Rare Plant Propagation and Reintroduction

Questions and Considerations for Natural and Historic Resources Lands in New Jersey

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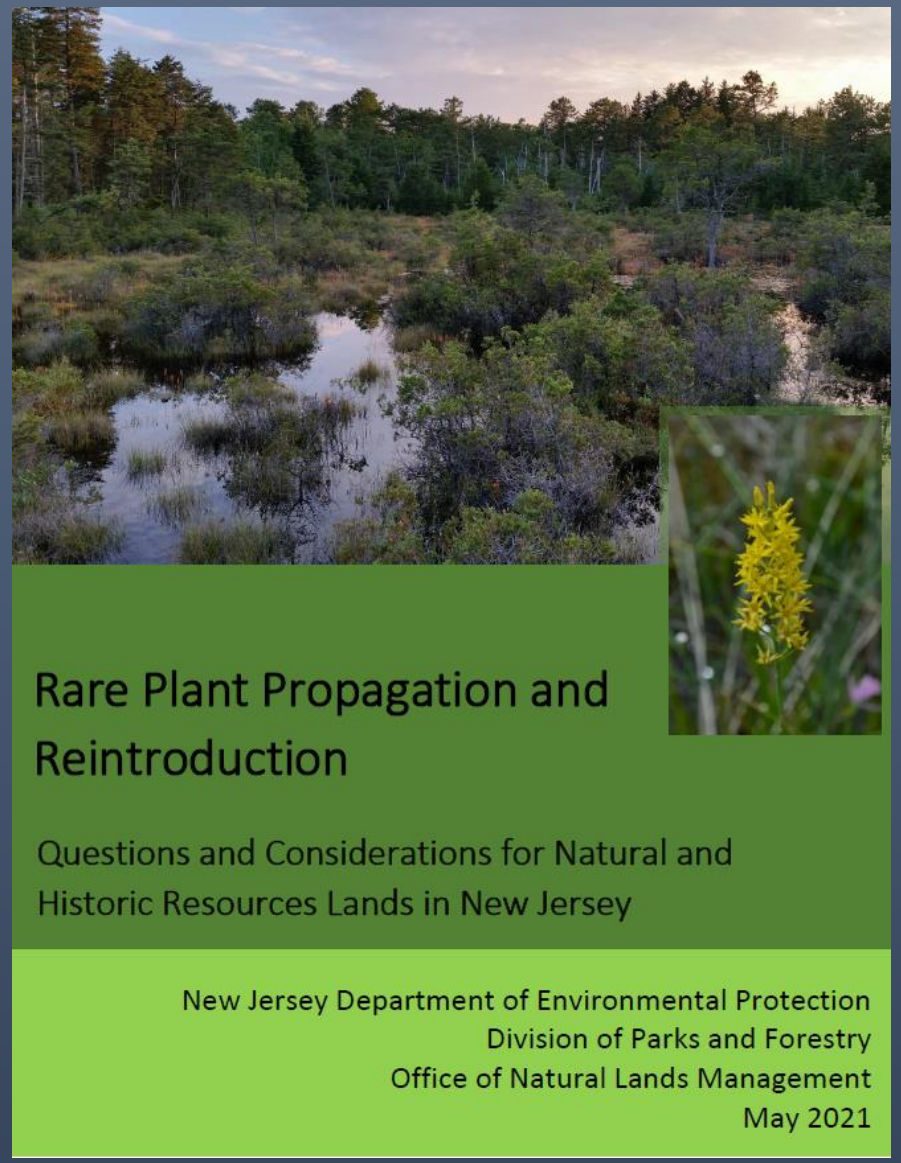
Hammond's Yellow Spring Beauty (*Claytonia virginica* var. *hammondiae*)

Photo by J. Hafstad

Report Overview

- Risks, challenges, and benefits
- Concerns and considerations identified in the current scientific literature
- Details of many examples
- Report is available online:

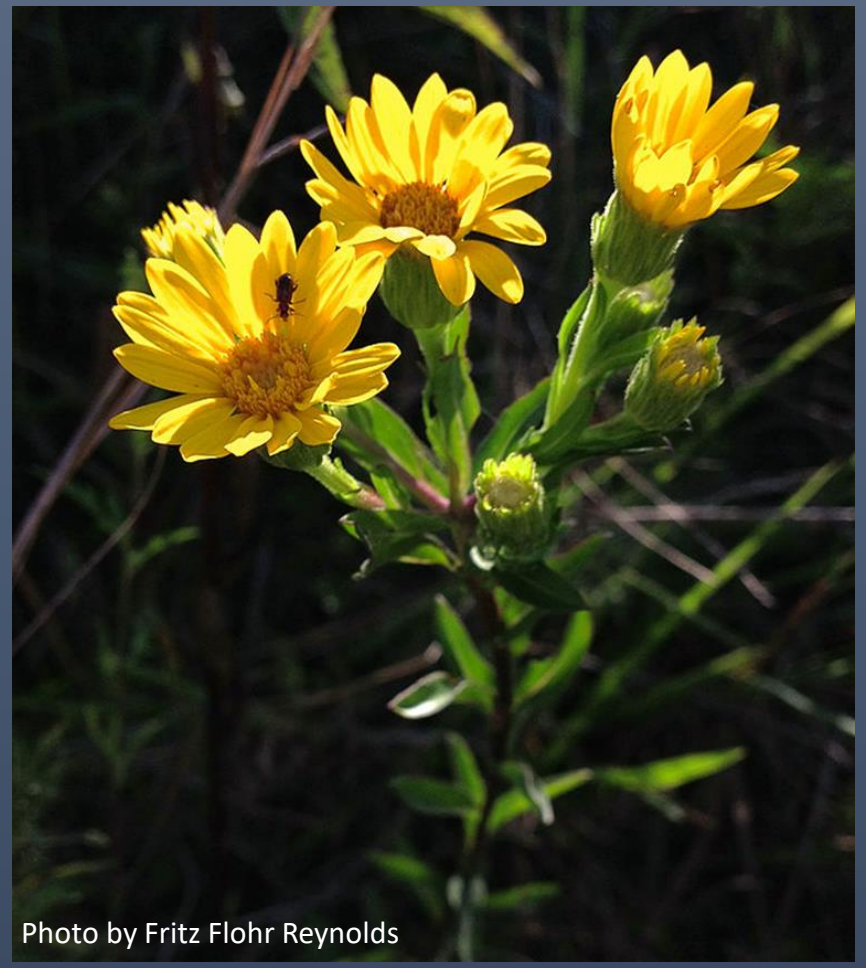
https://nj.gov/dep/parksandforests/natural/docs/rareplantpropagationreport.pdf



Background & Need

Propagation & reintroduction is proposed for

- “Mitigation” of habitat destruction
- Rare plant conservation
- Plan for climate change with assisted migration



Maryland golden aster (*Chrysopsis mariana*)

Terminology

Outplanting

Introduction

Augmentation

Relocation

Transplantation

Reintroduction

first…a thorough review of the Literature!

References	Count
Case Studies & Experiments	65
Overviews & Meta-analyses	59
Policy & Guidelines	22
Websites	17
Total	**163**

Goals of Reintroductions

- Establish resilient, self-sustaining populations
- Restore the appropriate amount of genetic diversity
- Prevent extinction/extirpation

Small whorled pogonia (*Isotria medoloides*)

Unintended Consequences

- Does not address the root cause of species decline: habitat degradation or destruction
- Used to rationalize further destruction of natural habitat
  - Falk and Olwell 1992
- Obscures biogeography and ecology
  - Fleming and Ludwig 1996
  - Fahselt 1988
- Regulatory issues

Plymouth rose gentian (*Sabatia kennedyana*)

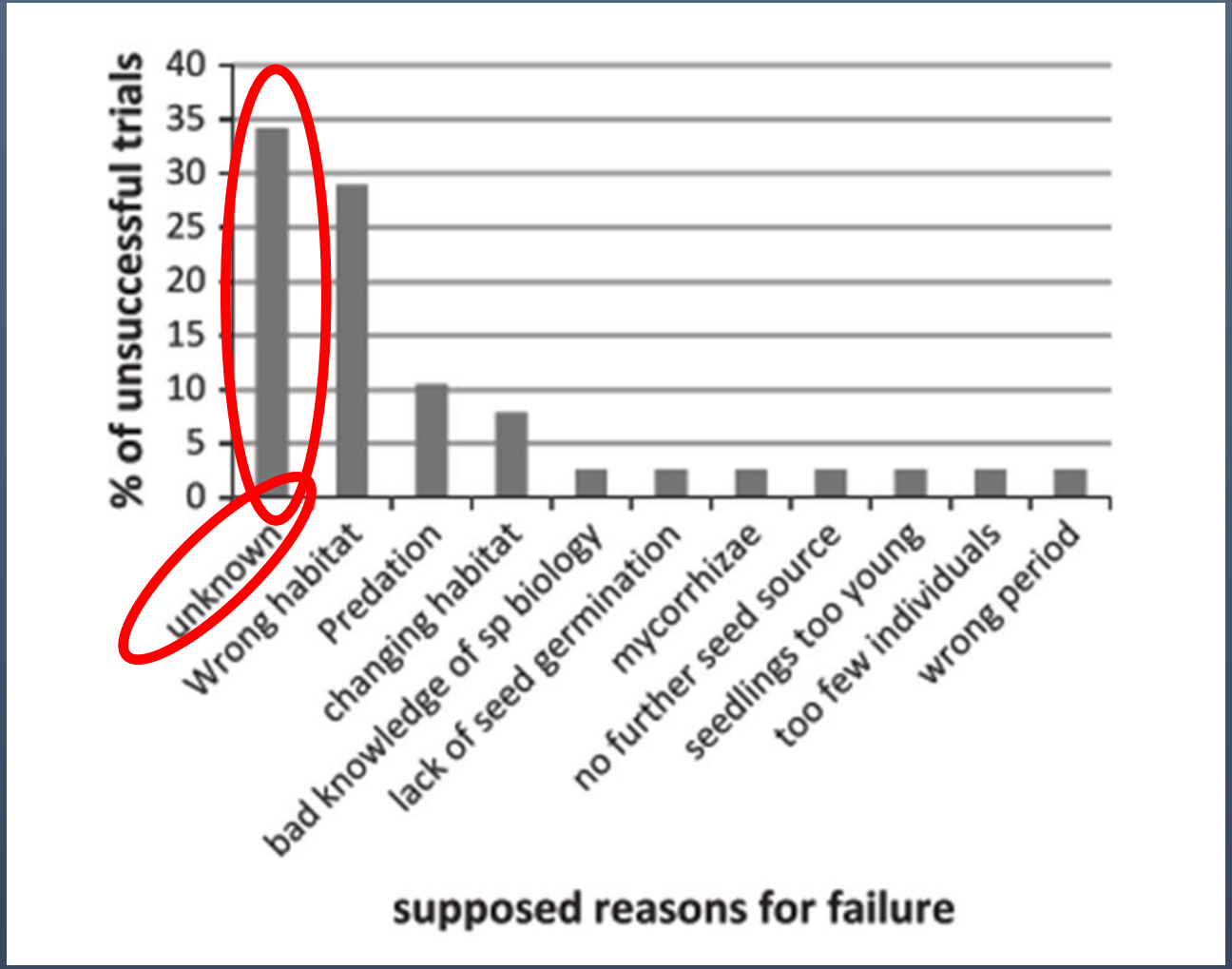
Hard shield fern (*Polystichum aculeatum*)

Risks and Challenges

- Harm to the source population and source site
- Damage to the recipient site
- Loss of genetic fitness
- Poorly understood biology and ecology

Spreading globe flower (*Trollius laxus* ssp. *laxus*)

Risks and Challenges



Godefroid et al. 2011

Risks and Challenges

- Harm to the source population and site
- Damage to the recipient site
- Loss of genetic fitness
- Poorly understood biology and ecology
- Long time commitment
- Limited resources

Spreading globe flower (*Trollius laxus* ssp. *laxus*)

Justification for a Reintroduction

Center for Plant Conservation (2019)

Not Justified:

- Undermines the imperative to protect existing sites
- Existing threats have not been minimized or managed
- Suitable habitat is not available
- Source population can’t sustain removal of individuals or propagules
- Species has not been thoroughly researched

surachet khamsuk/Shutterstock

Justification for a Reintroduction

Justified (CPC 2019)

- The distribution of the species is known and there are few, small, and declining populations, **AND**
- *In-situ* management options are inadequate for long-term conservation of the species, **AND**
- Threats have been identified, **AND**
- There is high risk of extinction/extirpation

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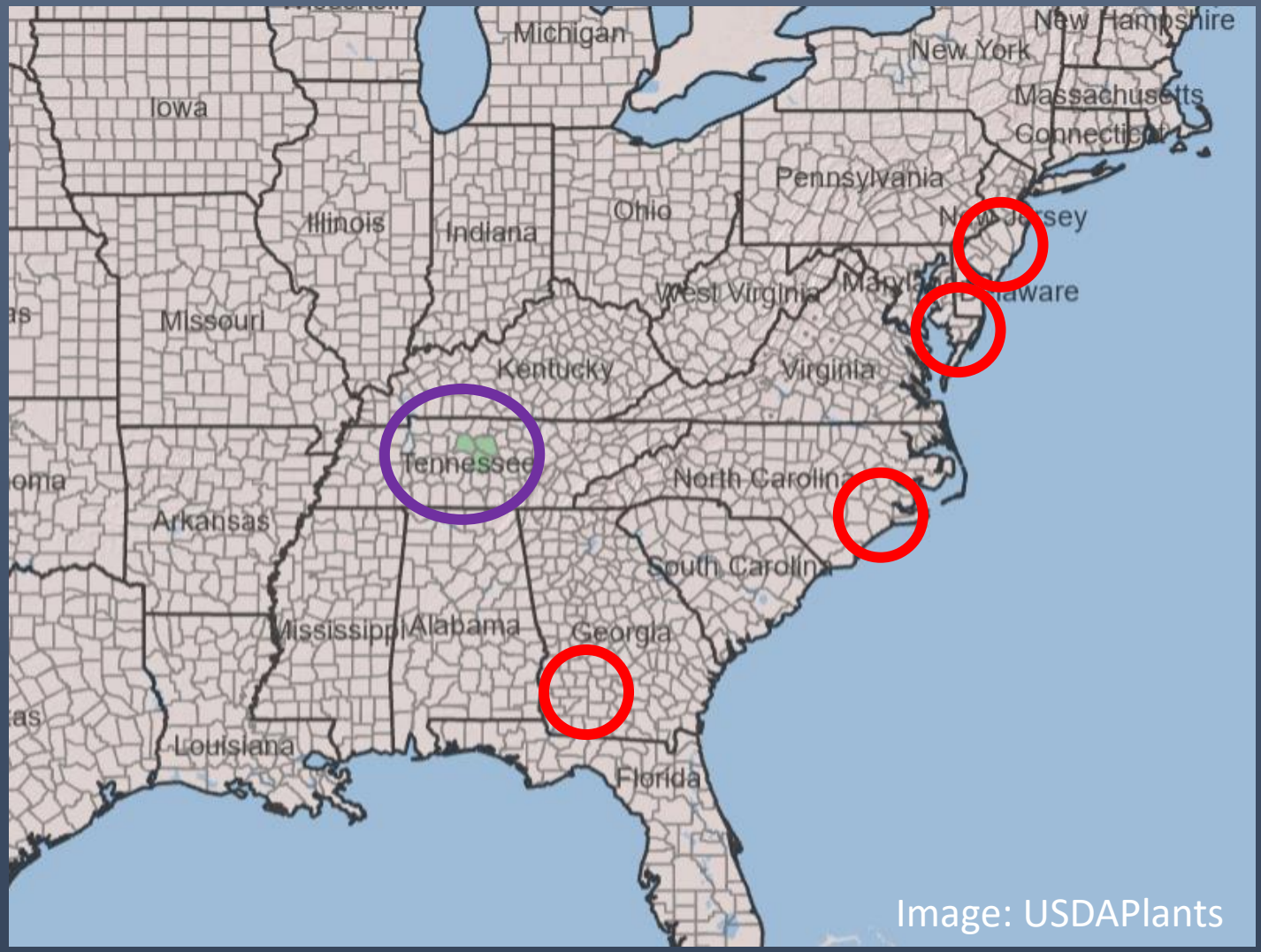
Project Components

1. Need to conduct extensive research on the species

- Conservation status
- Why the species is rare
- What threats the species faces
- Biology & ecology
- Genetic structure of the populations

Roughleaf yellow loosestrife (*Lysimachia asperulifolia*)

Tennessee purple coneflower
(*Echinacea tennesseensis*)



Hirsts' panic grass
(*Dichanthelium hirstii*)

Project Components

1. Need to conduct extensive research on the species
   - Conservation status
   - Why the species is rare
   - What threats the species faces
   - Biology & ecology
   - Genetic structure of the populations
   - Successful propagation methods

Ruth's golden aster
(*Pityopsis ruthii*)

Project Components

2. Implementation

- Use an experimental design
- Carefully choose outplanting sites
  - Meets habitat requirements

Harperella (*Ptilimnium nodosum*)

Project Components

2. Implementation

- Use an experimental design
- Carefully choose outplanting sites
  - Meets habitat requirements
  - Considers important species interactions

Salt marsh bird's beak
(*Chloropyron maritimum* subsp. *maritimum*)

Project Components

2. Implementation

- Use an experimental design
- Carefully choose outplanting sites
  - Meets habitat requirements
  - Considers important species interactions
- Outplanting process
  - Amount? Density? Spatial pattern?
  - Use seed or seedlings?

Project Components

3. Long-term commitment is essential

- Regular monitoring


Photo by Center for Plant Conservation 2019

Project Components

3. Long-term commitment is essential

- Regular monitoring
- Site management
- Plan for complications
  - ✓ Continued funding
  - ✓ Staff turnover

Salt marsh bird's beak
(*Chloropyron maritimum* subsp. *maritimum*)

Project Components

4. Reporting Results

- Successes
- Failures
- Unexpected events

Seabluff catchfly (*Silene douglasii* var. *oraria*)

Risky Reintroduction Projects

Some features of higher risk reintroduction projects include

- Removing adult plants from natural populations
- Planting outside of known historical range (assisted migration)
- Not using an experimental design to properly test hypotheses
- Intensive site disturbance
- Lacking biological and ecological understanding of the target species

Costs of a Conservation Reintroduction Project

Situation A (hypothetical)

- Species well-studied
- Plants are easy to grow
- Microhabitat well known
- Outplanting sites are available
- Estimated cost approx. **$5-7k** for propagation and several years of monitoring, assuming both could be done cheaply.

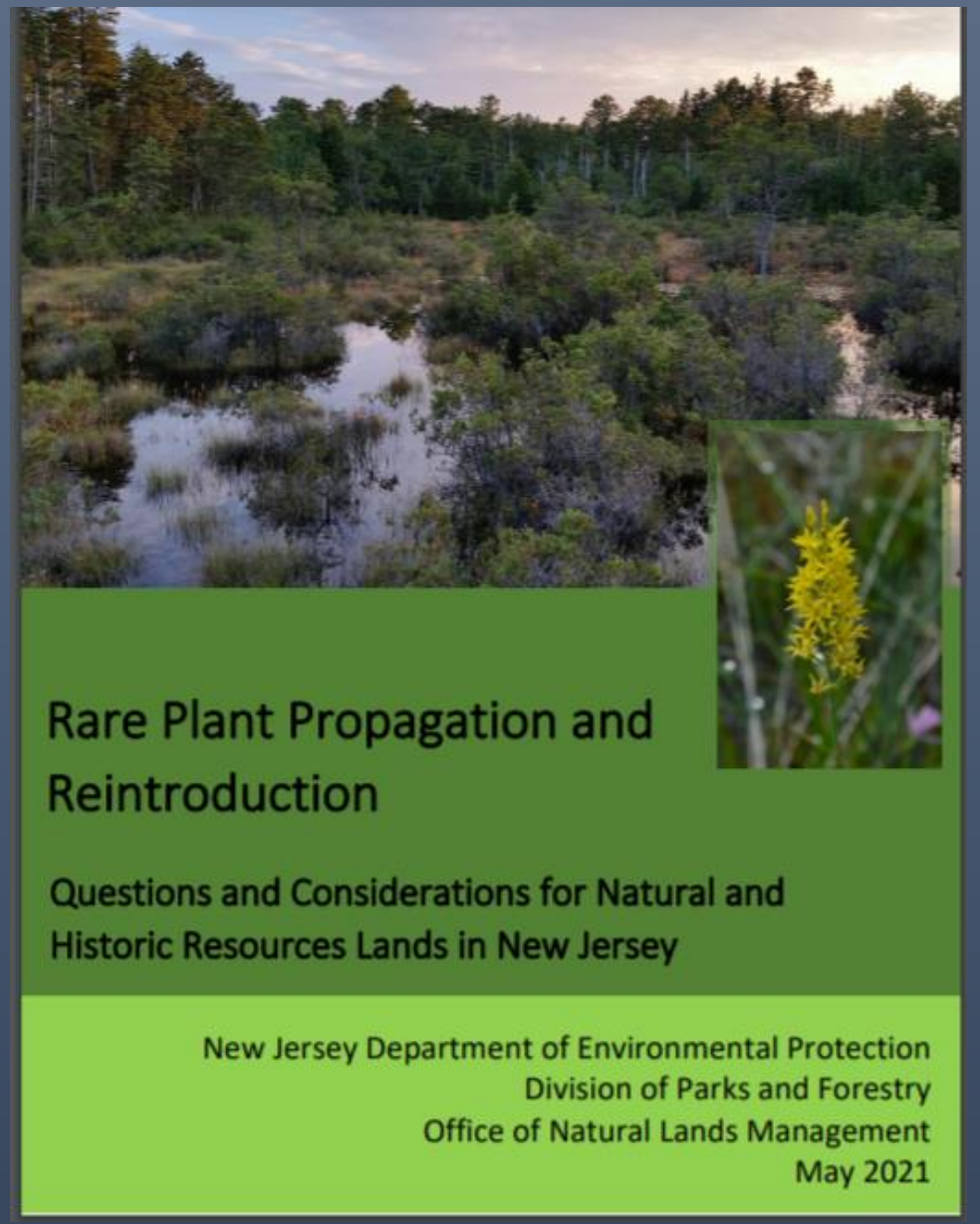
Situation B (*Schwalbea americana*)

- Species under-studied
  - EVERTHING was an unknown (how to grow it, what conditions it prefers, where to put it, etc.)
- Little habitat left for the species - the historical locations are all largely unsuitable
- Research needed to restore, create or enhance habitat at potential outplanting sites
- 25 years for the propagation and reintroduction component
- Costs to date > **$100k** …and the work still isn't done!!!

Resources in the Report

- Details of many reintroduction experiments
- Checklist for Reintroduction Plans
- Organizations
- Websites
- References
- Glossary

https://nj.gov/dep/parksandforests/natural/docs/rareplantpropagationreport.pdf



Checklist for Reintroduction Plans

Center for Plant Conservation:

- https://saveplants.org/
- Center for Plant Conservation. 2019. CPC Best Plant Conservation Practices to Support Species Survival in the Wild. Center for Plant Conservation, Escondido, CA

Limestone glade milkvetch (*Astragalus bibullatus*)

Acknowledgments

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Questions?

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