Habitat Restoration: Site Planning and Implementation

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Overview

- Introduction
- Framework for planning
- Land management planning
- Restoration practices
- Partners and resources
- Case studies

LTA Standards and Practices

- Standard 11 Conservation Easement Stewardship
- Standard 12 Fee Land Management

Importance of Land Management

- Land management is essential to protecting conservation values.
- Failure to protect conservation values may result in the land trust losing public support and funding

Fee Land Management Compared to CE

- Land trusts with fee lands are responsible parties
- Land owner of CE is responsible for maintenance of conservation value
- Separate CE agreement and land management plan
- Private inurement on CE lands

Relationship to Project Selection and Project Planning

- Selection includes evaluating site in the context of the land trust's mission statement and policy for land acquisition
- Project planning determines whether easement or property acquisition is feasible and appropriate
- Land management planning is the stewardship applied on the site

- Conservation values for easements are defined in IRC Section 170(h) to include:
  - Land areas for outdoor recreation by or for the education of the general public,
  - Protection of a relatively natural habitat of fish, wildlife, or plants, or similar ecosystem,
  - Farmland and forest land for scenic enjoyment of the general public, or pursuant to a clearly delineated Federal, State, or local governmental conservation policy

Biodiversity Status

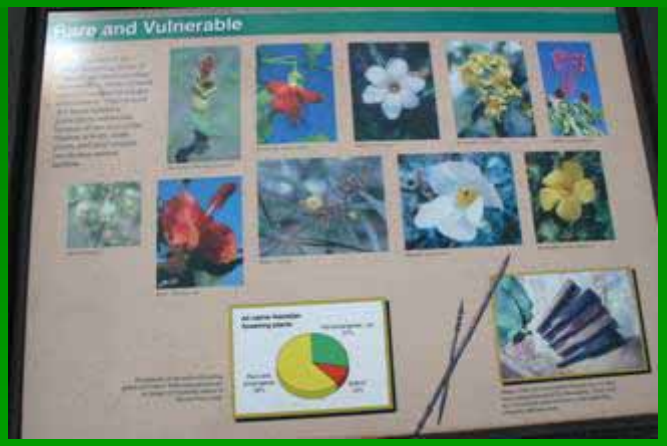
State of the Union: Ranking America's Biodiversity

- Scientists have documented more than 200,000 species in the US (10% of global)
- We are a center of diversity for salamanders, mussels, and turtles
- About 1/3 of well known species are at risk
- Habitat destruction and degradation; and alien species are major threats

Source: Stein, B.A. 2002. NatureServe http://www.natureserve.org/Reports/stateofunions.pdf

Biodiversity Status 2

- Endangered species
  - 412 animals
  - 598 plants
- Threatened species
  - 155 animals
  - 146 plants
- Over 1000 species have plans



Source: US Fish and Wildlife Service Endangered Species Bulletin March 2007

Biodiversity Status 3

- Terrestrial Vegetation of the U.S.
  - Cooperative project between the Nature Conservancy and the Natural Heritage Network
  - Based on a combination of physiognomic and floristic characteristics
  - Identified seven classes and 4,149 associations

Source:Grossman et al. 1998.
http://www.natureserve.org/publications/library.jsp

Framework for Planning

Conservation Design

- Core area or buffer?
- Size of parcel: Will it support diverse communities?
  - Varying species have widely different area requirements
- Shape: How much edge effect?

Site Context

- Surrounding land uses
- Local development trends
- Demographics of local community
- Anticipated public use needs that this property may be expected to fulfill

Connectivity

- Consider adjacent properties
- High quality sites can disperse natives
- Poor quality sites can increase invasive species
- Corridors for wildlife migration
- Fragmentation/isolation

Role of Disturbance

- Natural
  - Tree fall
  - Change in hydrology (e.g. beaver pond)
  - Grazing
- Human induced
  - Vegetation removal
  - Ditching or dredging
  - Road or trail construction
- Scale of disturbance

Goals of Land Management

Goals might include:

- Restoration of habitat
- Maintaining or improving biodiversity
- Providing ecosystem services
  (water purification, C sequestration, etc.)
- Programming (environmental education)
- Recreational opportunities

Intensity of Management

- Preservation (protection of existing communities)
- Restoration (establishment of a community similar to a reference one)
- Reconstruction or rehabilitation (establishment of a functional community unlike the reference)
- Succession and passive management (letting nature take its course)

Preservation

- Appropriate for sites with relatively intact, functional ecosystems
- Key is to minimize human-induced disturbance
- Presence of keystone species
  - Alligators
  - Beaver
  - Bison

Restoration

- Narrowly, the establishment of a reference community
- Broadly, practices that reduce degradation and improve the health of the ecosystem
- The Society for Ecological Restoration's website describes the range of restoration practices http://www.ser.org/content/ecological_restoration_primer.asp)

Restoration (2)

- Determine reference community
  - Public land survey records
  - Soil characteristics (esp. drainage)
  - Neighboring communities in similar landscape positions
- Plant/introduce appropriate species
- Manage site to support communities

Rehabilitation/ Reconstruction

- Determine community based on site characteristics and property goals
- Develop species list
- Modify site to support introductions
- Use native species and appropriate landscape design

Active or Passive?

- Letting nature take its course may not work
- Landscape is so human altered that natural processes are limited
- Most systems require active management

Essential Elements of a Habitat Restoration Plan

- 1. A clear rationale as to why restoration is needed
- 2. An ecological description of the site designated for restoration
- 3. Goals and objectives of the restoration project
- 4. A designation and description of the reference site
- 5. An explanation of how the proposed restoration will integrate with the landscape and its flows of organisms and materials
- 6. Explicit plans, schedules and budgets for site preparation, installation and post-installation activities
- 7. Explicitly stated performance standards, with monitoring protocols by which the project can be evaluated
- 8. Strategies for long-term protection and maintenance of the restored ecosystem

Source: SER Conservation Planning Resources

Land Management Planning

- Steps in site planning:
  - Collect information
  - Determine conservation priorities
  - Set goals and objectives
  - Develop work plan
  - Implement plan
  - Monitor and assess
  - Review and revise

Collect Site Information

- Property name and location with directions
- Contact information for responsible person(s) e.g. stewardship coordinator
- Legal documents including deed or title insurance documents
- Zoning and other land use restrictions
- Intentions of donors, funders, etc.

Resource Layers

- Geology
- Soils
- Hydrology
- Existing infrastructure
  (buildings, roads, etc.)
- Other (maps and narrative)

Natural Resource Inventory

- Plant community description and health (maps and narrative)
- Plant and animal species list, inclusive of locations of rare/declining species habitat
- Presence/absence of resource problems/issues (deer overabundance, invasive plants, fuel load, etc.)

Conservation Priorities

- Determine plant communities and other land cover (e.g. cliff face)
  - Compare to list of rare or unique habitats
- Assess likelihood of presence of rare, threatened and endangered species
  - Consult state Natural Heritage database (or Nature Serve)
- Identification and protection of most critical resources

Prioritize Communities

- Number of occurrences and sufficiency of occurrences to support community
- Quality and status (imperiled or secure) of communities and % under protection
- Extent and effectiveness of current management
- Develop rating system to target which communities need highest level of protection and/or management

Source: Chicago Wilderness

Threats

- Identify threats or stresses to the health of the ecosystem
- Threats include
  - Changes in hydrology
  - Fire and fire suppression
  - Excess nutrients and soil erosion
  - Plant diseases and insect infestations
  - Invasion of exotic species, etc.
  - Overgrazing by deer or other herbivores

Response to Threats

- Threats to biodiversity and conservation values need to be addressed
- Management planning requires:
  - Prioritization
  - Strategies
  - Identification of resources required

Hydrologic Alteration

- Most agricultural lands have been drained by tiles and ditches
- Runoff and flooding have increased because of impervious surfaces
- Wetlands may suffer from less (or more) water and degraded water quality

Watershed Management

- Watershed scale planning
- Consider effects of land use
- Construction of water control devices (e.g., levees, dams, gates, etc.)
- Best Management Practices
  - Buffer strips
  - Nutrient and pesticide management
  - Storm water control (detention ponds)
  - Green infrastructure (rain gardens, porous pavement, etc.)

Fire Regime

- Fire was a natural disturbance in many ecosystems
- Fire suppression has resulted in greater fuel loads which can lead to more intense burns
- Interval and intensity of fire help determine communities and structure
- Example: Lack of fire causes canopy closure and increase in shade tolerant species

Fire Management

- Is system fire dependent?
- Develop prescribed burn plan
- Obtain required permits
- Consider safety issues
- Check on insurance coverage
- Time burn according to conservation targets
- Leave refuges (don’t burn all habitat at once)

Structural Diversity

- In grasslands, fires can create a mosaic of structure
- In savannas, lack of fire often increases shrub density
- Upland forests typically operate under canopy-gap processes caused by wind throw, insects, and disease

Nutrient Loading

- Fertilizer applications (both ag and urban) and atmospheric deposition are sources
- High nutrient status often favors invasive species
- Nutrients can cause eutrophication in water bodies

Erosion and Sedimentation

- Soil loss decreases productivity and removes seed bank
- Erosion changes microbial community (e.g. mycorrhizae)
- Sediment in water bodies decreases photosynthesis, covers non-mobile organisms

Insect and Disease Problems

- Many problems are caused by non-natives
- Diseased plants can increase fire hazard
- Control of pests in natural systems is difficult

Invasive Species

- Often out compete native species (esp. in stressed systems)
- Includes both plants and animals (list is extensive)
- Controls are expensive and time consuming

Invasive Species

- Monitor for early detection
- Identify pest and understand life cycle
- Develop a control strategy
- Control practices
  - Herbicides
  - Burning
  - Biological control (e.g., musk thistle weevil)
  - Grazing

Excessive Herbivory or Predation

- White tail deer and other species may degrade plants near soil surface
- Domestic cats, raccoons and brown-headed cowbirds are nest predators

Implementation of Plan

- Establish strategies for each stewardship unit to meet goals
- List of activities to be performed in each stewardship unit
- Time frame for completion of activities
  - Short term (0 to 2 years)
  - Long term (more than 2 years)

Monitoring and Assessment

- Surveillance for threats to conservation values
- Biological monitoring surveys
  - Routine
  - Scientific
- Has work plan been successfully implemented?
- Are goals and objectives being attained?

Adaptive Management

- Adaptive management uses research strategies to evaluate success of alternative practices
- Design experiment to test:
  - Date of herbicide application
  - Timing of fire
  - Use of grazing animals
  - Et cetera

Summary

- Planning requires effort and resources
- Alternatives are
  - Inefficient use of time and money
  - Failure to achieve goals and objectives
  - Loss of biodiversity
  - Diminished public support

Assistance Available for Plan Development

- Land Trust Alliance (including LTANET)
- State land trust service centers
- The Nature Conservancy
- Other land trusts in your area
- Federal agencies (US Fish and Wildlife, US Geological Services (Biological Resources), USDA Natural Resources Conservation Service, etc.

- State agencies: Departments of Natural Resources, Environment, etc.
- Local government: Planning agencies, parks, etc.
- Not for profits: Audubon Society, Defenders of Wildlife, Pheasants Forever, etc.
- Colleges and universities (landscape architecture, natural resource depts., etc.)
- Consulting companies

Red Hills: Case Study

- Wade Tract managed by Tall Timbers Research Station and Land Conservancy
- Old growth of long-leaf pine with wiregrass understory
- Managed for support of Red-cockaded woodpecker

Source: Environmental Defense

Metolius Preserve: Case Study II

- Preserve is managed by Deschutes Basin Land Trust
- Predominantly Ponderosa Pine forest with White-headed Woodpecker
- Deschutes worked with Integrated Resource Management to develop a forest thinning strategy to produce more natural structure (clumpy and patchy)

Case Study III
Kankakee Sands Restoration

- TNC project on over 7,000 acres in NW Indiana
- Removed drainage ditches to create wetlands and wet prairie
- Developed own seed nursery with 390 species
- Habitat for Henslow's sparrow, grasshopper sparrow, lesser yellowlegs, etc.

American Plover (l) and Lesser Yellowlegs (R) courtesy of TNC website

Marsh Milkweed

Source: Wisconsin Stewardship Network

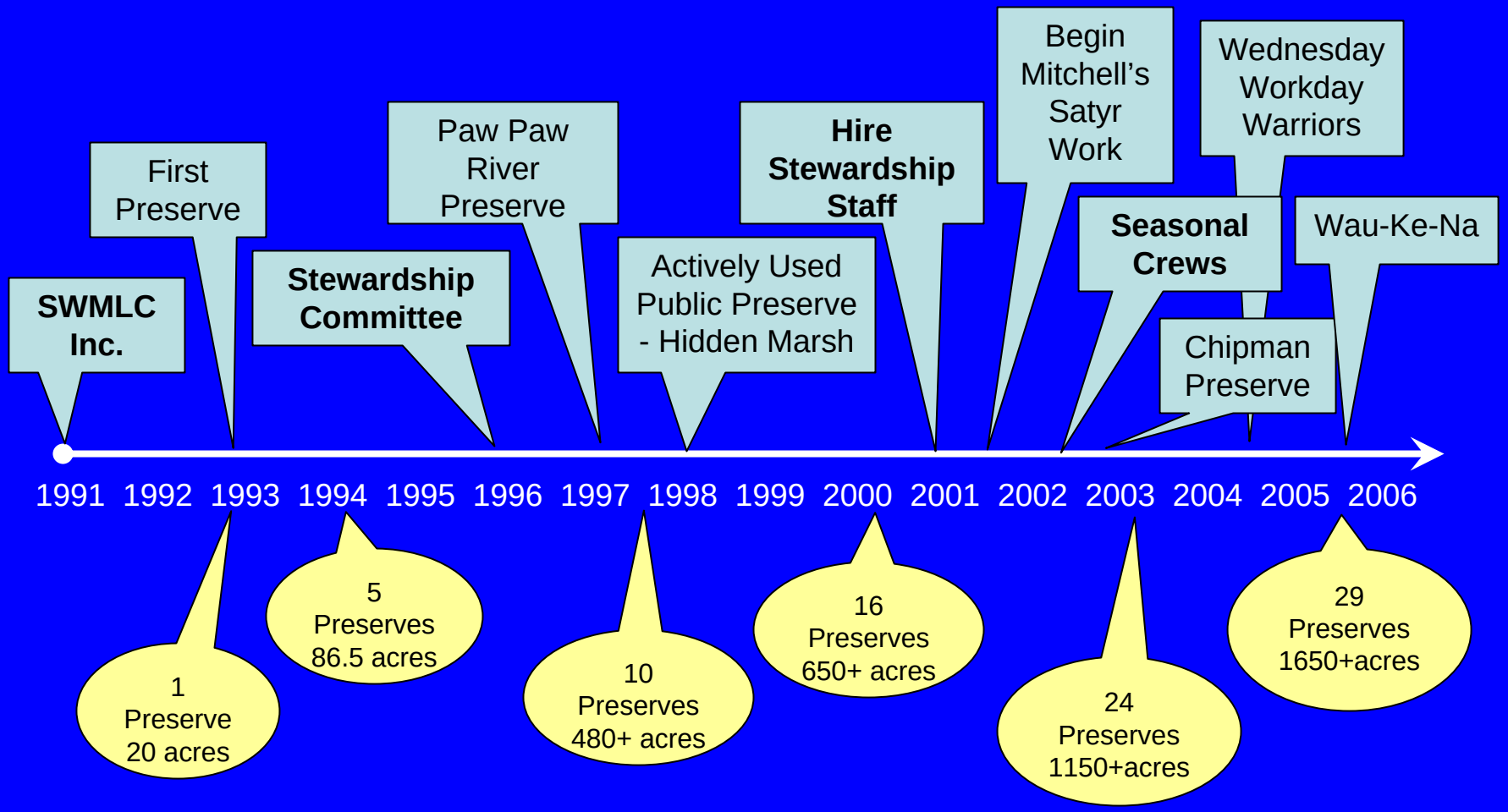
Red-tail Nature Preserve

Arellano property

on White River

Helping people protect the local wild and scenic places they care about most

SWMLC Stewardship Timeline



Stewardship Policy

- **Mission** – Advance the goals of protecting the diversity, stability and beauty of the region and make preserves available to the public where appropriate.

- **Management Philosophy** – What is ecologically appropriate and what is feasible.

- **Management Plans** – Assess and inventory properties when acquired. Level of active management will vary by preserve. Plans will be updated on a regular basis.

- **Management Practices** – Whatever is necessary to further the goals. Examples: invasive control by hand or chemical, Rx burning, hunting destructive wildlife, establishing trails, monitoring indicator species, etc.

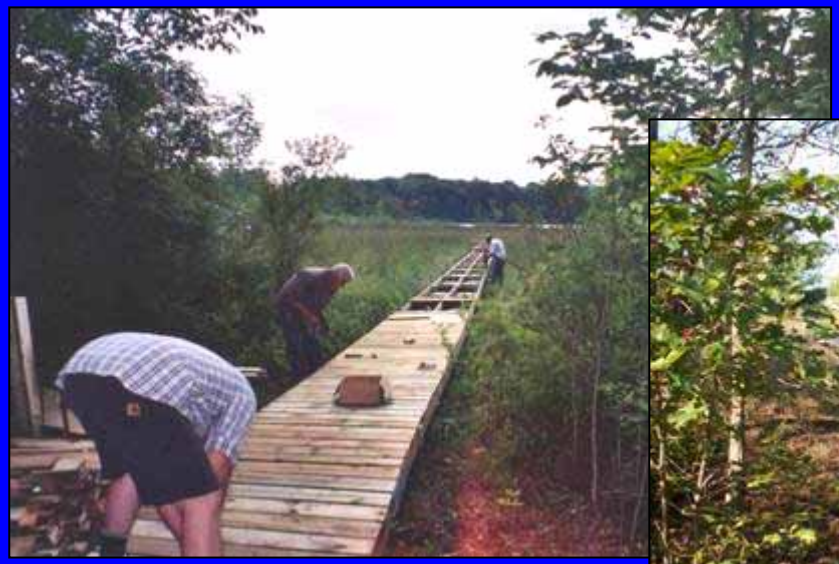
- **Public Use** – Evaluate conservation values and make recommendations to the board. Ecological integrity of the preserve comes first. Consider property donors request.

- **Signs and Parking** – Use of boundary signs at all preserves and larger entry signs when appropriate.

- **Donors and Stakeholders** – Engage them early and encourage participation.

Weekend Workdays

Wednesday Workday Warriors!



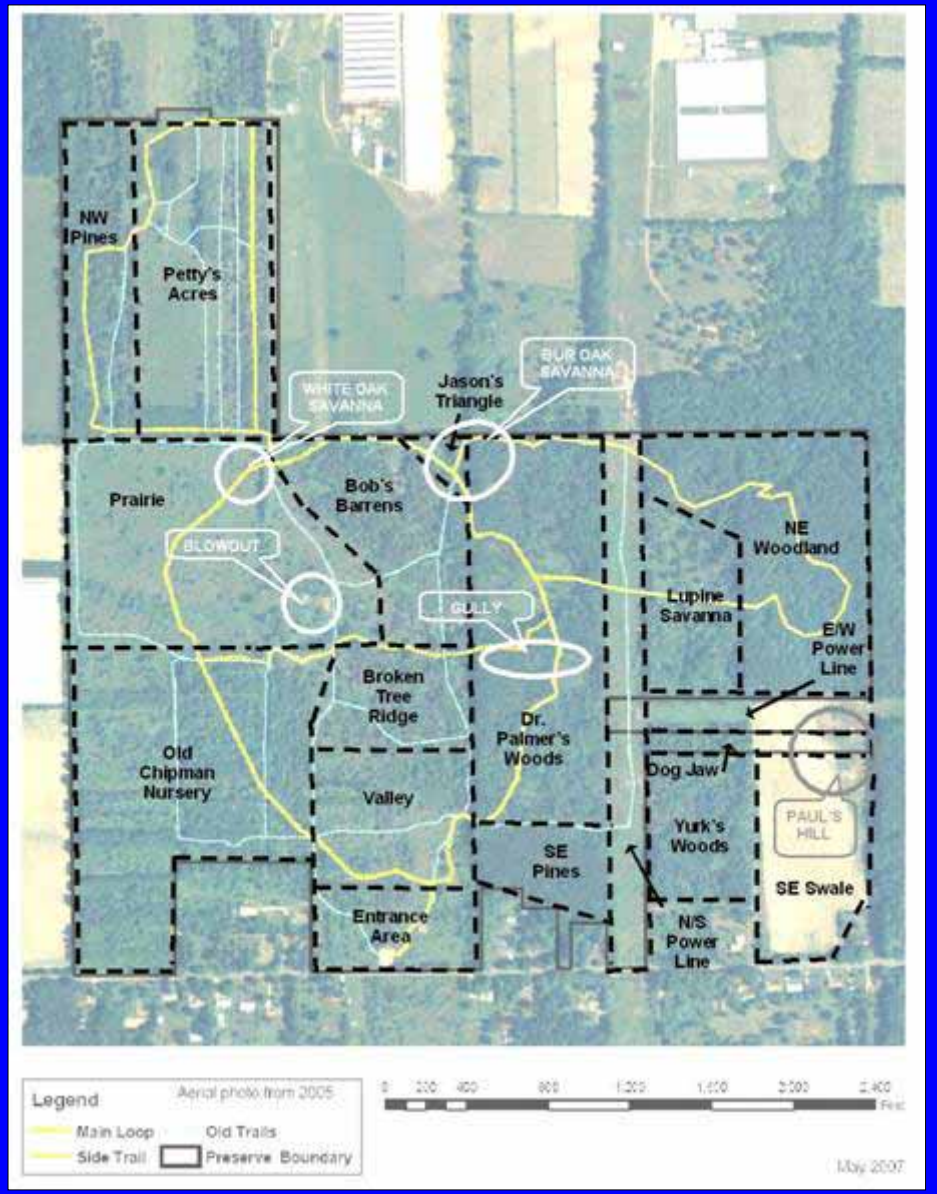
40+ Scheduled Volunteer Stewardship Opportunities

- Participation varies from 2 – 50
- Does not include prescribed fire program or field trips

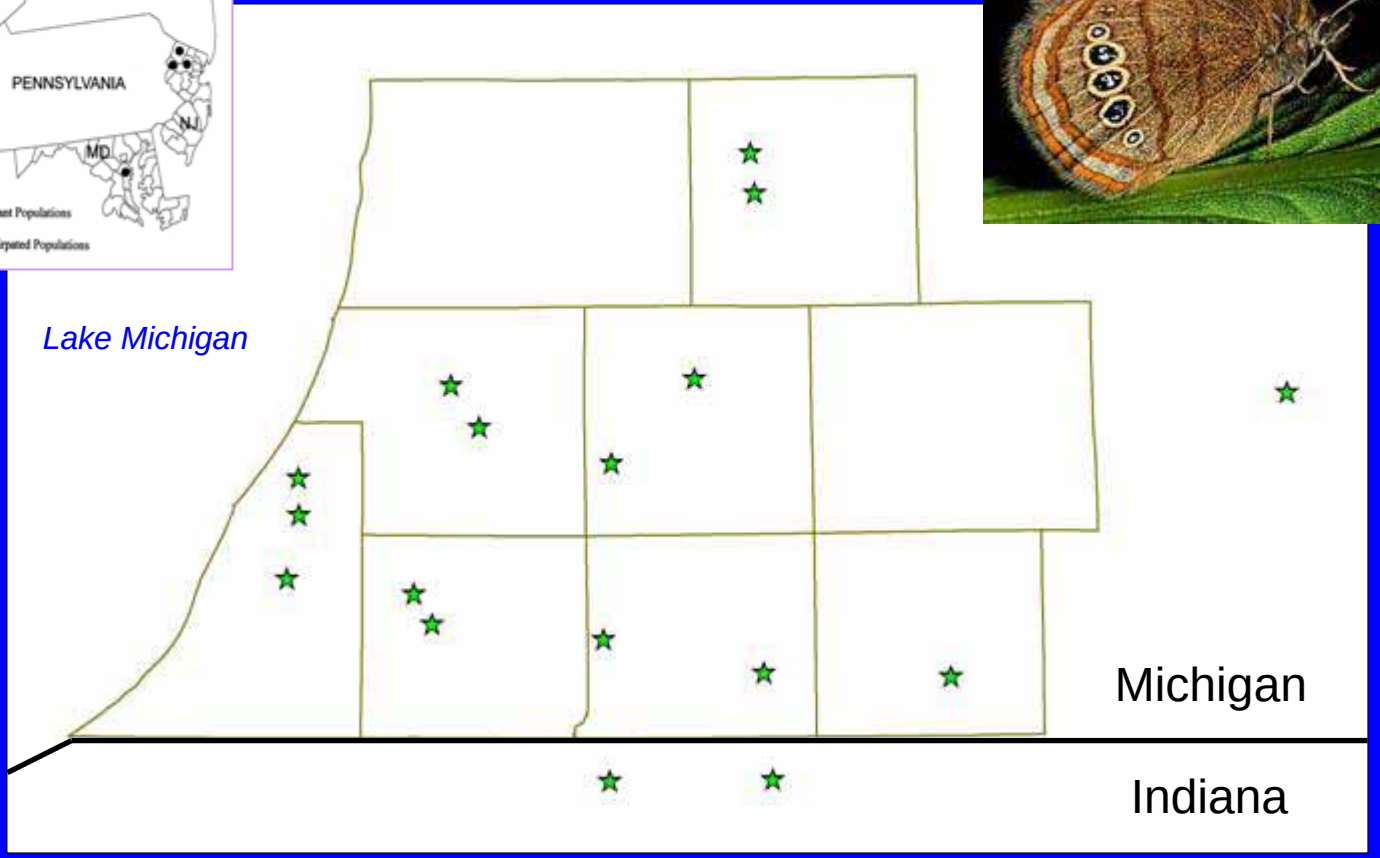
	SOUTHWEST MICHIGAN LAND CONSERVANCY	STEWARDSHIP EVENTS FOR FISCAL YEAR 2005-2006
Date	**Place**	**Activity**
10/5/05	Hidden Marsh & Lacey	clear trails, repair steps
10/8/05	Sand Creek	sow prairie seed
10/12/05	Chipman	burn workshop
10/19/05	Paw Paw R.	collect seeds
10/22/06	Dunes Pkwy	post boundaries
10/26/05	Villareal	dig plants
11/2/05	Sand Creek	burn breaks
11/5/05	Marc's Marsh	clear buckthorn
11/9/05	Sand Creek	burn brush piles
11/16/05	Wau-Ke-Nah	signs n. boundary
11/19/05	Chipman	clear scotch pine
3/11/06	Sand Creek	clear brush from prairie
3/15/06	Wau-Ke-Nah	post signs
3/29/06	Winterberry	cut&burn phragmites
4/5/06	Jeptha	trim path
4/12/06	Chipman	new trail
4/19/06	Chipman	new trail
4/28/06	Kesling	install sign
4/29/06	Wau-Ke-Nah	post boundaries and inventory
5/3/06	Hultmark	garlic mustard & bittersweet
5/10/06	Pritschet-Davis	garlic mustard & honeysuckle
5/17/06	Pritschet-Davis	garlic mustard
5/21/06	Chipman	savanna restoration
5/24/06	GMBauer	garlic mustard & honeysuckle
5/31/06	Tower Hill, Deer Creek, Harbert	garlic mustard, erosion control, monitoring
6/3/06	Kesling	garlic mustard
6/7/06	Hidden Marsh & Lacey	trail cleanup
6/14/06	BevVillareal& Chipman	plant rescue
6/17/06	Carter Lake	autumn olive
6/21/06	Chipman	collect & sow lupine seeds
6/28/06	Conservancy Office	weed/thin flowerbed
7/8/06	Chipman	scotch pine removal
7/12/06	Sand Creek	burn treeline
7/19/06	Paw Paw R.	open sw corner
7/26/06	Hickory Creek	post signs, honeysuckle
7/29/06	Con. Power Prairie	savanna restoration
8/2/06	Sand Creek	burn brush
8/9/06	Chipman	cut trees
8/13/06	Carter Lake	autumn olive
8/16/06	Glenn Allen Island	trash; monitor heron nests
8/23/06	Villareal & Chipman	plant rescue
8/26/06	Jeptha	autumn olive
8/30/06	Chipman	weed plants
9/6/06	Hidden Marsh & Lacey	mow trail

MANAGEMENT PLANS

Simple – Complex



Mitchell's Satyr – Federally Endangered Butterfly



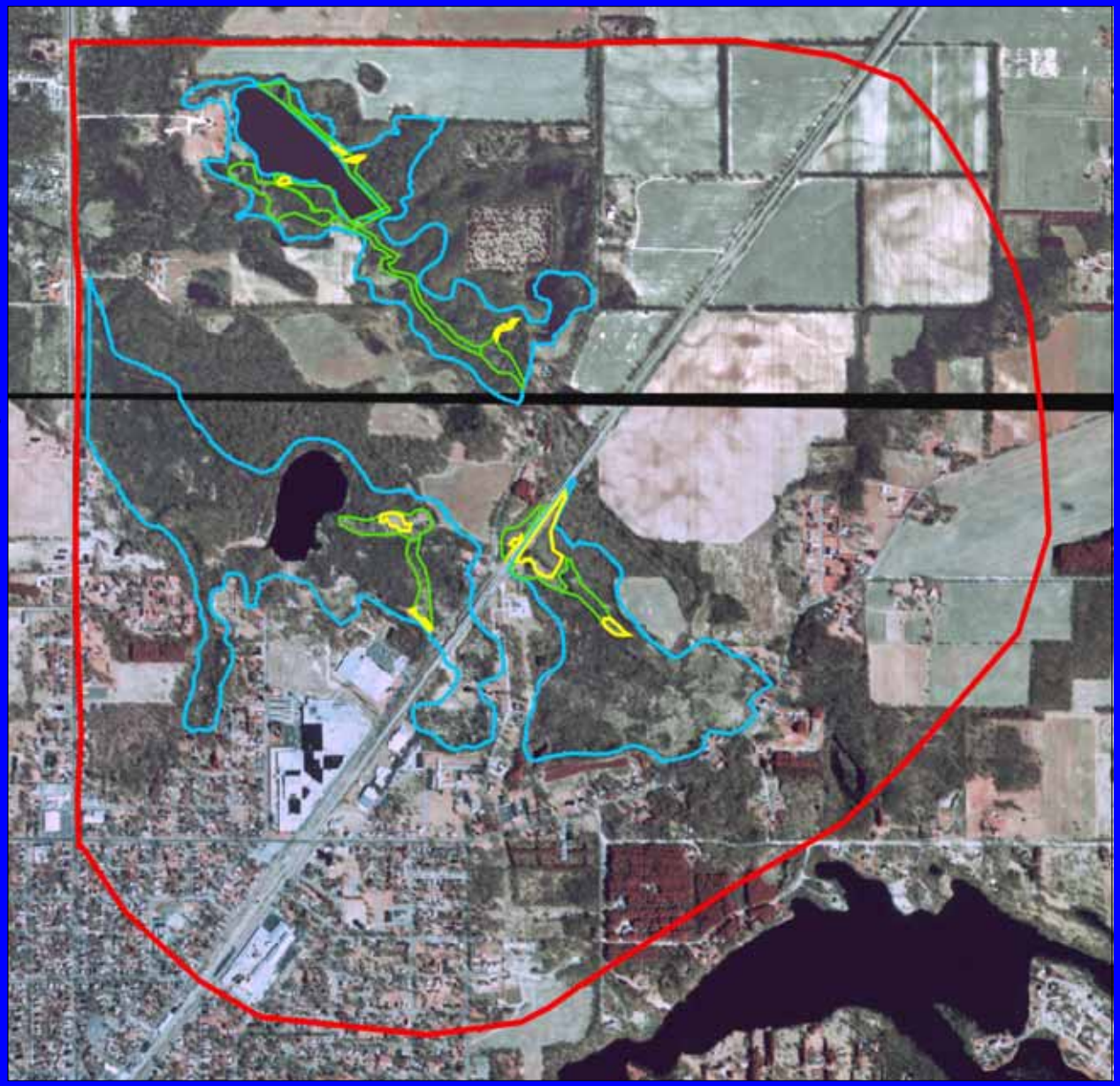
Habitat of Mitchell's Satyr

Habitat characteristics

- peat soil
- dominated by thin-leaved sedges (*Carex stricta)*
- groundwater seeps
- mosaic of sedge meadow, open fen, shrubby fen, and tamarack savanna

Worked with Michigan Natural Features Inventory to develop management plans

- Remaining viable habitat
- Potential habitat
- Strategies for restoration



Shrub Encroachment

Partners in Conservation

Mitchell's Satyr Recovery Team:

Indiana & Michigan Departments of Natural Resources

Michigan Natural Features Inventory

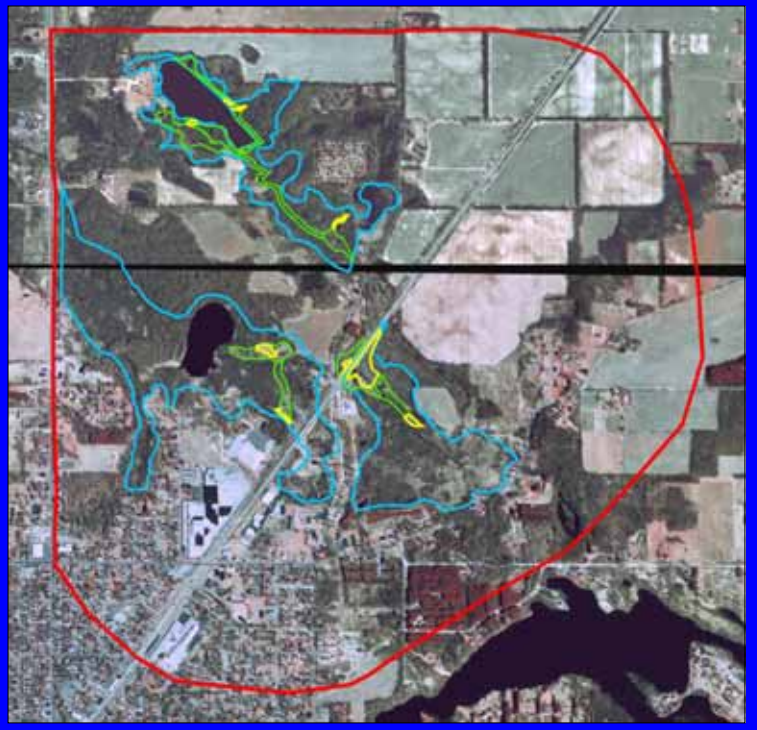
The Nature Conservancy

Southwest Michigan Land Conservancy

Toledo Zoo

US Fish and Wildlife Service

Volunteers (including private land owners)



Restoring Healthy Landscapes and Providing Passive Recreation

Chipman Preserve

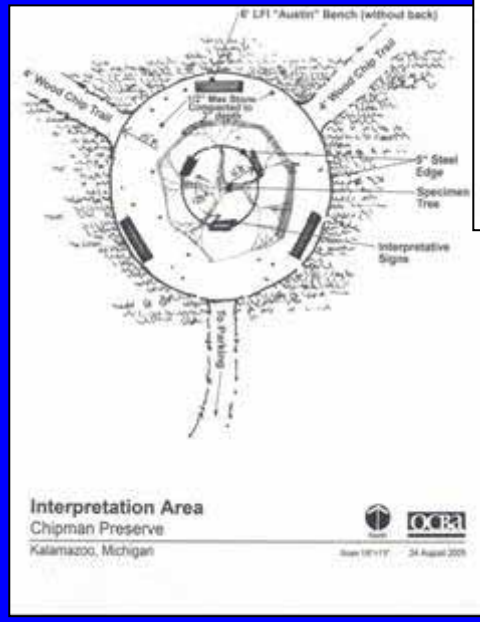
Working with volunteers, Stewardship Network, business partners and seasonal staff funded by donor and L.I.P. to restore oak savanna on a degraded landscape.

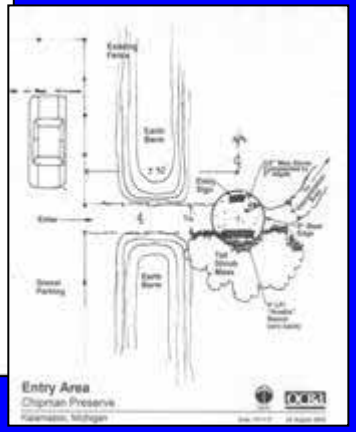
Prescribed Burning

Plant Rescues & Seed Collection

Over 125 species, thousands of plants

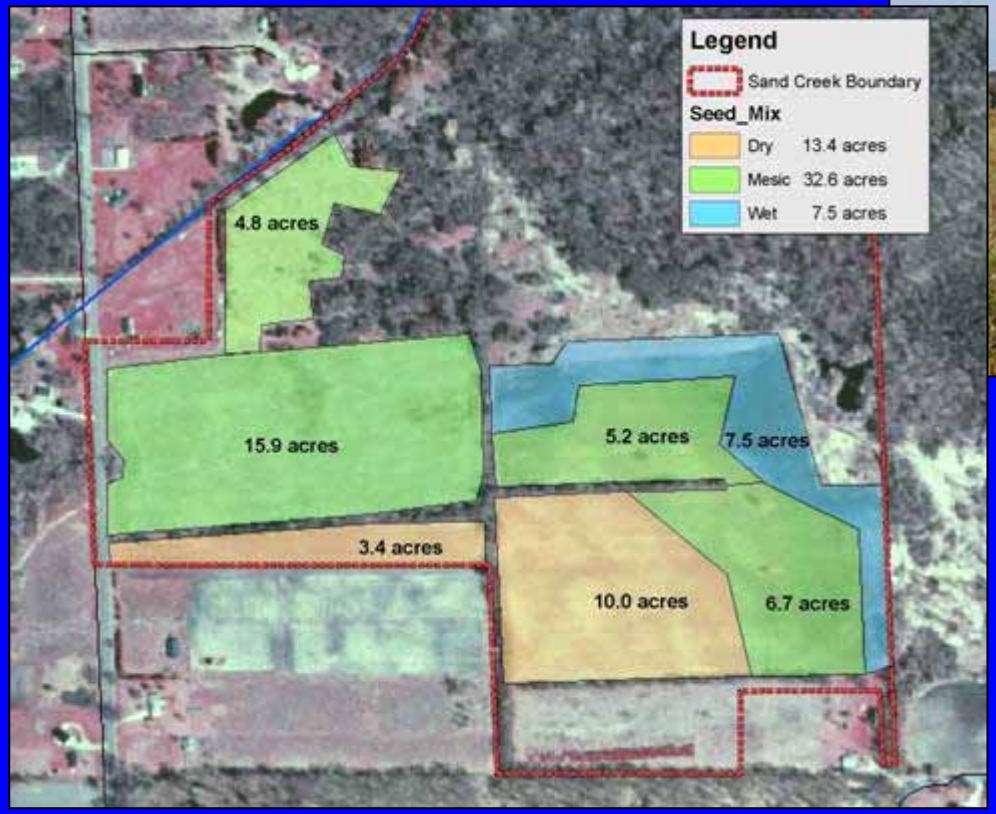
Engaging Donors & Outreach to Public





Starting From Scratch

Sand Creek Preserve



Native Grasses (10 species)

Wildflowers (75 species sown, 20+ volunteered)

Grassland Bird Habitat

Lyon's Lake Conservation Area

Restoring Important Little Bits

Marc’s Marsh

Removing Invasive Species

Marc's Marsh

Working with volunteers and seasonal staff funded by US FWS grant to restore high quality natural area and habitat for rare species.

Hidden Marsh

When to Walk Away

Oriental Bittersweet

http://tncweeds.ucdavis.edu

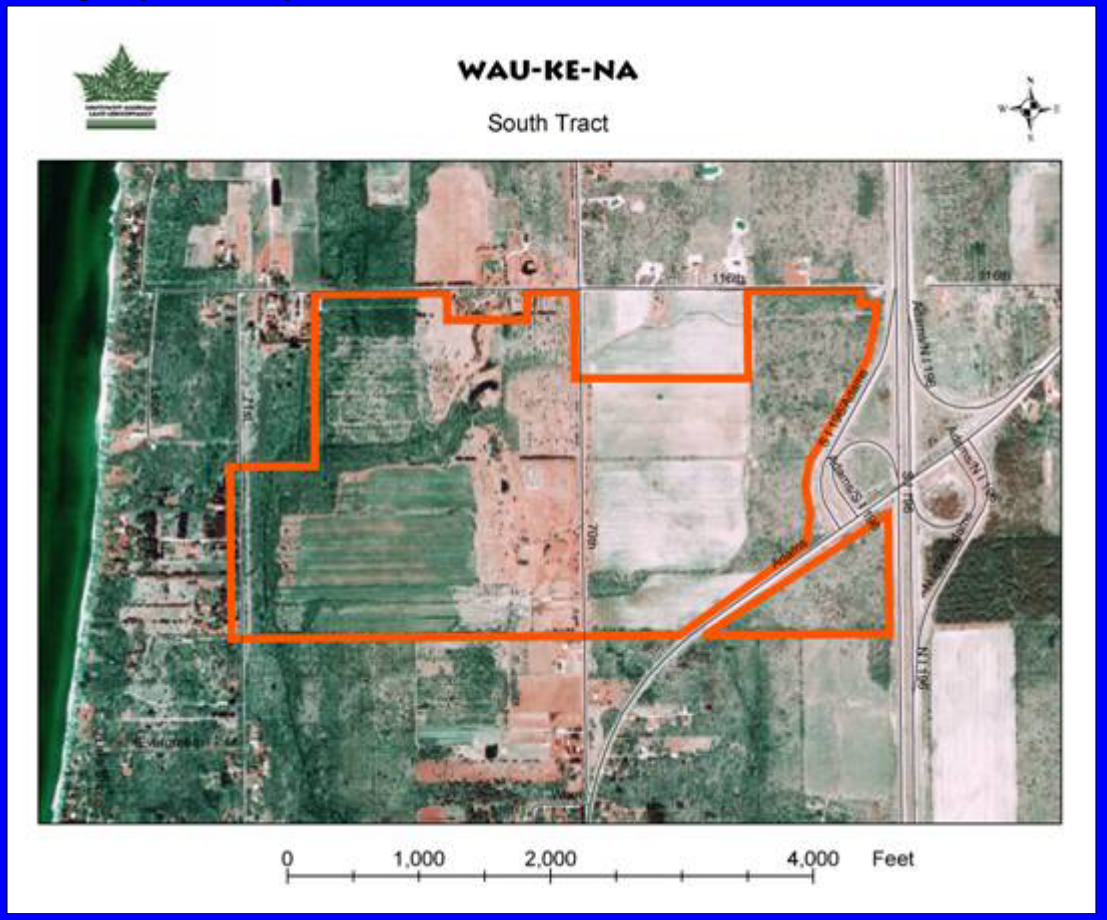
Managed as public open space, not ecological integrity.

Will still work to eradicate invasions of new pests to the region.

Black Swallow-wort

Wau – Ke – Na Planning

Working with volunteers, donors, business partners, homeowners association, local government, and MDEQ ($16,000 planning grant) to create a master plan for 365 acres of high profile preserve.



Master Plan Incorporates:

- Natural Features Inventory
- Public Use Design Charrette
- Hydrological Study

WAU-KE-NA

South Tract
Wetlands and Water Movement