USBR 2003; ANF2007). Defining planning elements and describing how to implement them is a basis with which existing plans can be critiqued (see Sections 2 and 3 of this report), and new plans developed.

### ***Element No. 1: Mission, Goals and Objectives***

The *mission statement* describes an organization's purpose or reason for being. It is a broad statement of purpose or "ends" to be achieved by the organization. These statements should be succinct, yet defining, and importantly applicable to all levels of the organization. They are distinct to the organization, in that each organization should have a different purpose than others.

It may be that all state DOT's could have the same or similar mission at a state-level. What would differentiate one state from another is the more defining sets of goals and objectives.

**Goals** develop naturally out of the mission statement and are broad areas set for mission accomplishment, or “an enduring intention to act”. They are generally long lasting and provide a guide for decision makers. While broad in nature, goals are specific enough to identify a future condition or accomplishment to be achieved. Common action words associated with goals include: maintain, support, add, pursue, discontinue, improve, protect, expand, limit, develop, rehabilitate, provide, evaluate, comply, enhance, increase, and restore.

**Objectives** are concise, usually time specific, statements of measurable planned results to guide management activities during plan implementation. Objectives tie work to achievement of goals.

Objectives are written to define actions or conditions to be achieved during the period the plan is in place. Several objectives are commonly needed to achieve a goal. The acronym SMART is commonly used to define the attributes of an objective, which means objectives are supposed to be

- Specific,
- Measurable,
- Achievable,
- Relevant, and
- Time-bound.

This SMART nature of objectives allows them to be readily judged for achievement for plan implementation, which is the central aspect of monitoring – strong statements of objectives sets the stage for productive accounting of accomplishments (or not) during monitoring.

### ***Element No. 2: Desired Future Condition***

Desired future conditions (DFCs) are an extension of goals. Whereas goals are general in action, DFCs are more explicit in describing the envisioned, desired future state of the managed system. DFC descriptions can include asset and ecological conditions. Activities conducted during implementation contribute to achieving the DFC. The difference between DFC and current system conditions drives a need for management, and it is the DFC that we judge against future conditions as determined during monitoring. Achieving the DFC means that management worked as expected, and should also mean that many of the goals and objectives were achieved (and vice-versa: achievement of goals and objectives should result in the achievement of DFC).

### ***Element No. 3: Constraints, Limitations and Capacity***

Many considerations are needed when planning, including administrative, social, economic and environmental considerations that provide context and constraints on, and define the capacity for, management activity. Common considerations that should be documents in a plan include:

- 1) ownership status (easements, deeds), and location and setting, including maps at various scales;

- 2) legal (laws and authorities that pertain to a management area and the opportunities and constraints they establish);
- 3) environmental (soils, topography, water resources, wildlife, cultural resources, historic resources, endangered species, and other environmental factors that establish opportunities or constraints);
- 4) social, including surrounding land ownership and land uses;
- 5) administrative, including personnel and associated infrastructure to get management accomplished;
- 6) asset characteristics, such as configuration of guiderail, clear areas based on highway speeds or drainage system capacity.

#### ***Element No. 4: Current Conditions***

A complete description of the existing physical, biological, and socioeconomic conditions of the management area provides context for management and a baseline to develop the plan and monitor successful plan implementation. Detailed description of the current state of the management system, especially those parts of the system that will change with management activity, is needed at various levels of details. Strategic plans are more system wide and general, more at a summary and synthesis of the system as a whole based on work at the tactical and operational levels.

#### ***Element No. 5: Management Direction and Activities***

This element provides management actions and directions for the management area in response to management concerns and stakeholder issues. They should be consistent with goals and objectives. Standards and guidelines are often associated with management actions and directions. The standards and guidelines can restate laws, agreements, best management practices, or other directives to follow in meeting the management direction and action. Tolerance thresholds for vegetation management, which provide guidance as to when to treat or not to treat, are an important part of standards and guidelines.

Standards and guidelines provide technical information and direction guiding the uses and activities of the managed system. Standards and guidelines impose limitations on activities or uses for reasons of public safety, risk reduction and environmental protection or to achieve a desired condition or objective. These standards and guidelines could be included in the planning document as supporting materials or incorporated by reference.

#### ***Element No. 6: Monitoring and Evaluation***

Monitoring is needed to track the success of implementing the management action(s)/direction(s), specifically accounting for how to evaluate, observe, enforce, comply, achieve, document or report the action, or determine that the management action was achieved. It should be noted that monitoring efforts occur periodically over the life of the plan, and results of monitoring will be evaluated to inform a new cycle of planning and management activity.



Elements that should be monitored to assess the success of IVM plan implementation should include the following measures (modified after ROWSC 2014): 1) condition of the ROW, including composition of and changes in the flora and fauna and how this affects safety and asset conditions; 2) production of right-of-way values, e.g., visuals, wildlife habitat and other environmental service, conservation of cultural resources; 3) environmental and social impacts of operations; 4) completion of vegetation management activities, including the use of herbicides; and 5) cost, productivity, effectiveness, and efficiency of vegetation management. Data is expected for all of these measures, with documented efforts to relate monitoring data to management goals and objectives. If data is not available for all the measures, use as much data as is available and work to add data in future planning cycles.

Results from monitoring should be incorporated into any assessment of the need for, and subsequent implementation of necessary revisions and refinement of, vegetation management plans and IVM operations (ROWSC 2014). Management plans should be periodically revised and management activities adjusted based on monitoring and documenting deviations from the management plan, effects of vegetation maintenance activities and other site disturbances, and social and environmental effects of vegetation maintenance activities. Management planning efforts associated with monitoring and evaluation could include (ROWSC 2014):

- 1) continuous improvement policies
- 2) written policy and procedures for monitoring that include performance indicators
- 3) documented changes in management planning based on results from monitoring; and
- 4) new or revised post-treatment protocols, policies and guidelines.

## **Summary**

In general, management plans at a variety of scales are commonly built using a set of elements that are necessary to describe:

WHY management is needed (as stated in mission, goals and objectives)

WHAT the current state of the managed system is versus the desired future state,

HOW, WHEN and WHERE management direction and actions will change or maintain the system so as to create a desired condition

WHAT were the various socioeconomic and environmental consideration used to justify management direction and action

HOW determining accomplishments will occur through monitoring to judge whether or not management worked

These “whys, whats, hows, whens and wheres” can be systematically accounted for by consistently using a set of core elements of management planning and implementation. These core elements are common across many professions and disciplines, and are made readily available in this report so existing vegetation management plans from department of

transportations, from across the country and with a focus on New York State Department of Transportation, can be evaluated for completeness and opportunities for improvement.

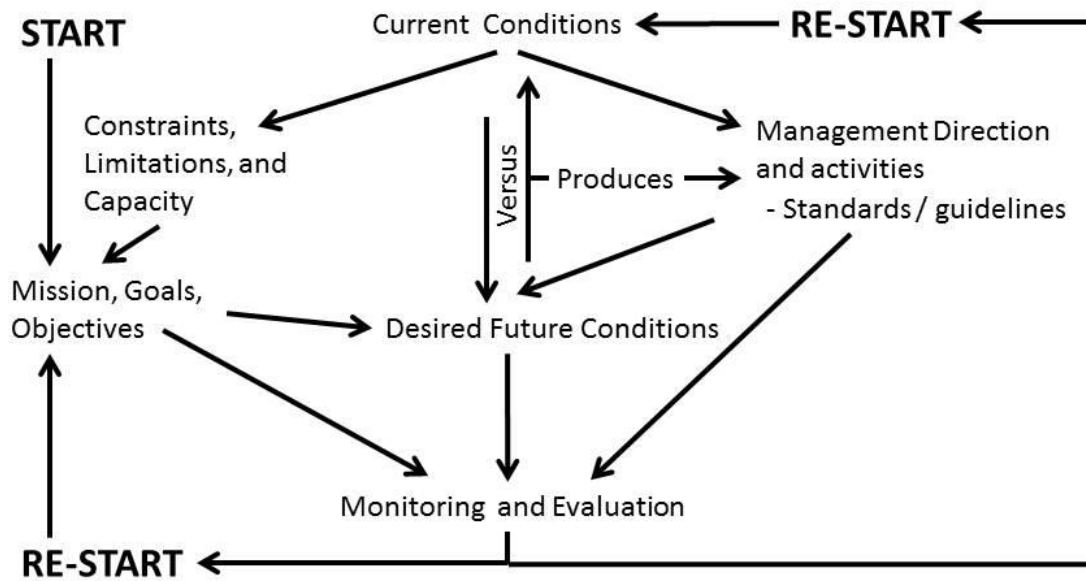


Figure 1. Basic elements used to construct and implement a strategic vegetation management plan that shows the flow (following the arrows) of management planning and implementation over time.

# The process of IVM

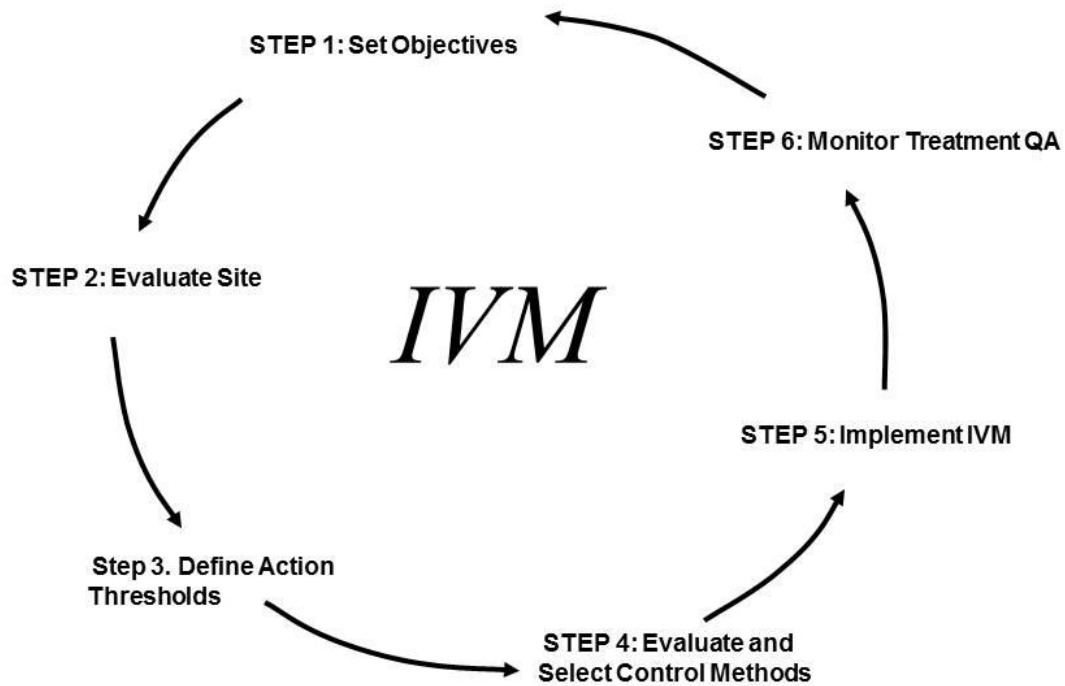


Figure 2. Integrated Vegetation Management flowchart showing the six elements basic to vegetation management planning and implementation for the right-of-way industries (adapted from: ANSI 2012; Miller 2014).

Sidebar 1. Verbatim portrayal of Criterion 4.1 from the ROW Steward Technical Requirement ([www.rowstewardship.org/standards](http://www.rowstewardship.org/standards)).

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## **PRINCIPLE #4: MANAGEMENT PLANNING**

*Documentation of objectives, philosophy, principles, procedures, and practices are critical to long-term, sustainable management, as embodied by various levels of plans, including resource inventories and maps. Program management plans establish goals and objectives and require accountability for both successes and opportunities for improvement. Improvement in maintenance practices is predicated on learning from both successes and opportunities for improvement.*

### **CRITERION 4.1: Strategic Vegetation Management Plan**

The ROW Asset Manager has an established formal written strategic Vegetation Management Program Plan.

Indicator 4.1.a: Supporting documentation is in place that guides IVM program decisions. The Vegetation Management Program Plan at a minimum addresses:

- a. Management policy and objectives
  - b. Description of the ROW resources to be managed (e.g., lengths, maintained width, area, infrastructure attributes)
  - c. Description of the land use classifications of adjacent lands
  - d. Description of the vegetation management tasks and maintenance activities used, based on the ecosystem in question and information gathered through resource inventories
  - e. Maps and/or geospatial record system describing the ROW resource base
  - f. Environmental limitations and safeguards appropriate to the sites and ecosystems that occur on the transmission system
  - g. Plans for conservation of ecosystem services
  - h. A means of monitoring work, including feedback mechanisms for revising procedures as appropriate to more effectively achieve objectives
  - i. Wildfire management plan (as appropriate)
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## **4 MODEL DEPARTMENT OF TRANSPORTATION PLANS FROM ACROSS THE COUNTRY**

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In 2010-2011, SUNY-ESF developed a strategic management plan element checklist for NYSDOT, featuring an earlier version and organization of the six basic elements presented in Section I of this report (Table 1). This checklist was used in this report section to evaluate coverage of basic elements of plans in Department of Transportation strategic plans from across the United States.

A total of 47 strategic plans were found for DOTs across the United States. Eleven of these were focused on vegetation management. Plans were found via Department of Transportation websites as listed on the U.S. Department of Transportation Federal Highway Administration's site: [www.fhwa.dot.gov/webstate.htm](http://www.fhwa.dot.gov/webstate.htm) (accessed in 2010-2011)<sup>2</sup>. Strategic plans from each of the 50 State's DOT websites were searched using the key words: long range plan, statewide, statewide plan, strategic plan, and statewide strategic plan. Vegetation management plans were found using site searches with the key words: rights-of-way, rights-of-way vegetation, rights-of-way vegetation management, and roadside vegetation management.

The researchers undertook their reviews based solely on information found online. State transportation agencies may have other information that is responsive to the needs of a strategic vegetation management plan but because of the quantity of information, it was not possible to follow up with interviews or clarifying questions.

The three most complete strategic vegetation management plans were determined to include plans from the:

- 1) Montana Department of Transportation (MDOT 2012)
- 2) Nebraska Department of Roads (NDOR 2008), and
- 3) Washington State Department of Transportation (WSDOT 2014) (Table 2).

Each plan was re-evaluated in March 2015 using the same checklist of planning elements. Evaluations from 2011 and 2015, of effectively the same plans, were remarkably the same (unpublished data). Two plans (Montana and Washington) were updated since 2011, but apparently did not change much in terms of planning elements. The Nebraska plan was still the version dated back to 2008. Plan evaluations were focused on examining whether or not an

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<sup>2</sup> Disclaimer: the analyses were based on information available from an agencies' website and may not reflect other information and initiatives underway related to strategic planning for vegetation management.

element was used in the plan, judged as: 1) “yes” – met; or 2) “partial” – partially met; or 3) “no” – for not met with reference to use of the element.

In addition to individual plan evaluations, all three plans were generally assessed to summarize strengths (positive planning that could be considered a model for other plans), areas for improvement (usually associated with missing elements), and insights gained from this research. This simple assessment approach follows standard practice (Parker et al. 2001).

## **Evaluation and Assessment of the Montana, Nebraska and Washington State Plans**

Montana’s and Washington State’s strategic plans covered all of the planning elements, at least partially (Table 2). All plans had mission, goals and objectives met, albeit for some plans only partially. “Background” and “Management Issues, / Constraints / Opportunities” (which are part of “Element 3: Context) were either not met (“no”) or only partially met. Consistently, the plans did not present the historical aspects of the roadside system, nor the administrative aspects. “Current Conditions” were all partially met, with strong elemental components of both maps and management zones. No plan presented, at all, the current condition of the vegetation itself. “Desired Future Condition” and “Management Direction” was only a “yes” for being met in the Washington State plan. “Standards and Guidelines” were a “yes” for two of the three plans. “Monitoring” was given short shrift across all of the plans.

In terms of assessment, where the plans were considered for strength, area for improvement, and insight, the three model plans provided the following:

**Strength** – Completeness of the Plans: While no plan was perfectly complete in terms of full accounting of all elements, all three plans had a majority of elements covered, with one plan accounting for all planning elements (at least partially).

**Area for Improvement** – Monitoring: While the “Context, Constraints, Opportunities” elements, which are mostly in the “Background” and “Management Issues / Constraints / Opportunities” part of the evaluation rubric, were consistently a bit short, it is the shortfalls in “Monitoring” that are of most concern. Monitoring is critical nature for organizational accounting and improvement.

**Insight** – the evaluation sheet (rubric) worked: The evaluation sheet was simple to apply. It was reproducible in outcome when applied multiply times. It seemed to work in directly evaluating DOT strategic management plans, which means it should be useful for others in the same vein and could be useful in directing the development or update of a strategic management plan.

A true SII – a Strengths, areas for Improvement, and developed Insights – is geared to be succinct and clear in describing what is the subject is, and why it is important (Parker et al.



2001). While clear in message, it does not allow for all of the new ideas to come forth, particularly in the arena of insights. The following “additional observations” comes from the SII assessment effort of the three most complete strategic vegetation management plans from across the country, and are offered here for possible utility in strategic planning efforts with DOTs.

Objectives are rarely SMART, yet they need to be: Nearly all of the management plan objectives reviewed were written more like goals, and even at that, almost all goals/quasi-objectives were not SMART (Specific, Measureable, Achievable, Relevant, Time-bound). Strong objectives are crucial to evaluate management successes or failure via monitoring. If objectives are not written properly, the chances of an effective monitoring program are greatly reduced.

Regional plans may be where it is at: Washington State DOT did not have a state-wide strategic plan, and instead had plans covering all the agency’s regions. Montana’s statewide plan was divided into sections based on ecoregion. An ecoregion is an area with similar climate, geology, geography, soils, other environmental factors, and with that a shared land use history and contemporary socio-economic pattern. An idea to consider is whether ecoregions may better than “regions” based on other factors such as administration for planning and management).

A Plan does not have to be one document: It is important that the core elements of strategic planning be documented, but not all planning elements must be in one document. While the research work presented in this section was based on looking at three plans as three whole and separate documents, a few of the plans made reference to other documents that could be considered part of the plan. It may be better to organize policy and procedures into separate documents, and then tier these documents to an overall strategic plan.

Strategic plans do not need to be long . . .: Nebraska, Montana and Washington State’s plans were relatively short at 111, 83 and 41 pages in total length. Strategic plans therefore do not need to be tomes to be useful – they just need to adequately cover the primary elements, and may also reference other documents where detail is available as needed.

People write good plans because they have to: All three plans reviewed are from states that mandate that plans be written and available to the public for comment. It is expensive to write plans, and that expense is one reason why they are rare in the public arena (recall only 11 of 50 states had a publicly accessible strategic vegetation management plan). It is likely that most vegetation managers for DOTs (and other like organizations) want to undertake formal, documented planning, but do not have the resources to do it. A legal mandate to plan results in resources being produced to support formal, documented planning. .

## **Evaluation and Assessment of the Montana, Nebraska and Washington State Plans: Summary**

Core elements of planning were assembled into a checklist to both evaluate and assess strategic vegetation management plans for all DOTs across the United States. Three plans were found to be most complete – Montana, Nebraska, and Washington. These three plans could be used as models for other DOTs who do not have complete strategic vegetation management plans.

It is noteworthy that even the three “best” plans could be improved. Improvements are possible in these three plans, especially in the arenas of developing more SMART objectives, providing full management context as a basis for management planning, decision making and implementation, and formalization of a program in monitoring and evaluation.

Table 1. A strategic management plan element checklist used by SUNY-ESF in 2010-2011, and again in 2014-2015, to evaluate coverage of the basic elements of plans in Department of Transportation strategic plans from across the United States.

Evaluation sheet for review of strategic and IVM plans for roadside management					
Document reviewed (citation):					
Author(s):					
Reviewer: C. Nowak, SUNY-ESF					
Date:					
<u>Core element</u>	Presence Yes/No/Partial	Comments:			
<b>Mission / Vision</b>					
- purpose of organization					
<b>Goals</b>					
<b>Objectives</b>					
<b>Background</b>					
- historical / contemporary context of ROW system in environmental and socioeconomic terms					
history of ROW management					
<b>Management Issues / Constraints / Opportunities</b>					
- administration (personnel, machines)					
- laws, regulations, ordinances					
- special, unique features (protection)					
- stakeholders (landowners)					
- legal rights (easements, fee ownership)					
<b>Current Conditions of the ROW System</b>					
- vegetation: maps, management zones					
<b>Desired Future Conditions</b>					
<b>Management Direction</b>					
- schedule, resources					
<b>Standards and Guidelines</b>					
- procedures, management zones					
<b>Monitoring</b>					
General comments:					

Table 2. Recent evaluation of the three most complete Department of Transportation strategic vegetation management plans with specific focus on examining whether or not a core element of planning was used in the plan, judged as: 1) “YES” – met; or 2) “PARTIAL” – partially met; or 3) “NO” – for not met with reference to use of the element.

Core Planning Elements	Organizational Source of Planning Document		
	MDOT 2012	NDOR 2008	WSDOT 2014
<b>Mission / Vision</b>	YES	YES	PARTIAL
- purpose of organization			
<b>Goals</b>	YES	YES	YES
<b>Objectives</b>	YES (PARTIAL)	YES	YES
Background	YES (PARTIAL)	YES (PARTIAL)	NO
- historical / contemporary context of forest system in environmental and socioeconomic terms			
- history of forest management			
<b>Management Issues / Constraints / Opportunities</b>	PARTIAL	YES (PARTIAL)	YES (PARTIAL)
- administration (personnel, machines)			
- laws, regulations, ordinances		x	x
- special, unique features (protection)		X	X
- stakeholders (landowners)			x
- legal rights (easements, fee ownership)			
<b>Current Conditions of the ROW System</b>	PARTIAL	PARTIAL	YES (PARTIAL)
- vegetation: maps, management zones			
<b>Desired Future Condition</b>	NO (PARTIAL)	NO	YES
<b>Management Direction</b>	PARTIAL	NO	YES
- activities, schedule, resources			
<b>Standards and Guidelines</b>	YES	NO	YES
- procedures, management zones			
<b>Monitoring</b>	NO (PARTIAL)	NO	PARTIAL

Management plans evaluated were: MDOT – Montana Department of Transportation, 2012, Statewide Integrated Roadside Vegetation Management Plan; NDOR – Nebraska Department of Roads, 2008, Plans for the Roadside Environment; WSDOT – Washington State Department of Transportation, 2014, Southwest Region, Area 1, Integrated Roadside Vegetation Management Plan, Maintenance Operation.

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# 5 NEW YORK STATE DEPARTMENT OF TRANSPORTATION'S STRATEGIC MANAGEMENT PLAN

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Six core elements of a strategic management plan were established in Section 1. These elements were organized into a management plan checklist and used to show that DOT organizations can produce plans with all of these elements by comparing the checklist to the three best strategic vegetation management plans in the United States (Section 2).

In this section, vegetation management planning documents from NYSDOT were evaluated for coverage of core, basic elements of strategic planning so as to define which elements are being used to guide vegetation management work on roadside rights-of-way, and conversely, define what opportunities for improvement exist.

Comparing the six core elements to NYSDOT revealed a mix of elements that were fully, partially or not covered (see notation in following headings). This evaluation is extended in the following element-by-element account of NYSDOT strategic planning elements.

## **Mission, Goals and Objectives – PARTIAL / NO**

NYSDOT has these core elements partially covered by current planning documents.

- A mission statement is available for the whole organization (found in March 2015 at <https://www.dot.ny.gov/about-nysdot/mission>): *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*; there is no publicly available mission statement for the vegetation management program.
- NYSDOT's vegetation manager for maintenance (J. Rowen) stated the mission of the vegetation management program is: *"to provide a roadside environment that is safe, environmentally friendly and appears as though it is being managed by nature"* (AASHTO 2011).
- Goals for vegetation management are stated as "objectives" in NYSDOT's Environmental Handbook for Transportation Operations (NYSDOT 2011). NYSDOT states that they manage *"vegetation on State highway rights-of-way (ROW) for the following safety, environmental, and infrastructure management objectives (sic, should be "goals")*:
  - 1) *Provide motorists with adequate site distances*;

- 2) *Control visibility of signs and guiderails;*
  - 3) *Prevent the presence of deadly fixed objects (usually trees that may impact cars that leave the roadway);*
  - 4) *Control the introduction and spread of invasive plant species and noxious plants;*
  - 5) *Maintain pavement by controlling drainage problems; and*
  - 6) *Prevent pavement breakage by plants.*
- Objectives for vegetation management are implied via general, written descriptions of desired conditions of vegetation for various right-of-way management zones in NYSDOT's Integrated Vegetation Management practice and procedure document (NYSDOT undated).

### **Desired Future Condition – YES (PARTIAL)**

NYSDOT has this core element covered by current planning documents.

- Recommended tolerance levels are clearly presented in NYSDOT's Integrated Vegetation Management practice and procedure document (NYSDOT undated). Three different management zones that comprise the roadside right-of-way have descriptions of type, size and abundance of vegetation that can be tolerated.
- NYSDOT *Environmental Handbook for Transportation Operations* (NYSDOT 2011) includes a short section on tolerance levels.

### **Constraints, Limitations and Capacity – NO (PARTIAL)**

- NYSDOT does not have many of these core elements, including missing information on historical and contemporary context, ownership status, and environmental, social, and administrative accounts.
- An account of laws and regulations, albeit only partial, is presented in NYSDOT's *Environmental Handbook for Transportation Operations* (NYSDOT 2011).
- Maps do exist at the regional and residency levels that show the roads system in the context of coarse sociopolitical and environmental (especially water resources situations).

### **Current Conditions – NO**

NYSDOT does not cover this core element in current, state-level planning documents.

NYSDOT has information on identified hazardous trees, maintained at local levels of organization (residencies). Invasive species infestations is developed in the regions, and maintained at the main office in Albany, but has not been organized at the state level.

## **Management Direction Activities (including standards and guidelines) – YES**

Management actions and directions are presented in various documents, including information on mowing, herbicides, alternatives to mowing, cultural/biological resources, and hazardous trees.

- The Maintenance Asset Management Information System, or MAMIS, is a work management process organized around the creation of a to-do list called “Needs”, the assignment of selected work to either State Maintenance Forces or Contractors for completion, and the reporting of what was accomplished by location or asset (the later also covers in part “monitoring”) (Wilcox 2003). MAMIS promotes the structuring and automating of managing day-to-day, cyclical and seasonal work, and associates that work with particular sections of highway or other State assets. This standardized structure for managing work across the State’s Maintenance Program provides a foundation for both the management and analysis pieces of infrastructure asset management.
- Vegetation management practice is guided conceptually and procedurally in NYSDOT’s document entitled: *New York State Department of Transportation’s Integrated Vegetation Management Program, An Application of Integrated Pest Management (IPM) for Control of Vegetation Along Highway Rights-of-Way* (NYSDOT undated). This document, which is circa late 1990s, presents vegetation management of roadside rights-of-way as following an Integrated Pest Management, or IPM, system, with the following classic IPM system components prescribed for NYSDOT: prevention, monitoring, threshold establishment, control methods, and evaluation. In total, this document is more in line with a “standard and guideline”, and while a bit dated, still functions to conceptually and practically guide roadside right-of-way vegetation management activity.
- NYSDOT *Environmental Handbook for Transportation Operations* (NYSDOT 2011) is a standards and guidelines document that provides (p. 7) “NYSDOT personnel with general awareness and guidance of the primary requirements that apply to the types of activities conducted by NYSDOT operations.” These operations are one of two types: 1) work conducted along the right-of-way; and 2) facilities-based activities conducted at a residency or shop; it is the former that is most associated with vegetation management. Under the heading “General Work on the Right-of-Way”, the document covers the procedural aspects of working in / near state- and federally-designated wetlands and cultural resources, among other aspects. Under the heading “Highway Maintenance Operations”, various procedural aspects are presented for the areas of mowing,

herbicides, alternative to herbicides, cultural and biological treatments, hazard tree management, wildlife, litter control and environmental stewardship.

- Transportation Maintenance Instruction (TMI) 14-01, *Mowing Guidelines*, establishes the Department's current policy for roadside mowing and is based on maintaining highway safety and mowing functionality. It includes specific information on the: extent, frequency and timing of mowing; operational and environmental considerations relevant to most mowing operations; and considerations for controlling vegetation in locations that are not mowable.

### **Monitoring and Evaluation – YES (PARTIAL)**

NYSDOT has some planning effort in monitoring and evaluation.

- NYSDOT does have an annual roadside quality assurance program, but documentation of policy, procedure and outcomes are not available at a state-level.
- Work accomplishment information is collected and internally reviewed using the MAMIS system (NYSDOT's computerized work and accomplishment reporting system).

### **Summary**

In comparing NYSDOT planning documents versus the core element checklist developed in this study, it was found that strategic vegetation management planning was relatively strong compared to other DOTs (see results from Section 2). NYSDOT has strong planning components in place for management direction and activity, including standards and guidelines. NYSDOT also has some important elements of planning in place for both "desired condition" and "monitoring" elements. This coverage of planning elements is similar to other DOTs across the country.



## 6 STATEMENT ON IMPLEMENTATION

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NYSDOT vegetation management plans are consistent with all of the “best” plans examined from across the United States. There are areas where improvement is possible - - as is possible with the strategic vegetation management plans of other DOTs. These include the following:

- Clearer and more complete statements on mission, goals and objectives, and particularly a need to separate goals from objectives, and to produce objectives that are SMART (specific, measurable, achievable, relative and time-bound);
- Fuller portrayals of “constraints, limitations and capacity” of the right-of-way system; and
- Accessible documentation of the current state of the right-of-way system, including both environmental and socioeconomic descriptions at regional and state scales.

A variety of published sources are available to aid NYSDOT and other DOTs in their development and presentation of these missing or partially fulfilled elements of planning, including the DOT vegetation management plans from Montana, Nebraska and Montana (see Section 2). The National Forest Systems planning at all levels, including strategic, is excellent and is probably the best model of natural resources management planning in the world (see, for example, the recent Land and Resource Management Plan from the Allegheny National Forest; ANF 2007). While National Forests are not roadside rights-of-way, much can be learned by comparing and contrasting what has been done with plan writing on National Forest with what can be done with DOTs. A variety of DOT-specific “how to plan” documents are available from various national organizations, with the following three found useful in the current study:

1. American Association of State Highway and Transportation Officials’ (AASHTO 2011) *Guidelines for Vegetation Management*;
2. Minnesota Department of Transportation’s (Johnson 2008) *Best Practices Handbook for Roadside Vegetation Management*; and
3. National Roadside Vegetation Management Association’s (NRVMA 1997) *How to Develop and Implement an Integrated Roadside Vegetation Management Program*.

Planning takes time and effort, and presents the developer with all the exposure and challenges from being open and accountable for decision making and planning with vegetation management. Yet, a complete plan with all elements —or as many elements as possible — developed and codified in writing is an important tool. It helps focus agency management and staff on constraints and opportunities with vegetation work and to have a shared understanding

of the future. It provides a tool for communicating vegetation management goals and objectives with stakeholders. It demonstrates that an organization is progressive and sustainable. It is only with this effort that the full benefits of planning can be secured.

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