

# INVASIVE PLANT MANAGEMENT DECISION ANALYSIS TOOL

## PROJECT COVER SHEET

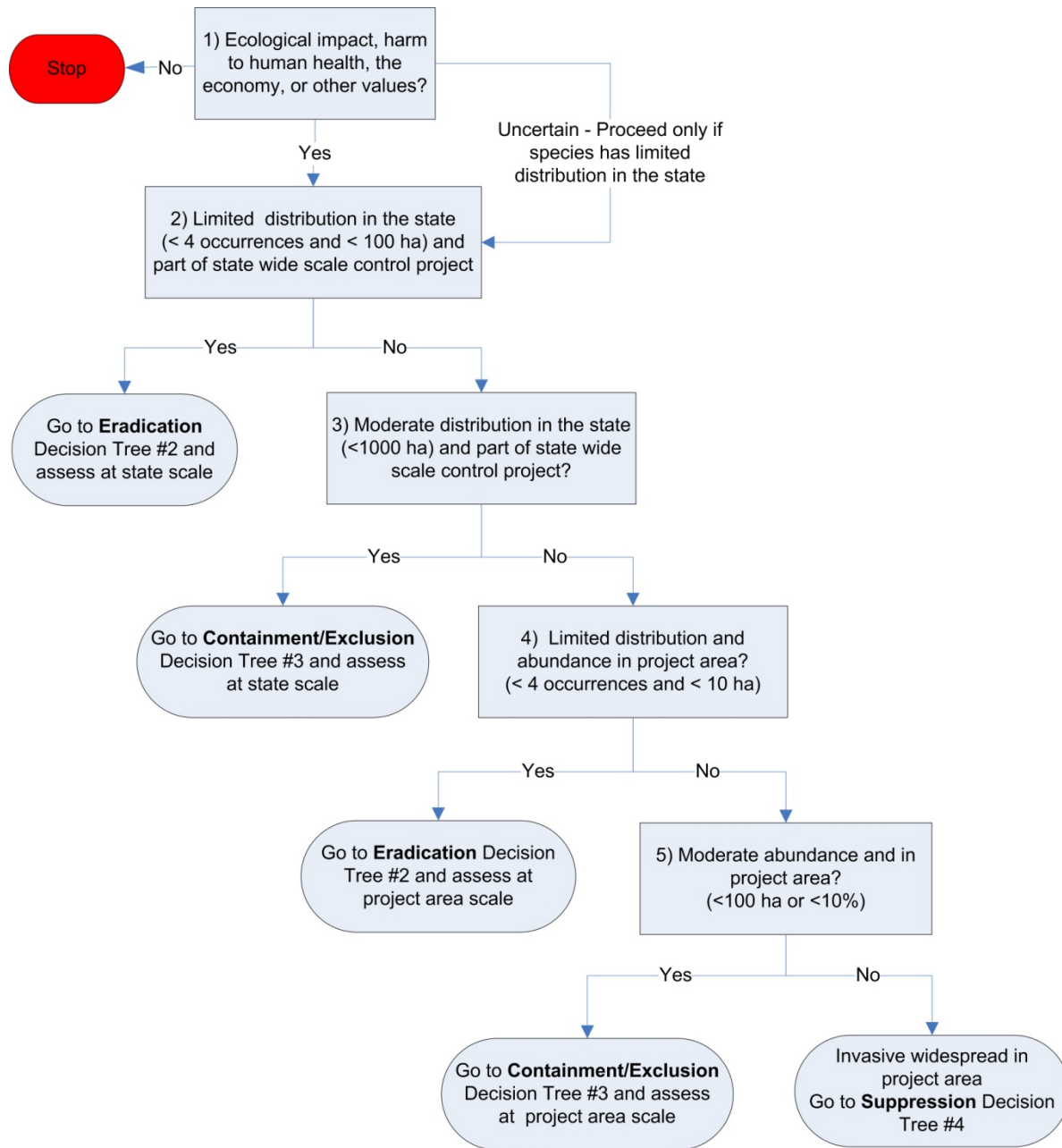
<b>Project Summary</b>			
Scientific name: _____			
Common name(s): _____			
Scale (See Figure 1, page 2) _____			
PRISM or Weed Management Area _____			
Conservation target impacted: _____			
Project area (site) name and size: _____			
Property owner(s) _____			
IPMDAT date assessed: _____			
Assessors: _____			
Reviewers (if peer review required): _____			
<b>Part 1 - Decision Analysis Summary</b> (Refer to completed worksheets)			
<b>Control Decision</b>			
<input type="checkbox"/> Proceed (project feasible and warranted)		<input type="checkbox"/> Stop (project not feasible and/or warranted)	
<input type="checkbox"/> Peer Review (project feasibility uncertain)		<input type="checkbox"/> Stop (secure sustainable funding source)	
<b>Total Project Cost:</b>			
<b>Project Timeframe</b>	Years:	From:	To:
<b>Distribution and Abundance:</b> (Obtain from Strategy Selection Worksheet questions)			
Total gross invaded area:		(hectares)	(acres) (square meters)
Total number of occurrences:			
<input type="checkbox"/> Limited in the state (question 1.2)		<input type="checkbox"/> Limited in project area <sup>b</sup> (question 1.4)	
<input type="checkbox"/> Moderate in the state (question 1.3)		<input type="checkbox"/> Moderate in project area <sup>b</sup> (question 1.5)	
<input type="checkbox"/> Widespread in the state (question 1.3)		<input type="checkbox"/> Widespread in project area <sup>b</sup> (question 1.5)	
<b>Control Strategy Selected:</b>			
<input type="checkbox"/> Eradication at state scale		<input type="checkbox"/> Containment/Exclusion in project area	
<input type="checkbox"/> Containment at state scale		<input type="checkbox"/> Suppression	
<input type="checkbox"/> Eradication in project area scale			
<b>Project Goal:</b> (Desired outcome)			

<b>Ecological Impact or Harm to other Values:</b> (Obtain from Strategy Selection Worksheet question 1.1)  
<b>Treatment Type:</b> <input type="checkbox"/> Manual <input type="checkbox"/> Herbicide <input type="checkbox"/> Mechanical <input type="checkbox"/> Biological Control
<b>Treatment Description:</b>  
<b>Cause of Invasion:</b> (What is the likely cause of the invasion? Is the cause persistent and likely to lead to reinvasion?)  
<b>Additional Information:</b> (History of the species in the project area, vector of the species, etc.)  

<b>Part 2 – Measuring Success and Restoration Needs</b> (Complete if project proceeding or if peer review)
<b>Monitoring Plan Description:</b> (Briefly describe methods, analysis and timeline. Attach monitoring plan)  
<b>Control Objective:</b> (i.e. Reduce stem density by 95% by 2020)  
<b>Restoration Needs:</b> (Is active restoration necessary? Attach restoration plan if applicable)  

## Tree 1. Strategy Selection Decision Tree.

Use with associated worksheet.



\* Project area is defined as local, landscape, or PRISM scale.

## Strategy Selection Worksheet

Use with Strategy Selection Decision Tree (Tree 1)

1.1	<p>Does the species cause significant ecological impact, harm to human health, the economy, or other values?</p> <ul style="list-style-type: none"><li>▪ Enter the total NYS Ecological Impact point score below from Section 1 of the appended New York State Ranking System for Evaluating Non-Native Plant Species for Invasiveness (Jordan et al. 2011 at <a href="http://nyis.info/Resources/IS_Risk_Assessment.aspx">http://nyis.info/Resources/IS_Risk_Assessment.aspx</a>). Species with a score of either 7 or 10 for at least one question in Section 1 meet ecological impact criteria.</li><li>▪ If the species has not been assessed for NYS, use assessments from other states in the northeast, or other suitable information. Explain in the Documentation box below and attach supporting documents.</li><li>▪ If impacts to other values (e.g. human health, the economy, etc.) explain in the Documentation box below and attach supporting documents.</li></ul>
<input type="checkbox"/>	1a Significant ecological impact - If the score for any of the four questions 1.1 through 1.4 in NYS ranking form was 7 or 10 points, then go to 1.2.
<input type="checkbox"/>	1b Ecological impact uncertain - If total score for Section 1 of the NYS ranking form was at least 9 but no question scored 7 points. Go to 1.2 only if the species has a limited distribution in state.
<input type="checkbox"/>	1c Negligible impact or harm - If total score for Section 1 of the NYS ranking form was <7, then stop.
<input type="checkbox"/>	1d Significant harm to human health, the economy, or other values.
Total NYS Ecological Impact Score: (maximum 40 points possible)	
Documentation:	

1.2	Does the invasive plant have limited distribution and abundance in the state (< 4 occurrences and < 100 gross hectares (247 acres) and part of a statewide initiative?
<input type="checkbox"/> If “Yes” go to Eradication Decision Tree (Tree 2) and assess at state scale. <input type="checkbox"/> If “No” go to 1.3.	
Documentation:	

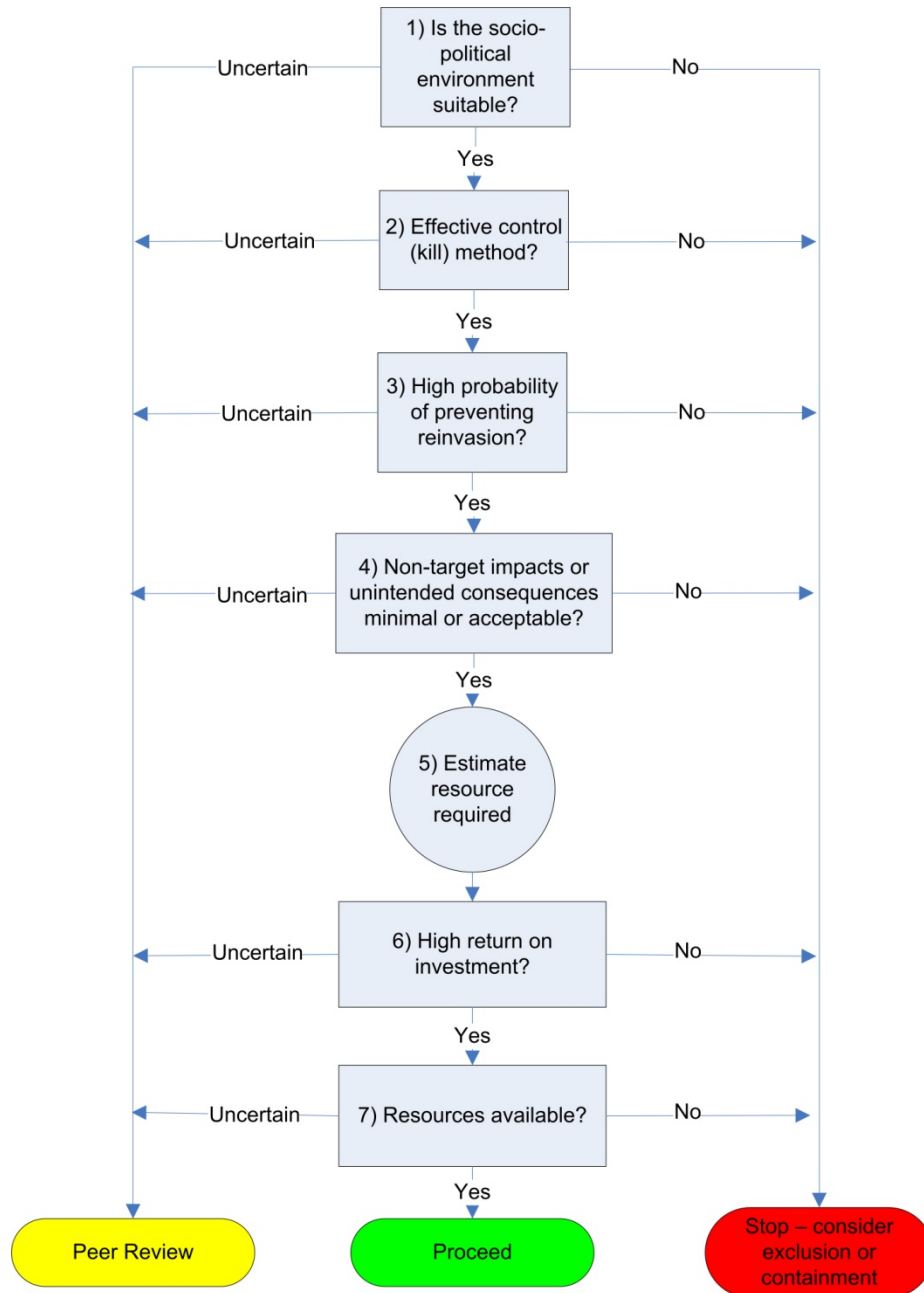
1.3	Does the invasive plant have moderate abundance in the state (<1,000 gross hectares (2,471 acres) and part of a statewide initiative?
<input type="checkbox"/> If “Yes” go to Containment Decision Tree (Tree 3) and assess at the state scale. <input type="checkbox"/> If “No” invasive plant widespread across the state or not part of statewide initiative, go to 1.4 and assess distribution at project area scale.	
Documentation:	

1.4	Does the invasive plant have limited distribution and abundance in project area (< 4 occurrences or < 10 gross hectares (24.7 acres)?
<input type="checkbox"/> If “Yes” go to Eradication Decision Tree (Tree 2) and assess at the project area scale. <input type="checkbox"/> If “No” go to 1.5.	
Documentation:	

1.5	Invasive plant has moderate abundance in the project area (<100 gross hectares (247 acres) or covers <10 % of project area (if project area is <1,000 acres).
<input type="checkbox"/>	If “Yes” go to Containment/Exclusion Decision Tree 3 and assess at the project area scale.
<input type="checkbox"/>	If “No” invasive plant widely distributed, go to Suppression Decision Tree 4 and assess at the project area scale.
Documentation:	

**Tree 2. Eradication Decision Tree - State and Project Scale Assessments**  
 (Adapted from Panetta and Timmins, 2004). Use with associated worksheet.

The goal of eradication is to eliminate all individuals and the seed bank with the low likelihood of needing to address the species in the future.



## Eradication Worksheet

Use with Eradication Decision Tree (Tree #2) at the state or Project Scale

<b>2.1</b>	<b>Is the social-political environment suitable?</b> Is social resistance to eradication expected? Within the invaded area, do all the agencies, organizations and/or landowners agree to participate?
<input type="checkbox"/> If “Yes” go to 2.2. <input type="checkbox"/> If “No” do not proceed. Consider containment (Decision Tree 3). <input type="checkbox"/> If “Uncertain” initiate peer review process and go to 2.2.	
Comments:	

<b>2.2</b>	<b>Effective control (kill) method available?</b> Is there a method available to kill the plant, prevent reproduction and eliminate seed bank within 10 years? Species with seeds (or vegetative propagules) that remain viable in soil for more than 10 years may not be able to be eradicated. Document the type of treatment that is anticipated to be used. Refer to NYS Plant Ranking System (Jordan et al. 2011) questions 4.1 and 4.3.
<input type="checkbox"/> If “Yes” go to 2.3. <input type="checkbox"/> If “No” do not proceed. Consider containment (Decision Tree 3). <input type="checkbox"/> If “Uncertain” initiate peer review process and go to 2.3.	
Documentation:	



2.3 High probability of preventing reinvasion?

A. Are spread prevention measures (i.e. inspections, cleaning stations, regulations, sanitation protocols and/or focused education efforts), early detection, and rapid response program underway and funded for 2 years?

B<sup>1</sup>. If assessing feasibility of eradication at the *state scale*, is the species not likely to reach state within 10 years determined by the predicted spread of the species from the nearest known occurrence?

B<sup>2</sup>. If assessing feasibility of eradication at the *project scale*, is the species not likely to reach the project area within 10 years determined by the predicted spread of the species from the nearest known occurrence?

Preventing reinvasion may be difficult if the species has the potential to spread rapidly (abundant reproduction (vegetative or by seed) and/or long distance or human dispersal including commercial sale) and/or if the initial cause of the invasion persists (e.g. regular natural or human disturbance or road runoff). Refer to NYS Plant Ranking System (Jordan et al. 2011) questions 2.1, 2.2 and 2.3 for guidance.

☐ If “Yes” to both A and B go to 2.4.

☐ If “No” do not proceed. Consider exclusion or containment (Decision Tree 3).

☐ If “Uncertain” initiate peer review process and go to 2.4.

Documentation:

2.4	Is the risk low that the proposed control action could result in a non-target impact or unintended consequences that are unacceptable to the land manager, stakeholders or the public? For example, long-term damage to native plants; chemical contamination of soil, surface water or groundwater; removal of important habitat for wildlife that cannot easily be replaced; another invasive species replaces the one that was removed; or native plants are exposed to high deer herbivory.
<input type="checkbox"/> If “Yes” go to 2.5. <input type="checkbox"/> If “No” do not proceed. <input type="checkbox"/> If “Uncertain” initiate peer review process and go to 2.5.	
Documentation:	

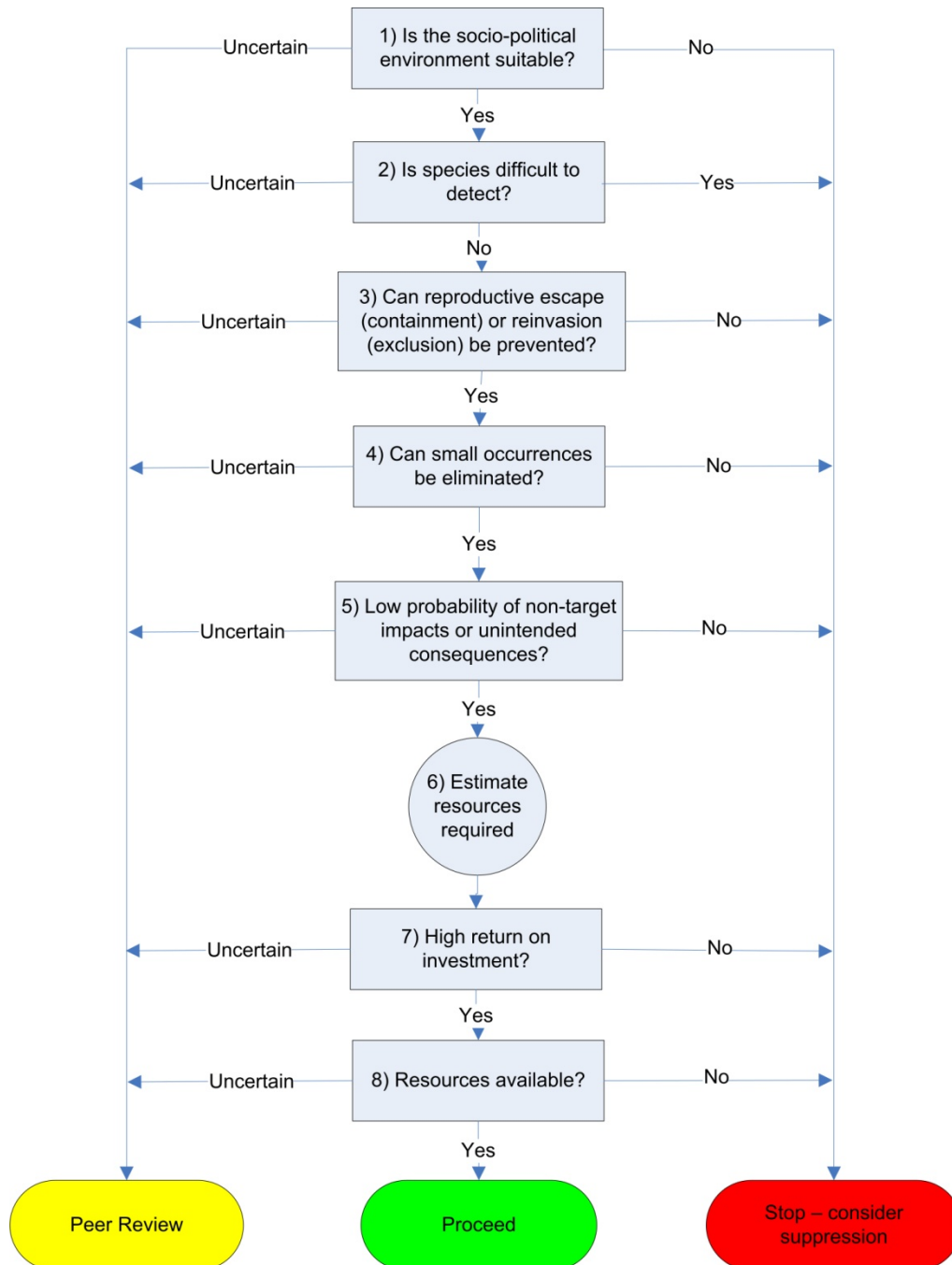
2.5	Estimate resources required to achieve eradication. Complete eradication effort scoring system (See Appendix I), estimate project cost, and then proceed to Question 2.6. Eradication effort is calculated by multiplying the gross infested area times the impedance factor score (Eradication effort = gross infestation area x impedance score). See Appendix III for a budget worksheet. Cost estimate should include resources required for early detection survey work.	
Gross infestation area =		Impedance score =
Eradication effort =		Estimated project cost = \$
Comments:		

<p><b>2.6</b> Is there a high return on investment?</p> <p>Compare estimated invasive plant control project cost (Question 2.4) to conservation benefits of maintaining/restoring conservation target. See Figure 2 on page 7 and associated text for guidance on determining conservation benefit and return on investment. In general, high cost projects with low conservation benefit should not proceed.</p>
<p><input type="checkbox"/> If “Yes” go to 2.7.</p> <p><input type="checkbox"/> If “No” do not proceed. Consider containment (Decision Tree 3).</p> <p><input type="checkbox"/> If “Uncertain” initiate peer review process and go to 2.7.</p>
<p>Comments:</p>

<p><b>2.7</b> Resources available?</p> <p>Funding for core operations is secure for at least two years, and the project has undertaken the necessary financial planning and achieved partial success in developing sources of long-term funding to sustain core costs for the next 5 years.</p>
<p><input type="checkbox"/> If “Yes” Proceed – complete coversheet parts 1 and 2.</p> <p><input type="checkbox"/> If “No” do not proceed with implementation. Complete part 1 of the coversheet and secure sustainable funding source.</p> <p><input type="checkbox"/> If “Uncertain” initiate peer review process and complete coversheet parts 1 and 2.</p>
<p>Comments:</p>

**Tree 3. Containment/Exclusion Decision Tree - State and Project Scale assessments**  
 Adapted from Panetta and Timmins, 2004). Use with associated worksheet.

The goal of containment or exclusion is to prevent infestations that cannot be eradicated from spreading into the uninvaded areas.



### Containment/Exclusion Worksheet

Use with Containment Decision Tree (Tree #3), at the State or Project Scale

<b>3.1</b>	<b>Social-political environment suitable?</b> Is social resistance to control expected? Within the containment area, do all the agencies, organizations and/or landowners agree to participate?
<input type="checkbox"/> If "Yes" go to 3.2. <input type="checkbox"/> If "No" do not proceed. Consider suppression if applicable (Decision Tree 4). <input type="checkbox"/> If "Uncertain" initiate peer review process and go to 3.2.	
Comments:	

<b>3.2</b>	<b>Is the invasive plant species difficult to detect?</b> Is the species always inconspicuous within the matrix vegetation (non-emergent with non-distinct features)? See Panetta and Timmins (2004) for addition information on detection.
<input type="checkbox"/> If "No" go to 3.3. <input type="checkbox"/> If "Yes" do not proceed. Consider suppression if applicable (Decision Tree 4). <input type="checkbox"/> If "Uncertain" initiate peer review process and go to 3.3.	
Documentation:	

<p><b>3.3</b> Can reproductive escape (containment) or reinvasion (exclusion) of the invasive species be prevented or greatly reduced?</p> <p>A. Are spread prevention measures (i.e. inspections, cleaning stations, regulations, sanitation protocols and/or focused education efforts) and/or early detection/rapid response program underway and funded for 2 years?</p> <p>B. Can infestations in or surrounding the project area that cannot be killed (due to size etc.) be managed to prevent or greatly reduce seed production and dispersal or can new occurrences be eliminated as quickly as they are established?</p> <p>Preventing reproductive escape may be difficult if the species has abundant reproduction (vegetative or by seed) and/or long distance or human dispersal. Refer to NYS Plant Ranking System (Jordan et al. 2011) questions 2.1, 2.2 and 2.3 for guidance.</p>
<p><input type="checkbox"/> If “Yes” to both A and B go to 3.4.</p> <p><input type="checkbox"/> If “No” do not proceed. Consider suppression if applicable (Decision Tree 4).</p> <p><input type="checkbox"/> If “Uncertain” initiate peer review process and go to 3.4.</p>
<p>Documentation:</p>

<p><b>3.4</b> Can small satellite occurrences be control (killed)?</p> <p>Is there a method available to kill small patches (i.e. 0.25 hectare) (0.62 acres) of the invasive and eliminate the seed bank within 10 years? (Refer to NYS Plant Ranking System (Jordan et al. 2011) questions 4.1 and 4.3)</p> <p>Satellite occurrences must be eradicated at a rate faster than they occur. Document the type of treatment that is anticipated to be used.</p>
<p><input type="checkbox"/> If “Yes” go to 3.5.</p> <p><input type="checkbox"/> If “No” do not proceed. Consider suppression if applicable (Decision Tree 4).</p> <p><input type="checkbox"/> If “Uncertain” initiate peer review process and go to 3.5.</p>
<p>Documentation:</p>

3.5	Is the risk low that the proposed control action could result in a non-target impact or unintended consequences that are unacceptable to the land manager, stakeholders or the public? For example, long-term damage to native plants; chemical contamination of soil, surface water or groundwater; removal of important habitat for wildlife that can't easily be replaced; another invasive species replaces the one that was removed; or native plants are exposed to high deer herbivory.
<input type="checkbox"/> If "Yes" go to 3.6. <input type="checkbox"/> If "No" do not proceed. Consider suppression if applicable (Decision Tree 4). <input type="checkbox"/> If "Uncertain" initiate peer review process and go to 3.6.	
Documentation:	

3.6	Estimate required resources to fund containment program. Estimate containment/exclusion program cost for five years and then proceed to question 3.7 (See Appendix III for a budget worksheet). When estimating the cost of containment, assessors need to recognize that resources will be required in perpetuity for early detection and rapid response. Cost estimate should include resources required for early detection surveys, monitoring and control of satellite occurrences. For containment programs at the state, PRISM, Weed Management Area or landscape scale, consider completing the control effort scoring system to estimate resources required (See Appendix II).
Estimated project cost: \$	
Comments:	

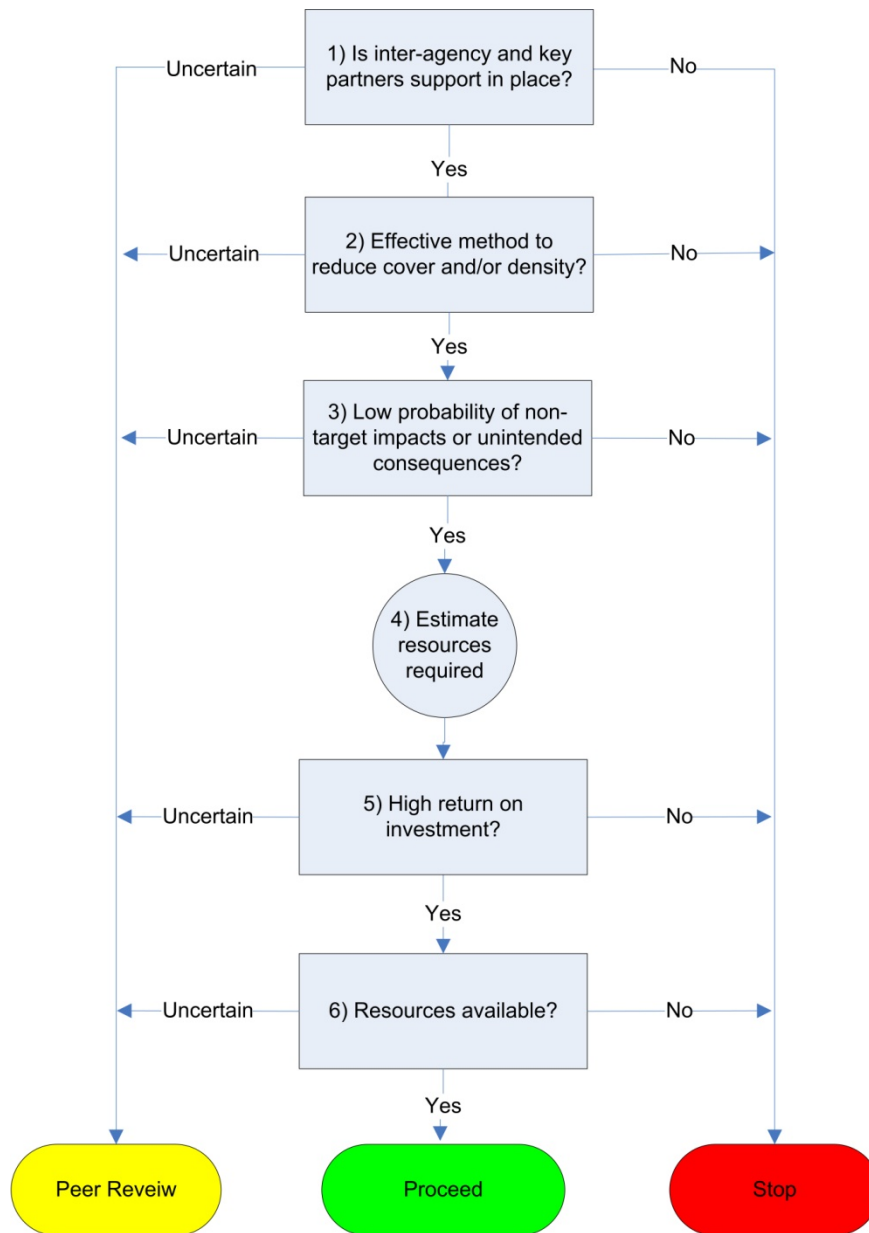
<p><b>3.7</b>    Is there a high return on investment?</p> <p>Compare estimated invasive plant control project cost (Question 3.5) to conservation benefits of maintaining/restoring conservation target. See Figure 2 on page 7 and associated text for guidance on determining conservation benefit and return on investment. In general, high cost projects with low conservation benefit should not proceed.</p>
<p><input type="checkbox"/> If “Yes” go to 3.8.</p> <p><input type="checkbox"/> If “No” do not proceed. Consider suppression if applicable (Decision Tree 4).</p> <p><input type="checkbox"/> If “Uncertain” initiate peer review process and go to 3.8.</p>
<p>Comments:</p>          

<p><b>3.8</b>    Are resources available?</p> <p>Funding for core operations is secure for at least two years, and the project has undertaken the necessary financial planning and achieved partial success in developing sources of long-term funding to sustain core costs for the next 5 years.</p>
<p><input type="checkbox"/> If “Yes” Proceed - complete coversheet parts 1 and 2.</p> <p><input type="checkbox"/> If “No” do not proceed with implementation. Complete part 1 of the coversheet and secure sustainable funding source.</p> <p><input type="checkbox"/> If “Uncertain” initiate peer review process and complete coversheet parts 1 and 2.</p>
<p>Comments:</p>          



#### Tree 4. Suppression Decision Tree.

The goal of suppression is to reduce the cover and/or density of an invasive plant below a threshold that mitigates ecological impacts or other harm.



## Suppression Worksheet

Use with Suppression Decision Tree (Tree #4) at Project Scale

4.1	Is key partner and landowner support in place? Do all the agencies, organizations and/or landowners in the conservation area agree to participate (sufficient participation to maintain conservation target)?
<input type="checkbox"/> If “No” do not proceed. <input type="checkbox"/> If “Yes” go to 4.2. <input type="checkbox"/> If “Uncertain” initiate peer review process and go to 4.2.	
Comments:	

4.2	Is there an effective control method to reduce cover and/or density? Technology available to adequately suppress occurrence in perpetuity? Can species cover and density be maintained below threshold that will mitigate ecological impact to conservation target? Document the type of treatment that is anticipated to be used.
<input type="checkbox"/> If “Yes” go to 4.3. <input type="checkbox"/> If “No” do not proceed. <input type="checkbox"/> If “Uncertain” initiate peer review process and go to 4.3.	
Documentation:	

4.3	Is the risk low that the proposed control action could result in a non-target impact or unintended consequences that are unacceptable to the land manager, stakeholders or the public? For example, long-term damage to native plants; chemical contamination of soil, surface water or groundwater; removal of important habitat for wildlife that can't easily be replaced; another invasive species replaces the one that was removed; or native plants are exposed to high deer herbivory.
<input type="checkbox"/> If "Yes" go to 4.4. <input type="checkbox"/> If "No" do not proceed. <input type="checkbox"/> If "Uncertain" initiate peer review process and go to 4.4.	
Documentation:	

4.4	Estimate resources required to fund suppression project. Estimate suppression project cost for five years and then proceed to question 4.5 (See Appendix III for a budget worksheet). When estimating cost, assessors need to recognize that resources will be required in perpetuity unless the species can be brought under effective biological control. Cost estimate should include monitoring and active restoration if needed.
Estimated project cost: \$	
Comments:	

**4.5 Is there a high return on investment?**

Compare estimated invasive plant control project cost (Question 4.4) to conservation benefits of maintaining/restoring conservation target. See Figure 2 on page 7 and associated text for guidance on determining conservation benefit and return on investment. In general, high cost projects with low conservation benefit should not proceed.

- ☐ If “Yes” go to 4.6
- ☐ If “No” do not proceed.
- ☐ If “Uncertain” initiate peer review process and go to 4.6.

Source of information:

**4.6 Are resources available?**

Funding for core operations is secure for at least two years, and the project has undertaken the necessary financial planning and achieved partial success in developing sources of long-term funding to sustain core costs for the next 5 years.

- ☐ If “Yes” Proceed - complete coversheet parts 1 and 2.
- ☐ If “No” do not proceed with implementation. Complete part 1 of the coversheet and secure sustainable funding source.
- ☐ If “Uncertain” initiate peer review process and complete coversheet parts 1 and 2

Source of information:

## WORKSHEET INSTRUCTIONS

The IPMDAT is comprised of a strategy selection decision tree and three control strategy decision trees (eradication, containment/exclusion and suppression). The assessor(s) should first fill in the project description information on the project cover sheet. Next, use the strategy selection decision tree and worksheet to determine the appropriate control strategy based on the species distribution and abundance. Then use the appropriate control strategy decision tree following instructions on the associated worksheet.

Use the best available information to answer each question thoroughly (cite references when appropriate). Record answers using worksheet check boxes and spaces provided for documentation. Extensive information on ecological impacts, biological characteristics, distribution and control effectiveness has been compiled on NYS non-native plant invasiveness ranking forms for 178 species (Jordan et al. 2011 at [http://nyis.info/Resources/IS\\_Risk\\_Assessment.aspx](http://nyis.info/Resources/IS_Risk_Assessment.aspx)), TNC's element stewardship abstracts (<http://www.invasive.org/gist/esadocs.html>), and Nature Serve assessments

The IPMDAT has four possible outcomes: 1) Proceed with implementation – project has a high probability of success, has conservation (or other) value, and is cost effective; 2) Stop – secure sustainable funding source; 3) Stop - control not feasible and/or not warranted; or 4) Peer-review required – feasibility and/or conservation value is uncertain (See below for additional information).

Complete the IPMDAT in the following order: 1) project summary section on the cover sheet, 2) worksheets, 3) Part 1 of the coversheet, and if the analysis indicates that the project should proceed or that a peer-review is required, complete Part 2 of the coversheet and assemble a project package that includes the following plus any pertinent maps or references:

1. Coversheet
2. Strategy selection and control strategy worksheets
3. Eradication effort scoring form (if applicable)
4. Budget
5. Monitoring plan
6. Restoration plan (if applicable)
7. NYS and PRISM ranking forms for the invasive plant species
8. Outcome of peer review (if peer review is needed)

If a peer review is needed, the review should consider the following questions:

1. Review the decision tree criteria. Is the information presented complete?
2. Are there partner contributions to the project?
3. How does the project rank in relation to other priorities?
4. Estimate the cost and consequences of not undertaking or completing the control project. What would be the impact on the conservation target of not acting? Would the target persist? In what condition? What other targets or values would be compromised?
5. Can the control project be sustained until completion given current and potential future resources?