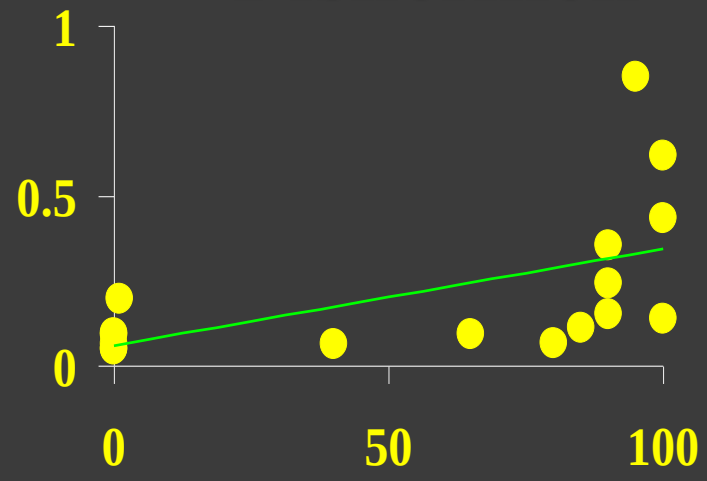
Case Studies of Aquatic Plant Establishment Methods

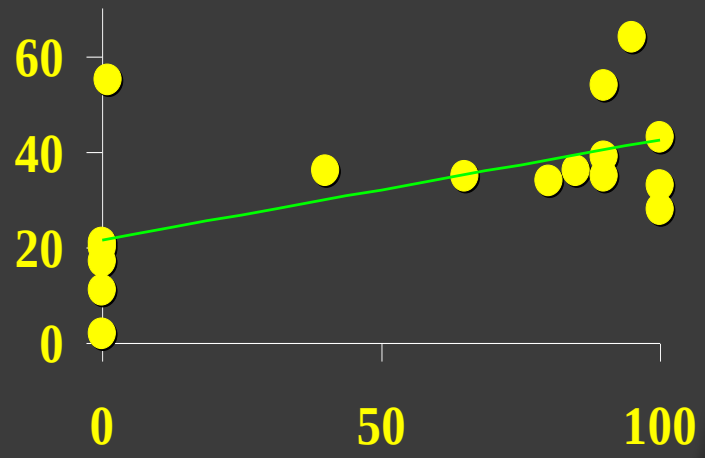
Mike Mounce,
Division of Fisheries,
Illinois Department of Natural Resources

Economics of Habitat

Bass Catch Rate - Fishermen



Bass Fishing Effort



17 Lakes

$P \leq 0.05$

The Effects of Six Different Soil Treatments on the Establishment of Aquatic Plants in an Illinois Upland Reservoir

Michael Mounce - IDNR

Nathan Badgett - EIU

Factors Limiting Establishment of Aquatic Plant Communities

- Lack of propagules
- Water level fluctuations asynchronous w/ life cycles
- Excessive turbidity and/or nutrients
- **Unsuitable terrestrial soils**
- Herbivory, *Phys. & bio. (compet.) displacement*

from: Smart, R. M., R. D. Doyle, J. D. Madsen, and G. O. Dick. 1996. Establishing native submersed aquatic plant communities for fish habitat. Pages 347-356 *in* L. E. Miranda and D. R. DeVries, editors. Multidimensional approaches to reservoir fisheries management. American Fisheries Society, Bethesda, Maryland.

Experimental Design

- **American water willow, *Justicia americana*, dormant root crowns planted at five sites on Mill Creek Lake, Clark Co., Illinois**
- **Six treatment plots / site – 0.25 m^2 (.45 x .6m)**
- **Control plots - not aerated (5) & aerated (2)**
- **Plots spaced 0.33 m apart and aligned parallel to water's edge**

Soil Treatments

Slow Release Fertilizer (Osmocote) – ¼ tsp. / rhizome

Liquid Iron w/ Other Micro Nutrients - 2 tsp. / plot

Soil Sulfur – 40 g. / plot

Sphagnum Peat Moss – 3 - 44oz. cups / plot

"Mycorrhizal Fungi" – 2 tbs. soil / rhizome

Rooting Hormone – dust rhizomes

Aerated Control

Control

2-way ANOVA of Parameters Measured (July)

Parameters	Treatment	Site
Survival	F=2.67 P<.05	F= 7.11 P<.01
Stem Height	F=1.15 P>.05	F=12.18 P<.01
Stem Diameter	F=0.94 P>.05	F=12.17 P<.01
No. of Stems	F=2.09 P>.05	F=10.88 P<.01
No. of Rhizomes	F=0.78 P>.05	F= 7.39 P<.01
"Robustness"	F=1.62 P>.05	F= 8.39 P<.01

Tukey Comparison of Means of Prop. Survival by Treatment (July)

Trtmnt.	Mean	Homogenous Grps.
Rt. Hrmn.	**8.0**	**A**
Sulfur	**7.8**	**A**
A. Cntrl.	**7.0**	**A**
Mycorr.	**6.4**	**B**
Control	**5.4**	**B**
Micro N.	**5.1**	**B**
Macro N.	**4.6**	**B**
Peat Moss	**3.6**	**B**

ANOVA

F=2.67

P<.05

2-way ANOVA of Parameters Measured (Sept.)

Parameters	Treatment	Site
Survival	F=2.11 P>.05	F= 9.22 P<.01
Stem Height	F=1.57 P>.05	F=13.61 P<.01
Stem Diameter	F=1.26 P>.05	F= 5.35 P<.01
No. of Stems	F=1.36 P>.05	F= 6.45 P<.01
No. of Rhizomes	F=4.51 P<.01	F=12.62 P<.01
"Robustness"	F=0.80 P>.05	F=11.32 P<.01

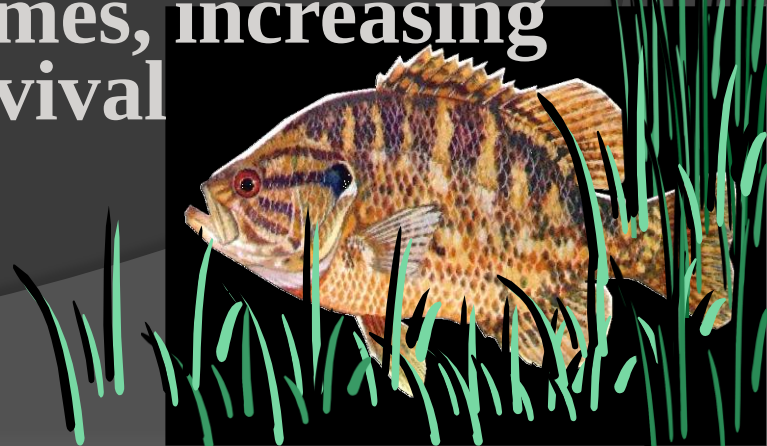
Tukey Comparison of Means of Number of Rhizomes by Treatment (Sept.)

Trtmnt.	Mean	Homogenous Grps.
Aer. Cntrl.	**11.6**	**A**
Macro N.	**6.7**	**A**
Sulfur	**6.0**	**A**
Rt. Hrmn.	5.2	B
Control	4.8	B
Mycorr.	4.6	B
Micro N.	4.6	B
Peat Moss	3.2	B

ANOVA
F=4.51
P<.01

Conclusions

- **Site** may be a more important factor than soil treatments in limiting survival and development of aquatic plants **(eggs /basket)**
- **Rooting hormone, sulfur, and aeration** may enhance survival of dormant root crowns
- **Aeration, macro nutrients, and sulfur** may increase production of rhizomes, increasing the chances of long term survival of water willow



Stem Cutting Treatments and Site Factors Affecting Water Willow Establishment

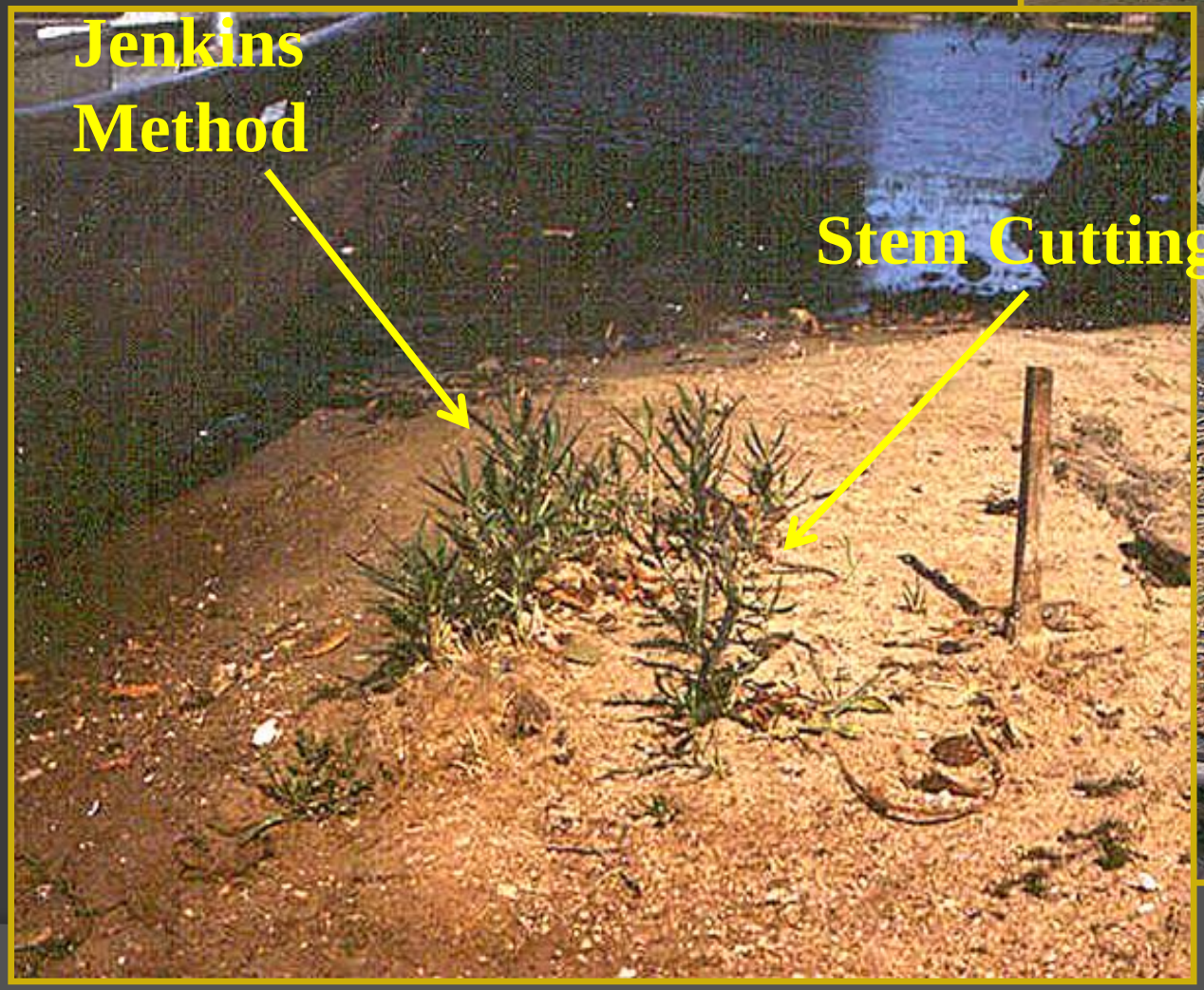
Michael Mounce – IDNR

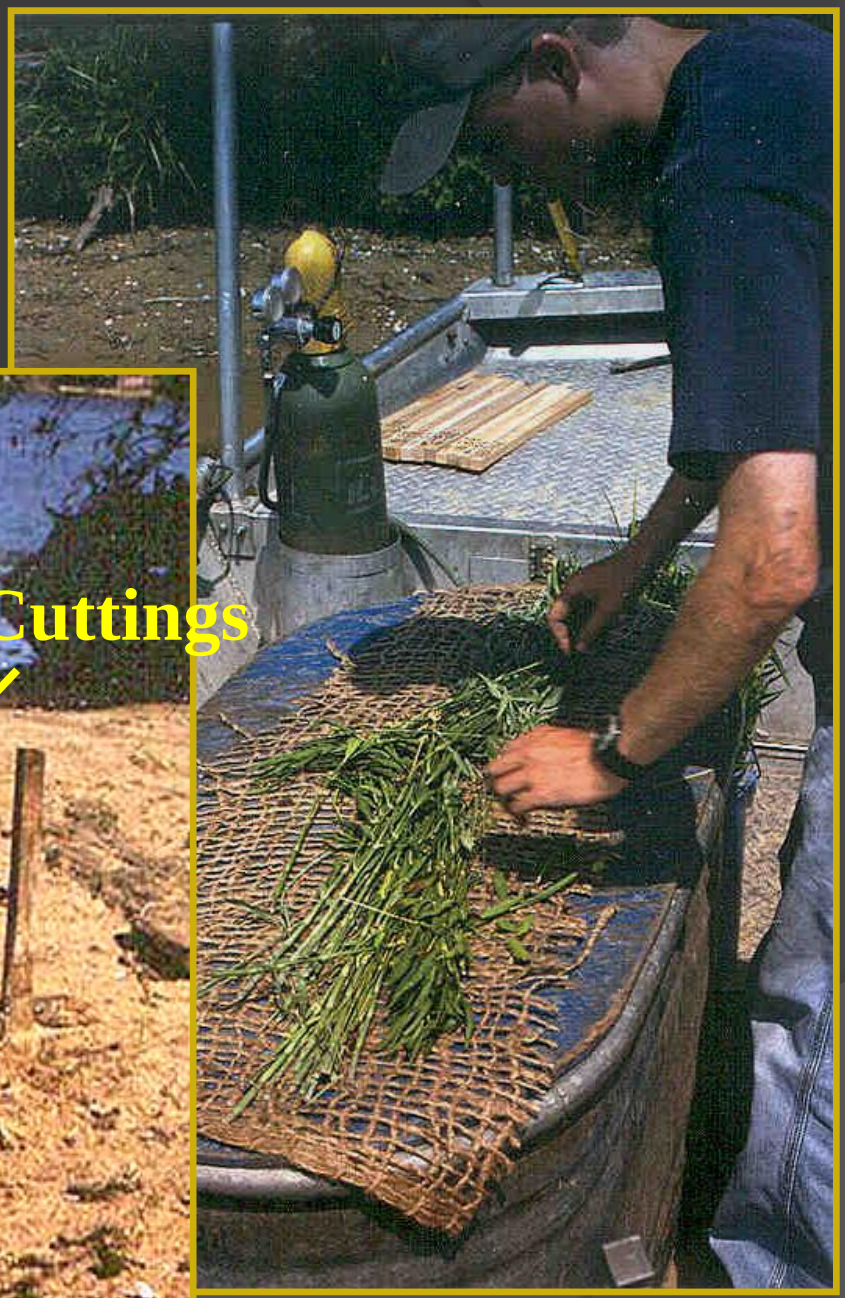
Matt Prevo - EIU

K.I.S.S. METHOD

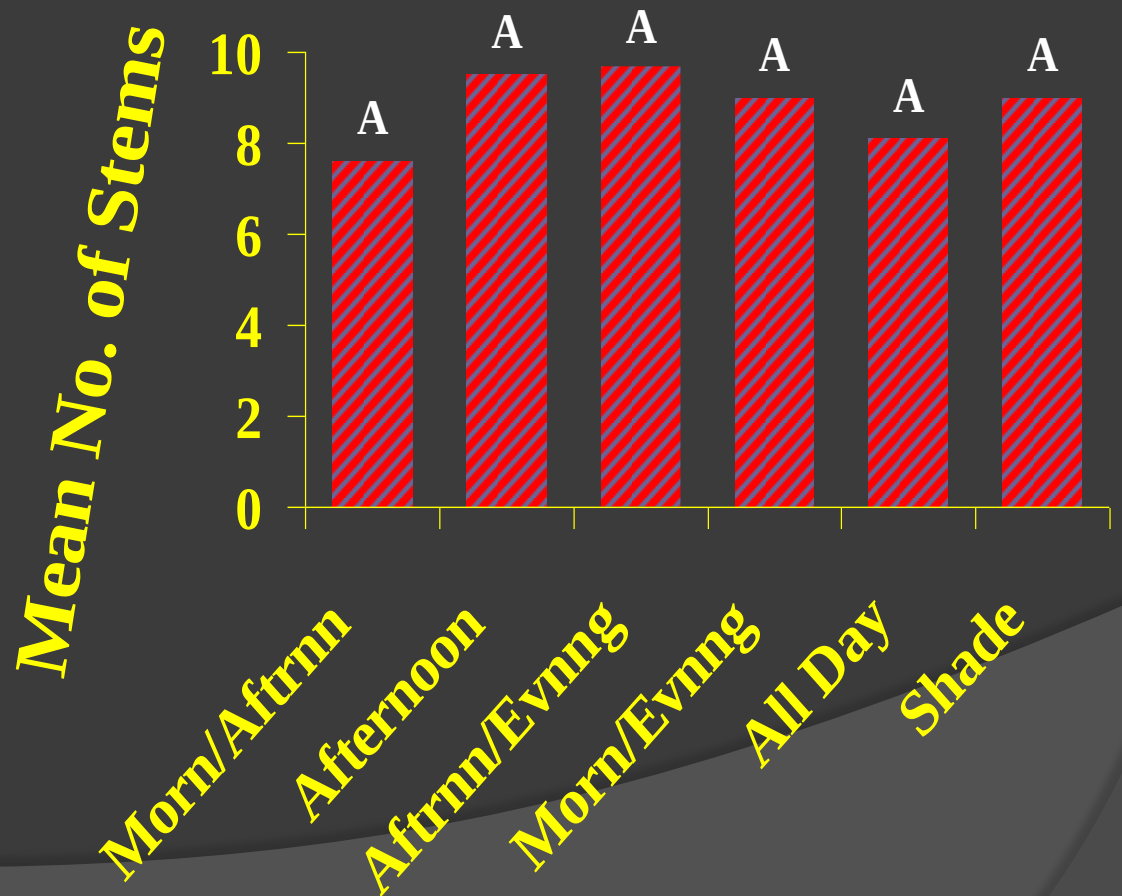
Water Willow

Results

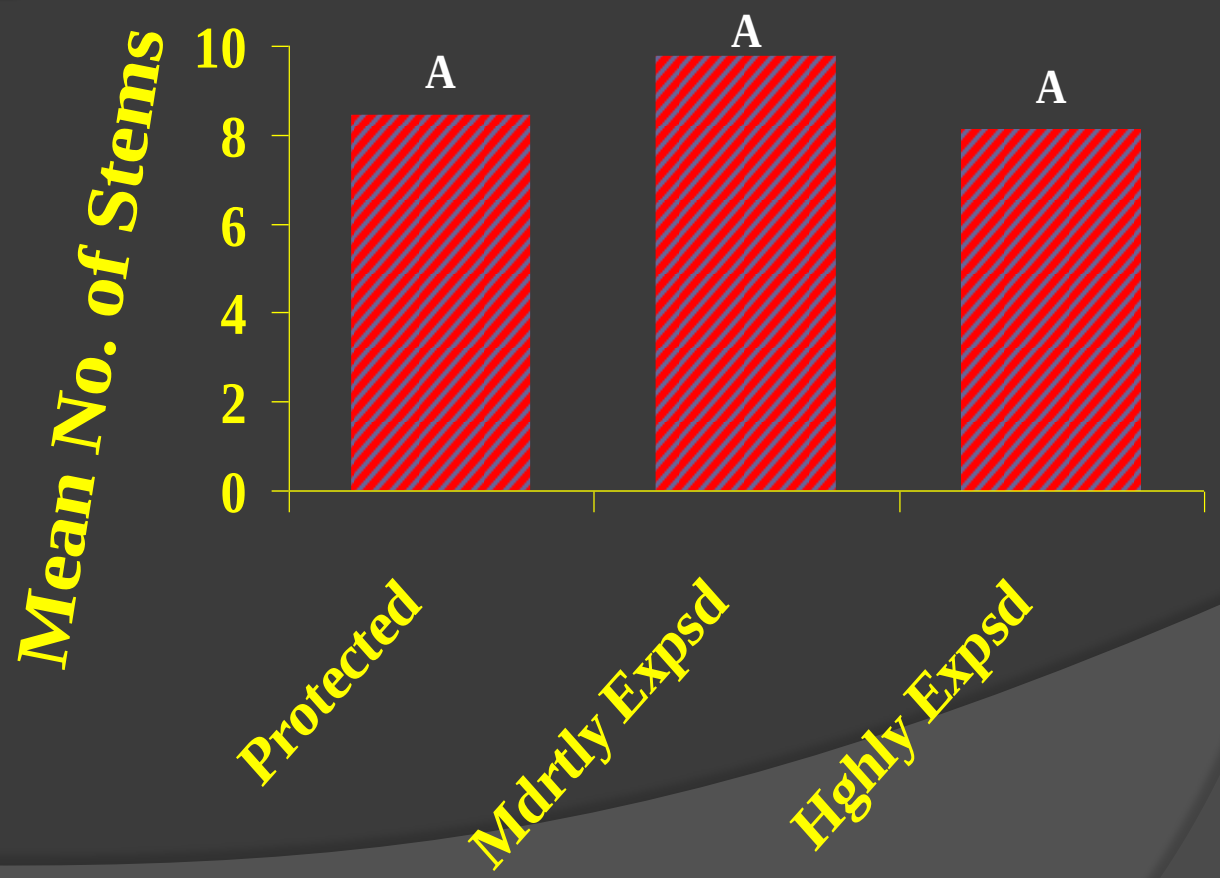




Effects of Sunlight Exposure on Survival of Stem Tip Cuttings



Effects of Wave Exposure on Survival of Stem Tip Cuttings



Application of Results

- **The use of stem tip cuttings appears to provide the optimal use of time and materials for est. water willow in lakes.**
- **Rooting hormone in combination with aeration, macro nutrients (slow release), and sulfur significantly enhances establishment of water willow and possibly other species.**
- **Planting more sites is preferred over fewer "large" plantings due to yet undetermined site specific effects on propagule survival.**

Aquatic Vegetation Introduction in Lake Paradise, Coles Co., Illinois

‘07-’08

Michael Mounce – IDNR

240 Exclosures

Materials

30 rolls (100') - PVC-coated wire mesh (**2"x4"x48", 14 Ga**.) - cut 10' & 20' pieces

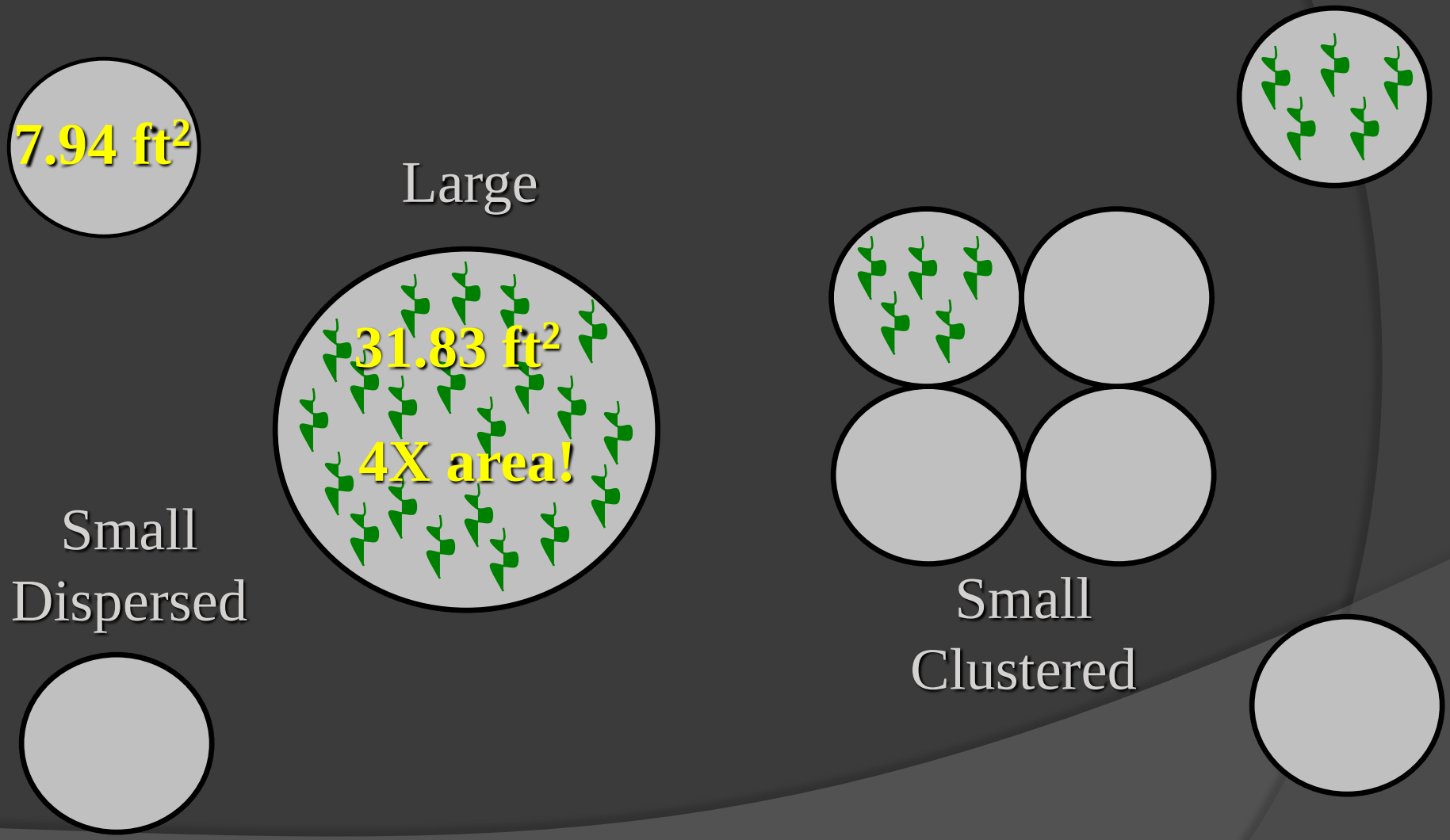
660 sticks rebar - (**6.7'x1/2", 60 grade**)

@ 2,000 Plastic Cable Ties - (**120 lb., 14", UV resistant**)

@ 1,250 Plastic Cable Ties - (50 lb., 8", UV resistant)

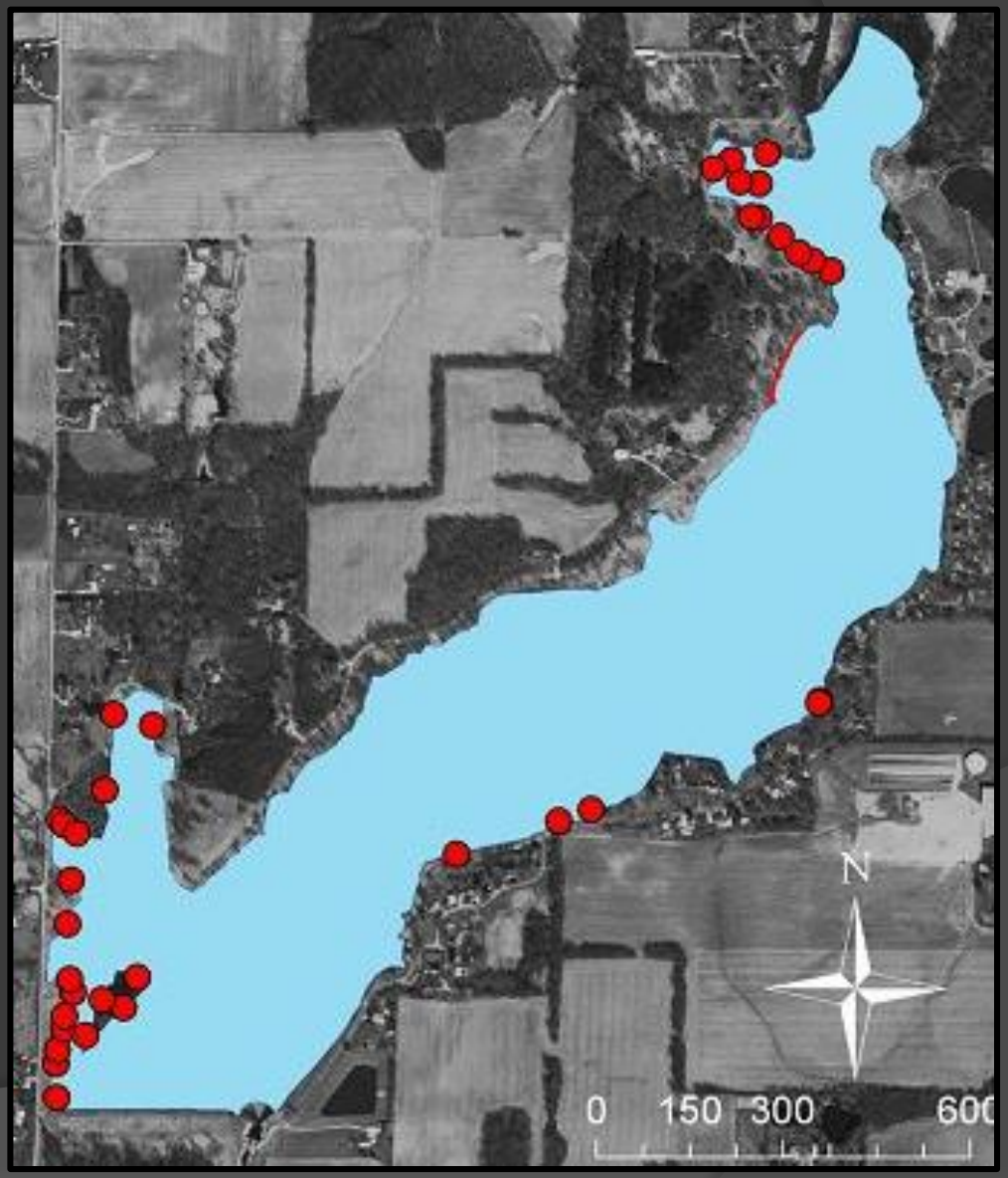

DEPT OF NATURAL RESOURCES

Exclosure Size - Bigger?



Planting Considerations - Exclosures

Sheltered from SW wind exposure due to **potential ice damage**

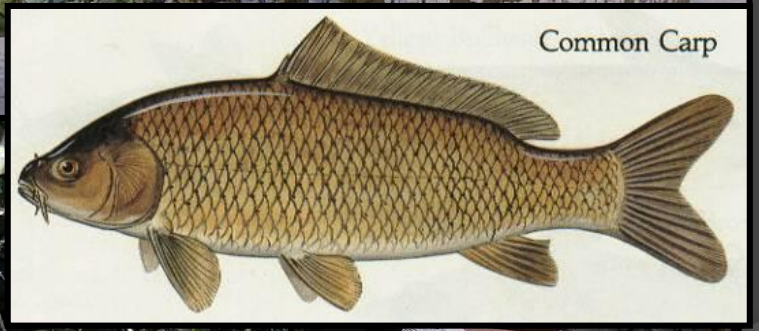


Disaster ?

Emergent Species

Emergent Species

Troubles



Self-Perpetuating Habitat

Can be planted directly -

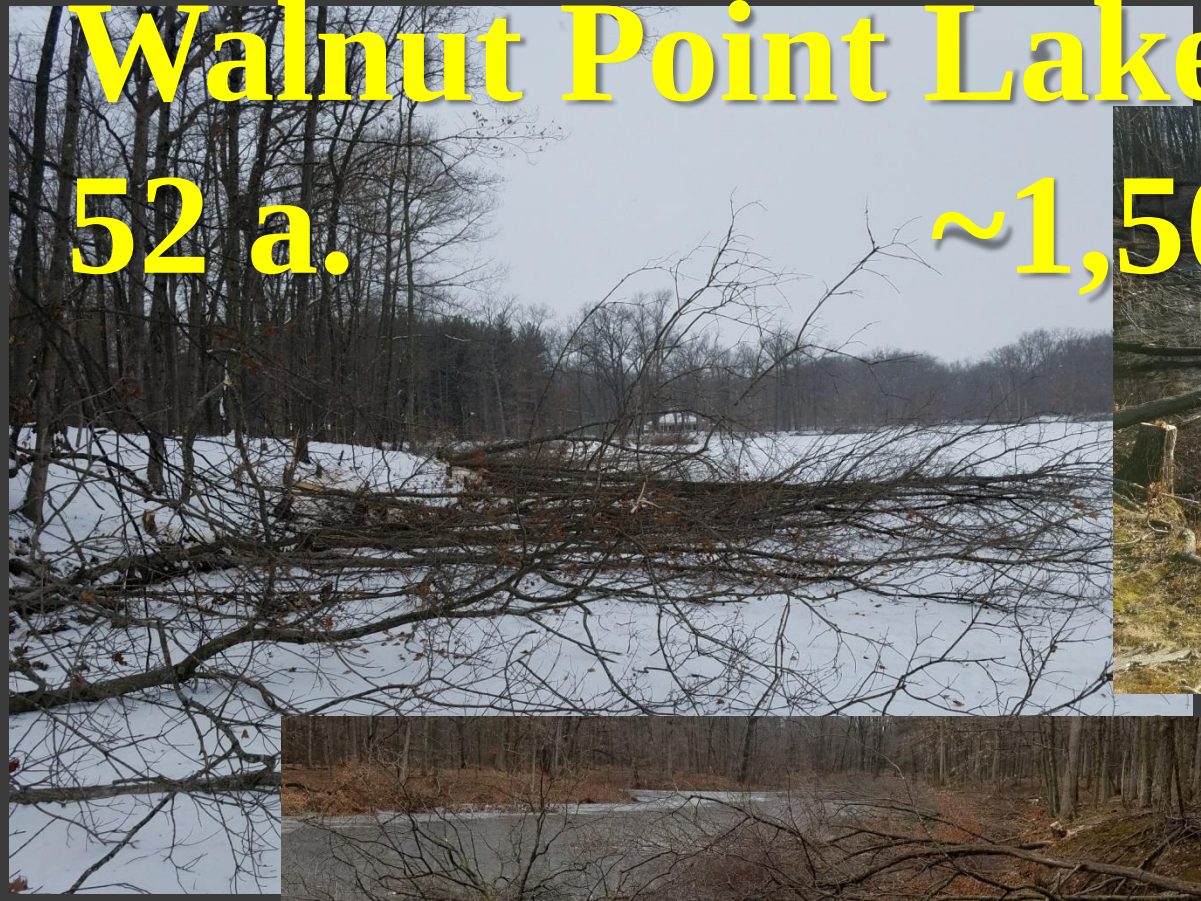
shallow better than too deep


RAM 1500

Walnut Point Lake 2018,

52 a.

~1,500+ Trees



PURPOSE

Habitat (INHS)

Sunlight-

Penetration

Shoreline

Woods

Effective Habitat is a Function of Both Quality and Quantity

Improved Habitat Quality Will Provide Stability in Fish Populations