



# AQUATIC WEED REMOVAL

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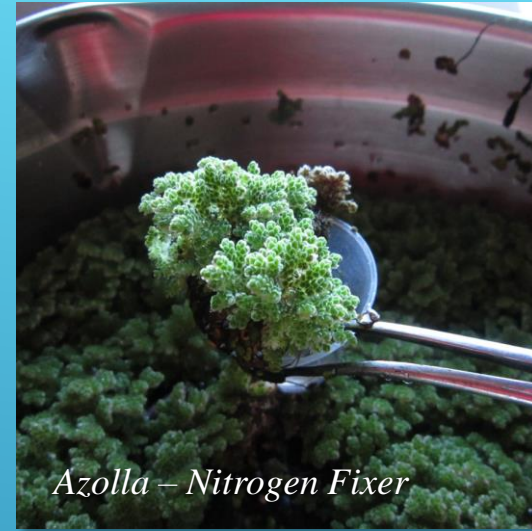
SUPPORTED BY UI ARBORETUM ASSOCIATES

# PROBLEM – ARBORETUM PONDS

Weed  
Overgrowth



Eutrophication  
(Nutrient Buildup)



TYPES: *Azolla*, duckweed, water meal

CONSISTENCY: Floating, granular

COMPOUNDING FACTOR: Nitrogen Fixing

# NEEDS/SPECIFICATIONS



## PROBLEMS:


- Unreliable
- Expensive
- Labor intensive
- Harmful to other pond life



What didn't  
work.

What's  
needed:

- Low-labor (comparatively)
- Low-weight
- Safe
- Improve pond health (preferred)

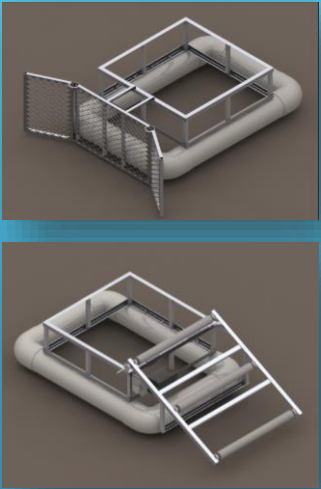
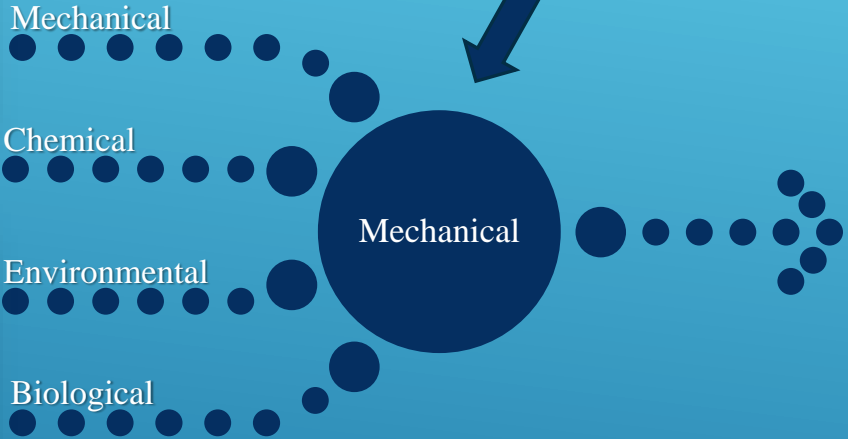


Need	Spec
Labor	8 man-hours per week (or less)
Maneuverability	Movable by 1-2 people (no component more than 100 lb)
Cost	Under \$15,000

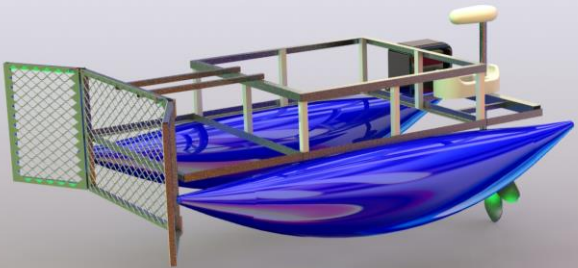
# DESIGN DECISIONS



*Arboretum Associates Input*

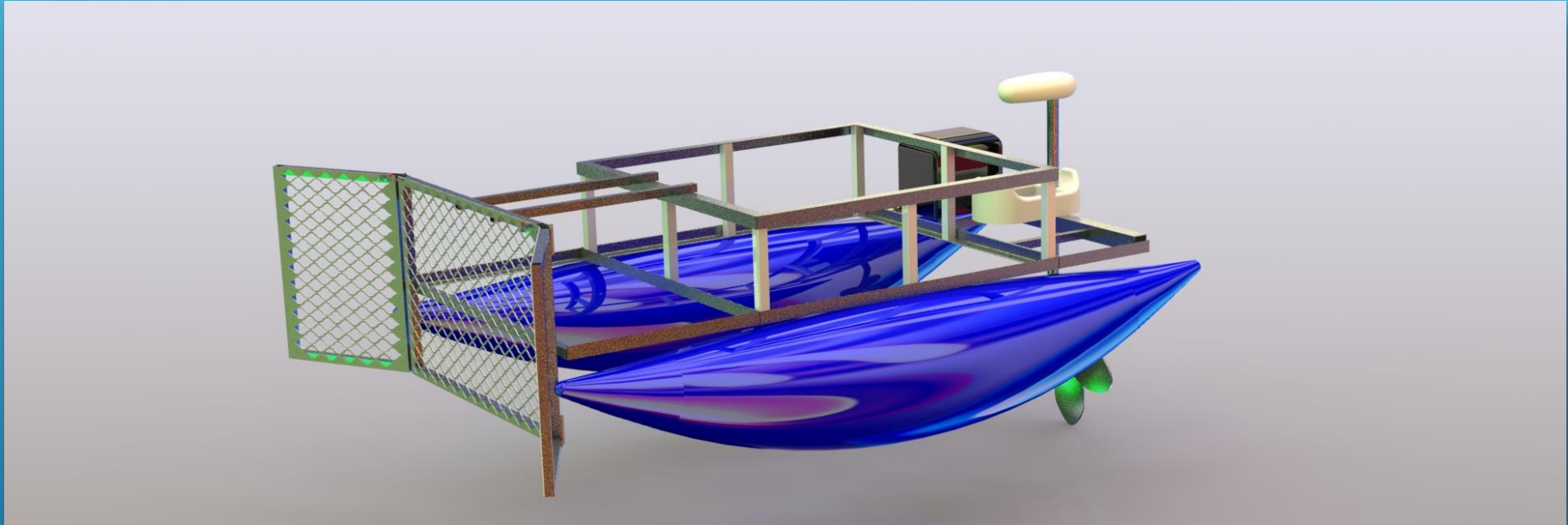


*Final Design*



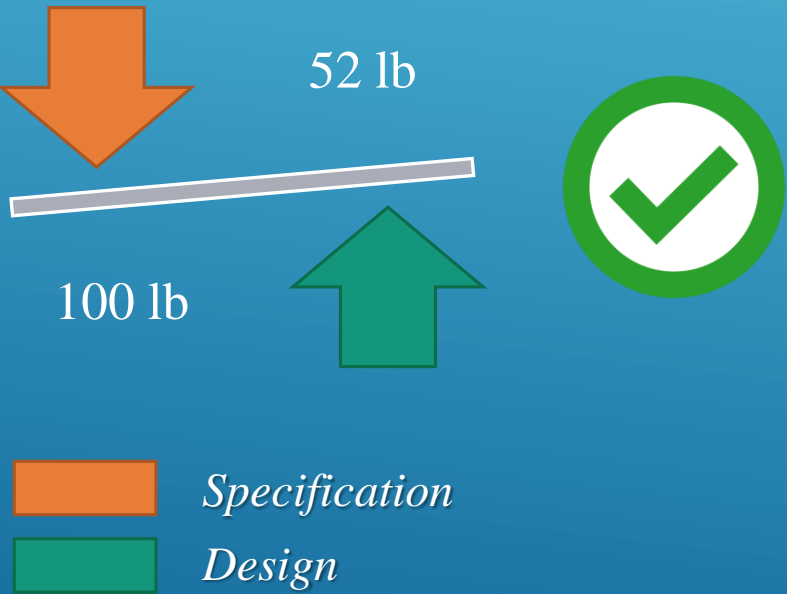


# FINAL DESIGN FOR PROTOTYPE

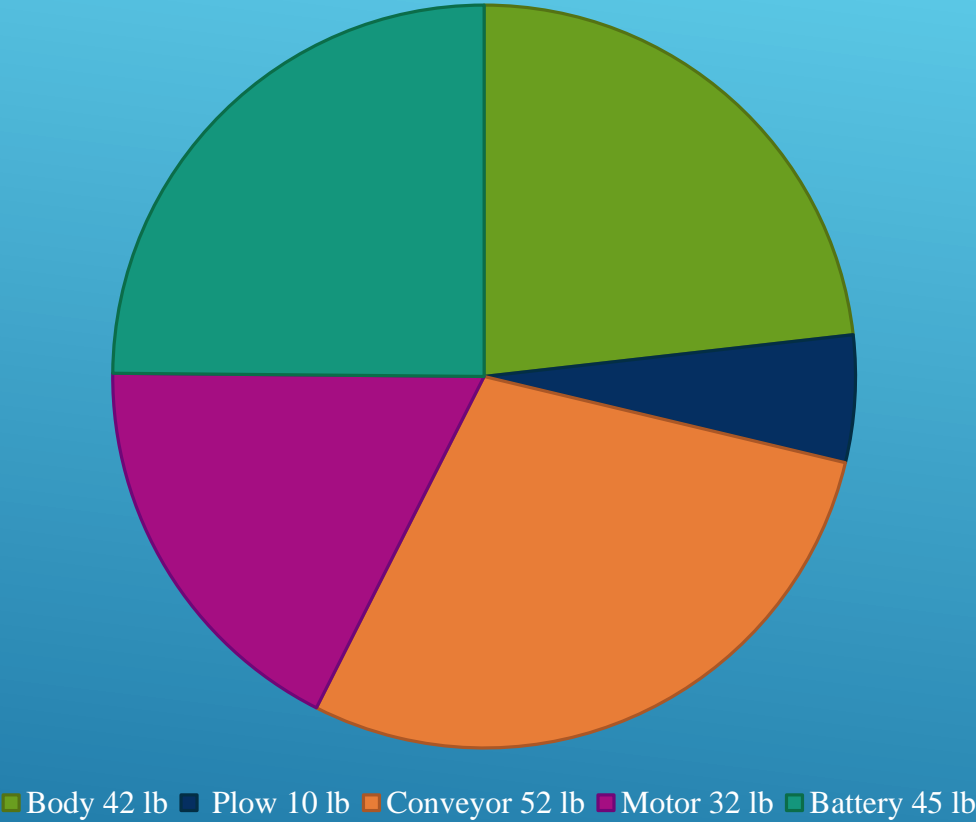


# DESIGN EVALUATION: WEIGHT

*Heaviest Component  
(compared with requirement):*

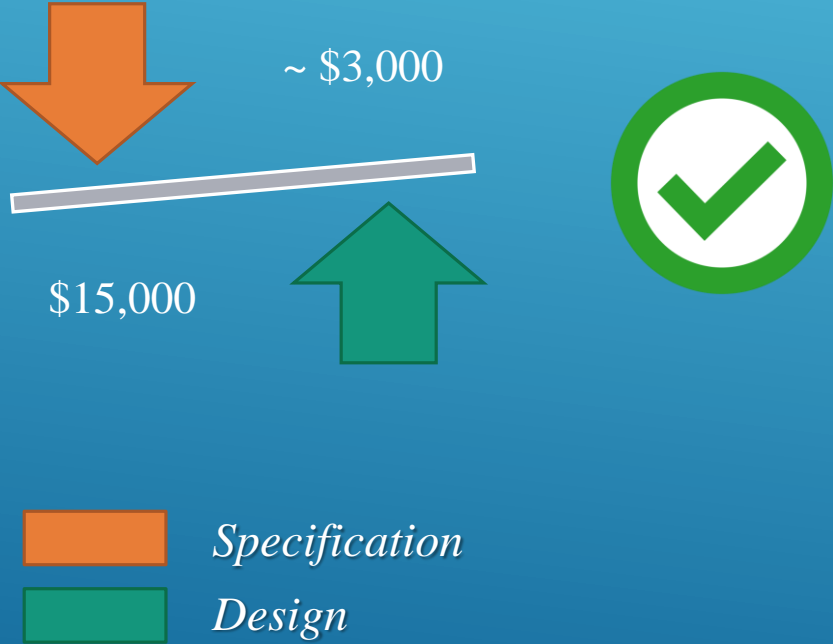


Component Weights

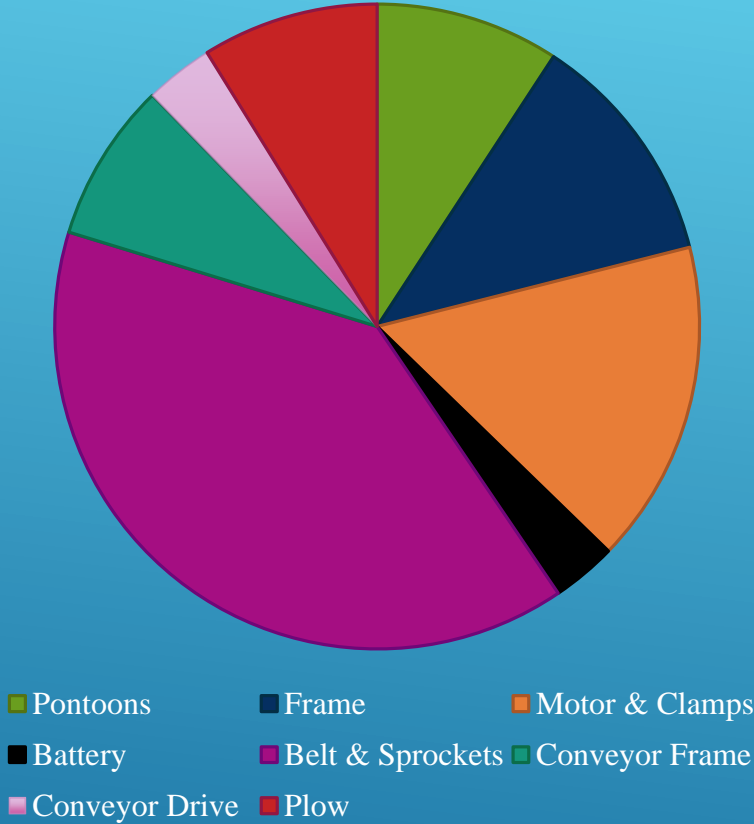


# DESIGN EVALUATION: COSTS

*Cost (compared with requirements):*



Component Cost Proportions



*Cost of final design does not include all shipping etc. or PVC. Full accounting will be provided in Final Report. Spending leaves plenty of room for on shore conveyor & RC improvements.*

# DETAIL: BODY & MOTOR



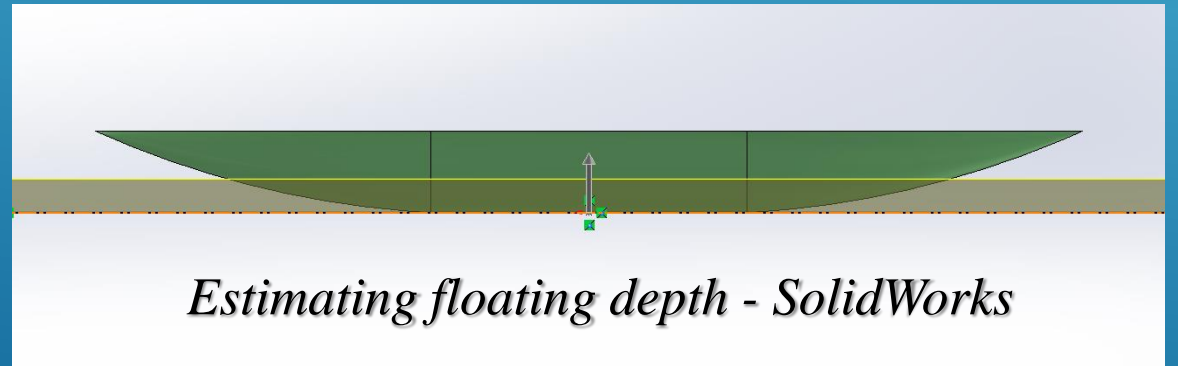
*Old Pontoons*



*New Pontoons*



*Frame with Pontoons*

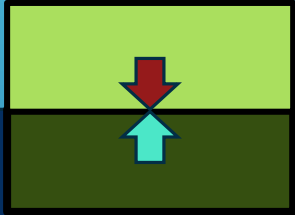


*Estimating floating depth - SolidWorks*



# DETAIL: BODY & MOTOR

## WEED COLLECTION:



*Weeds self-support*

*Weeds support their own weight in water – basket removed under boat for convenience.*

*Azolla ~ 17 lb/ft<sup>3</sup>. Keep in mind when filling basket.*



*Basket opening: 42"x42"*

## MOTOR & CONNECTION:



*Conversion Clamps*



*Battery Connection*



*Cayman Haswing Trolling Motor*

## DETAIL: PLOW



*Plow on Body*



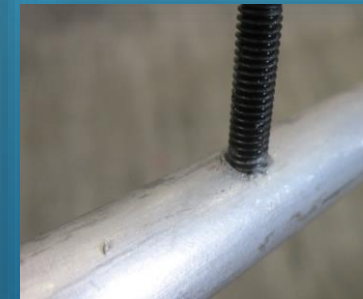
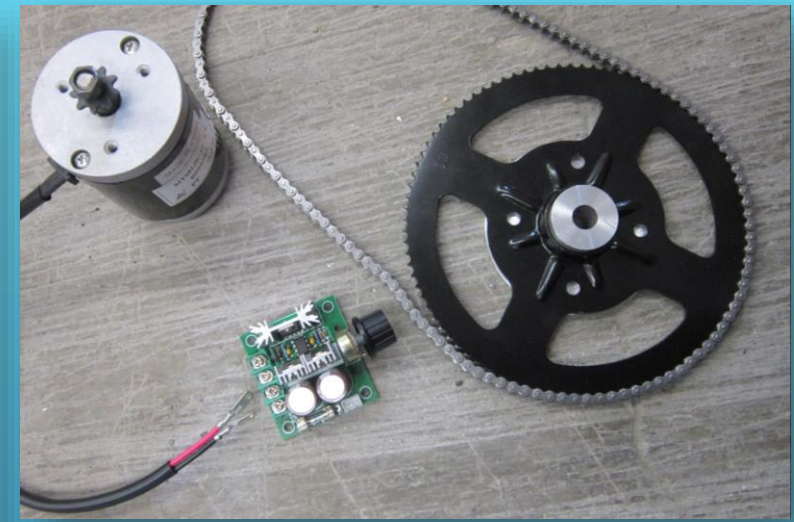
*Adjustment Mechanism*



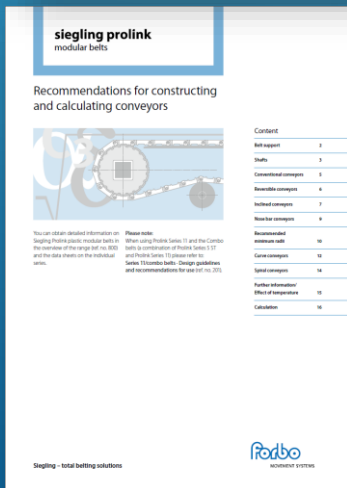
*Suggested On-Shore Conveyor  
(\$2,500)*



*Conveyor Frame*



*Drive System* ↑  
← *Belt*



## Densities and coefficients from Forbo, plus:

Belt Speed	65 ft/min
Axle Distance	4 ft
Azolla Density	17 lb/ft <sup>3</sup>





# CONSTRUCTION OVERVIEW:

*With a few exceptions, large-scale simple design. Easy to modify.*



*Sewing Straps*



*Milling Holes*

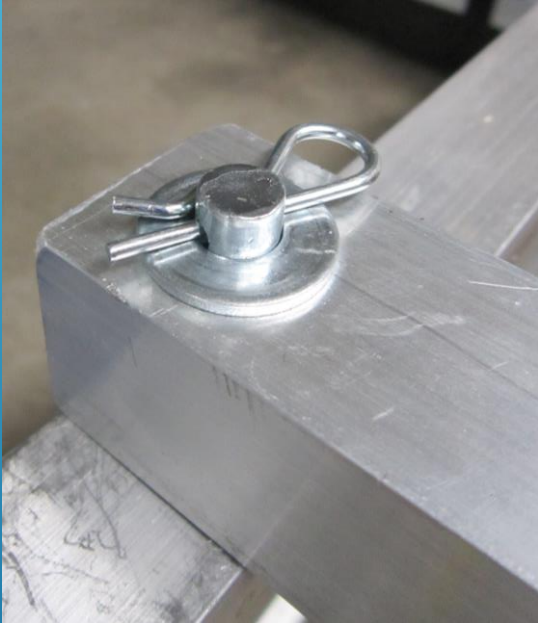


*Pontoon Attachments*



# RECOMMENDATIONS/CONTINUING WORK

## RECOMMENDATIONS FOR USE:



*Plow Connections*

- *Attachments easily removable with cotter pin – not recommended to transport assembled*
- *Operate with tether until RC connection is reliable*
- *Allow to dry after use*
- *Oil conveyor drive chain periodically*

## FUTURE WORK:



*Motor Remote*

- *Remote Extension*
- *Integration of kill switch & conveyor controls*
- *Automate plow*
- *Keep looking into larger solutions\**

QUESTIONS?