
Welcome
Diver Assisted Suction Harvesting
Wisconsin Lakes Convention
March 30, 2016

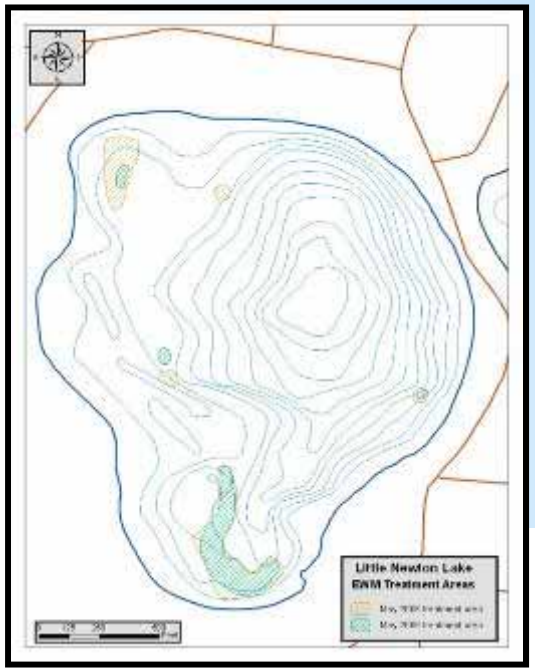
Brief History

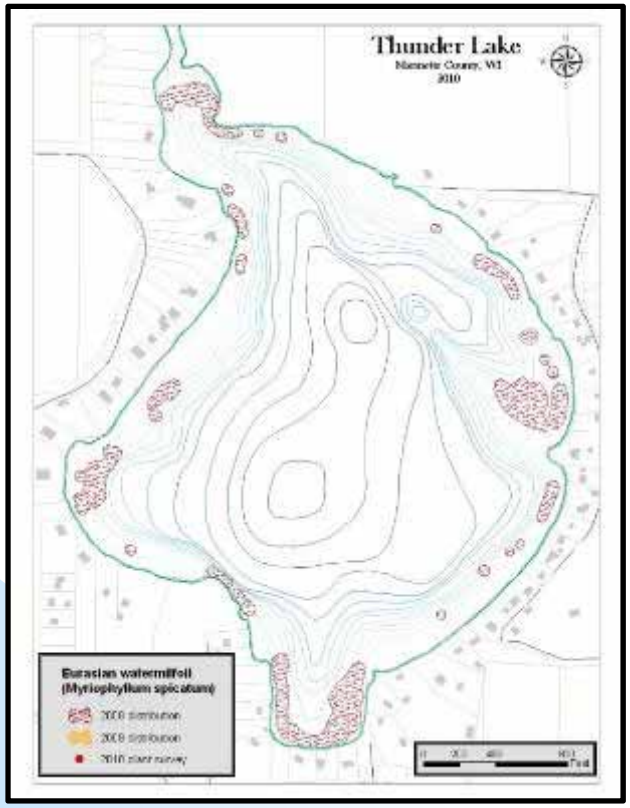
2007 - Discovered EWM in Beecher Lake (72 ac) and Little Newton Lake (60 ac)

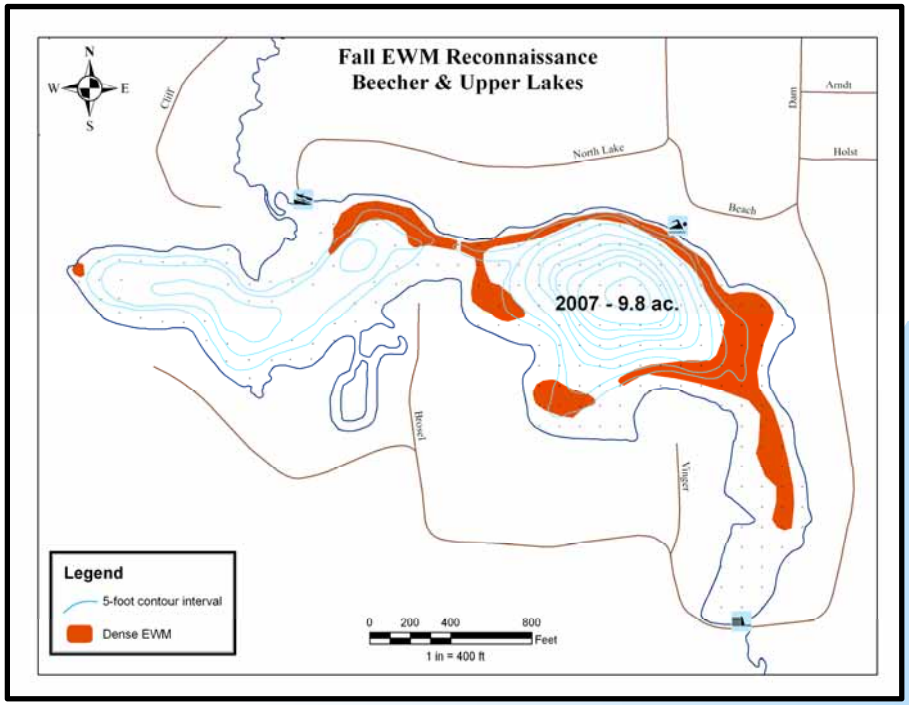
- AIS grants on both lakes to develop management plans and control EWM

2009 - Manage existing EWM population in Thunder Lake (135 ac)

- Lake Management Planning Grant







Chemical Control

- Effectiveness has varied
- Controversial
- Not applicable for low density populations

Manual Harvesting

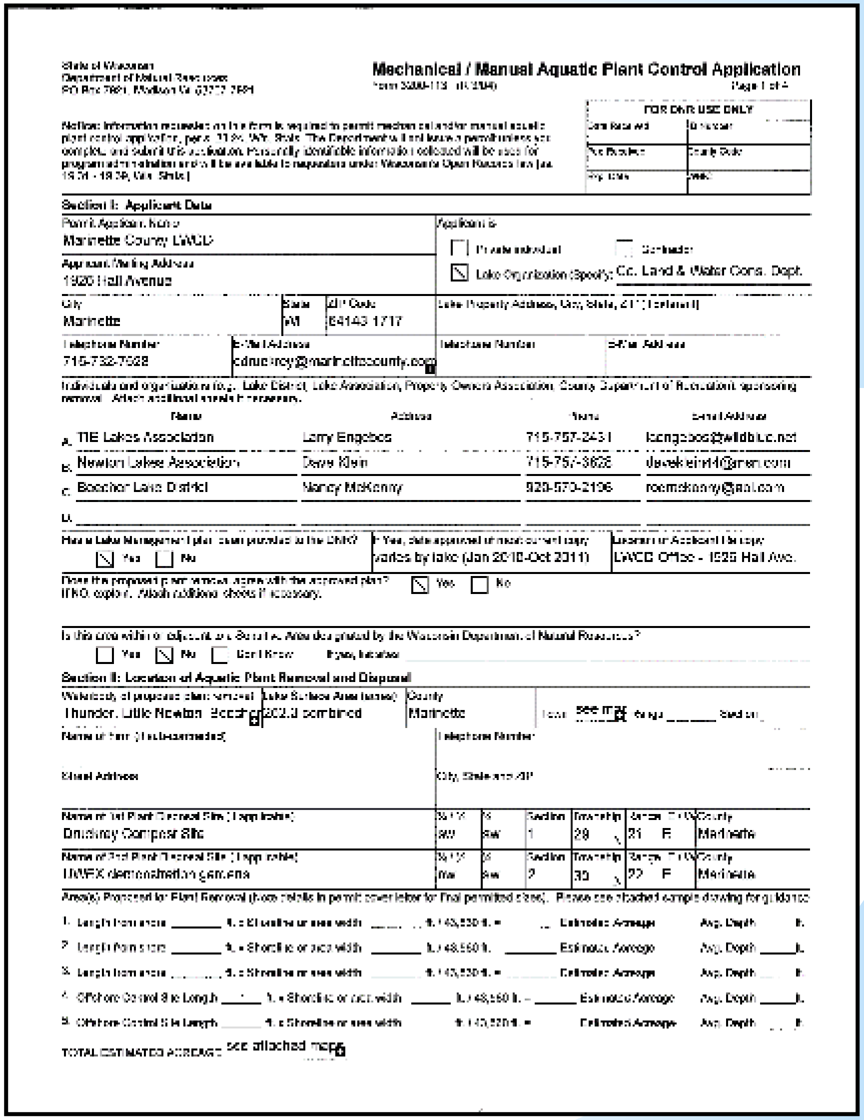
- Difficult in deep water
- Difficult with very large plants
- Labor intensive

2012 AIS Control Grant

- Provide funds for construction of a Hydraulic Harvester
- Cost of Boat/motor/trailer was not grant eligible
- Equipment (pumps, hoses, dive gear) is grant eligible
- County match includes boat and lots of time

APM Rules and Permitting

- **DASH should be part of a comprehensive APM plan.**
- **Permitted under NR109 –**
  Manual and Mechanical Aquatic Plant Control
- **As practiced, suction Harvesting is not considered dredging:**
  - **Plants are removed by hand**
  - **Sediment removal is incidental to plant harvesting (sediment attached to roots)**


Mechanical / Manual Aquatic Plant Control Application

Section I: Applicant Data

Marinette County LWCD

1926 Hall Avenue

Marinette | WI | 54143 1717

715-732-7528

Co. Land & Water Cons. Dept.

TIE Lakes Association | Larry Engebos | 715-757-2431

Newton Lakes Association | Dave Klein | 715-757-3628

Beecher Lake District | Nancy McKenny | 920-570-2136

varies by lake (Jan 2010-Oct 2011)

LWCD Office - 1926 Hall Ave.

Section II: Location of Aquatic Plant Removal and Disposal

Thunder, Little Newton, Beecher | 202.3 combined | Marinette

Druckrey Compost Site | SW | SW | 1 | 28 | 21 E | Marinette

UWEX demonstration gardens | SW | SW | 2 | 30 | 22 E | Marinette

TOTAL ESTIMATED ACREAGE: see attached maps

Building a Hydraulic Harvester

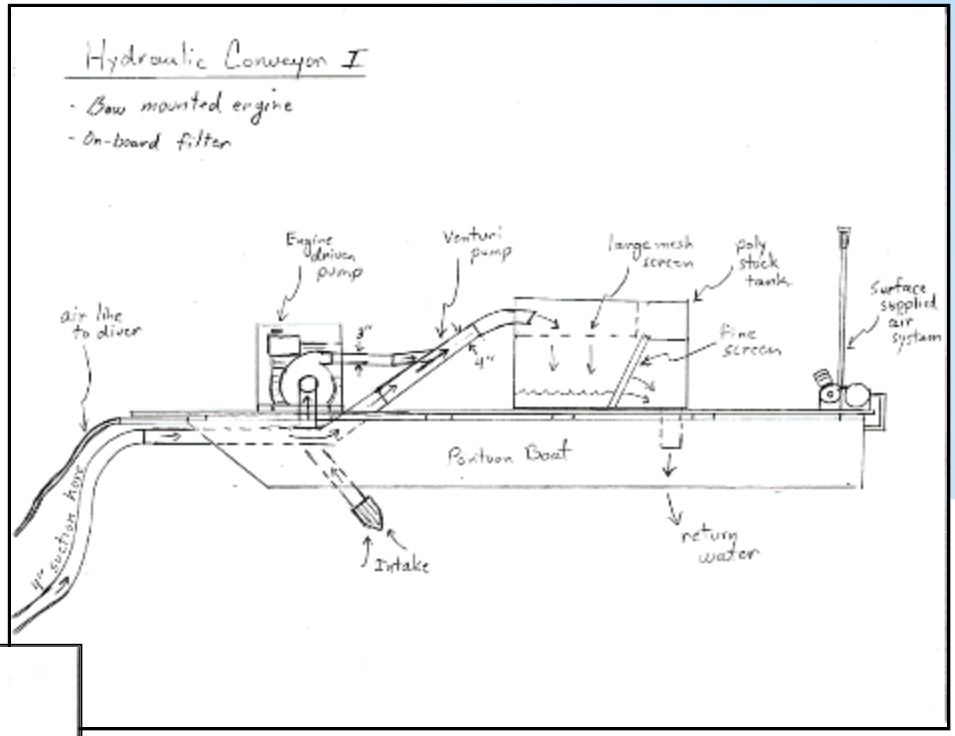
The Marinette Co. experience

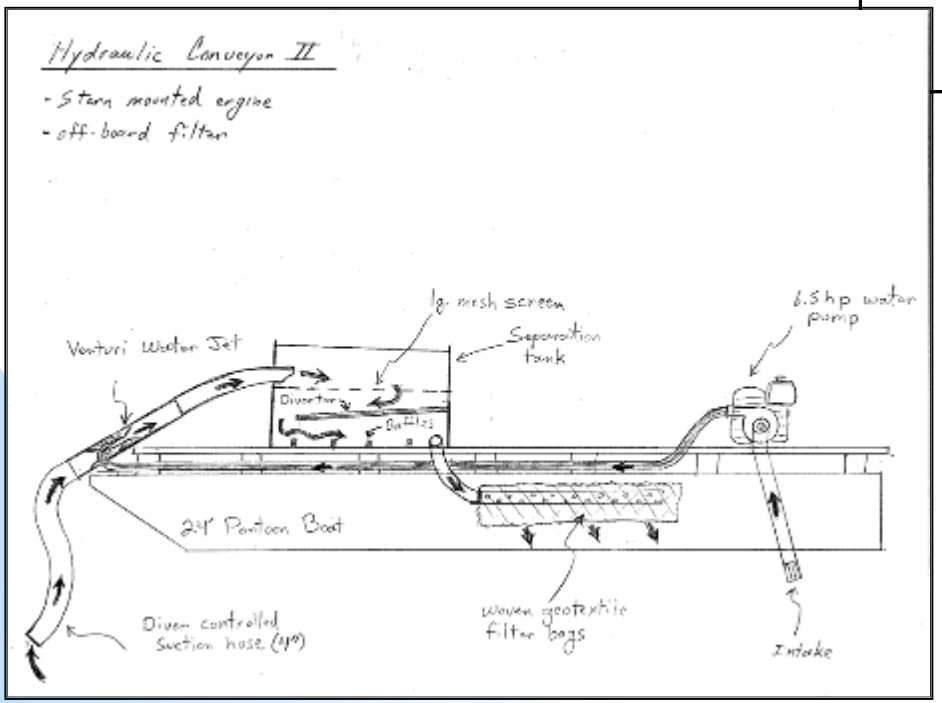
Don’t reinvent the wheel!

Lake Tomahawk suction harvester

Design Goals:

- Increased hydraulic efficiency
- More compact plant separation device
- Better return-water filtration





- Use an engineered venturi
- Fewer tight radius bends
- Increase filter area
- Filter return water off the boat

The “Guts” of a hydraulic harvester:

Water jet (venturi)

Engine-driven high pressure water pump

Suction is created by passing high pressure water through the water jet

Our working platform started life as a 24-foot Sun Tracker Party Barge

American Marine & Motorsports in Shawano

Ask to see the pontoon boat graveyard


PARTY BARGE

Pumps and Equipment

- 389 cc Honda (11.7 hp)
- HP 500 pump
- Integrated air compressor
- Twin 2” discharge hoses
- Twin leg water jet
- 4” suction hose (smooth interior)
- 4” swivel tip
- Lots of clamps and fittings

The pump and compressor are housed in a cabinet to the rear of the boat

Hoses are routed under the deck on top of the pontoons

The water jet is mounted on a sliding board that can be raised for trailering

The return water filtration system starts with a 175-gallon stock tank with a couple of toilet flanges in the bottom

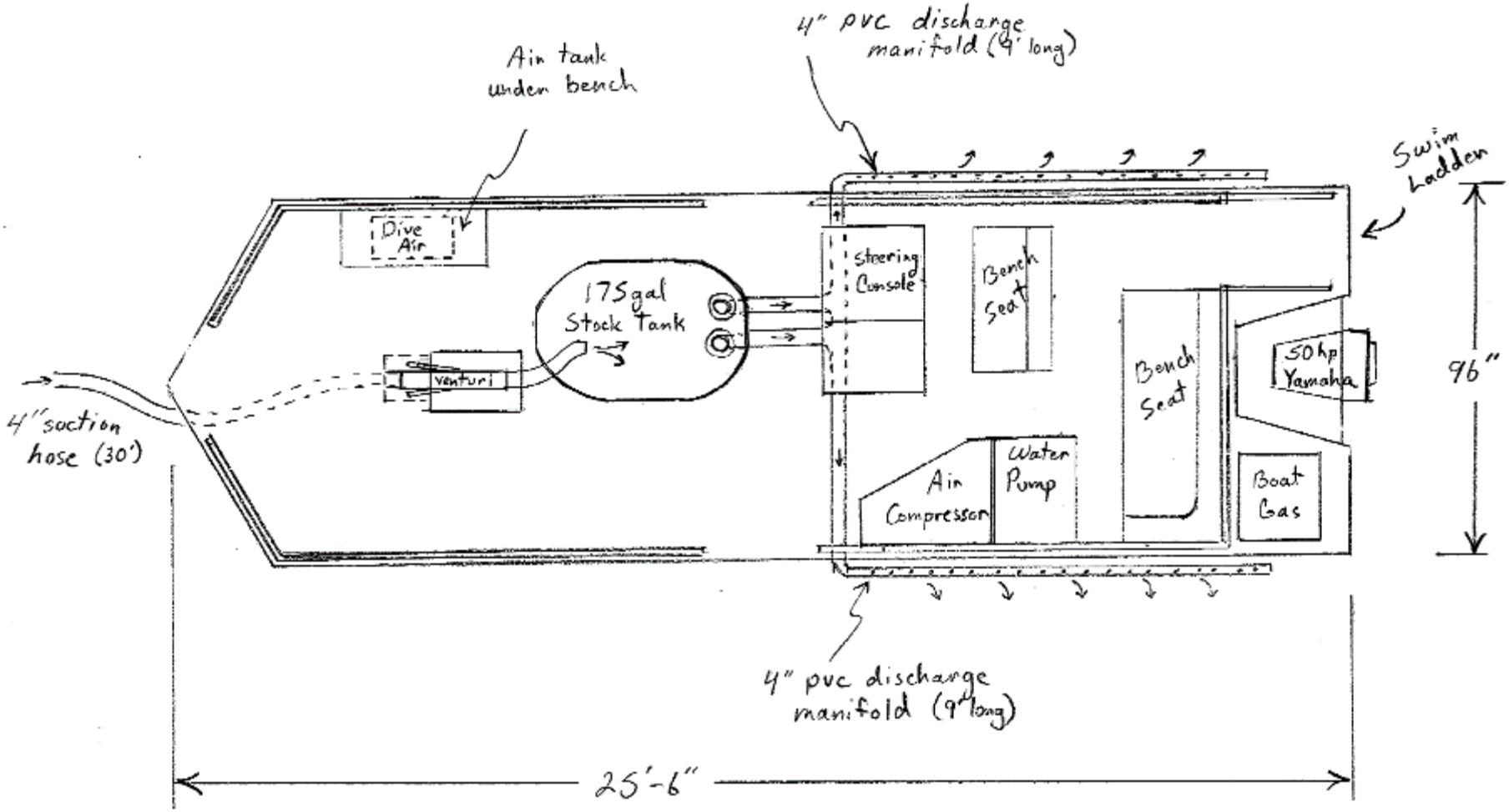
Plants are deposited on a ¼-inch wire mesh screen

Water drains through 4” pvc pipes and fittings

Return-water manifolds on each side of the boat are made from perforated sewer pipes covered with custom-made mesh bags

Hydraulic Harvester
Plan view scale - 1"=3'

Marinette Co. LWCD
3/15



Hydraulic Harvester
Side view scale - 1"=3'

Marinette Co. LWCD
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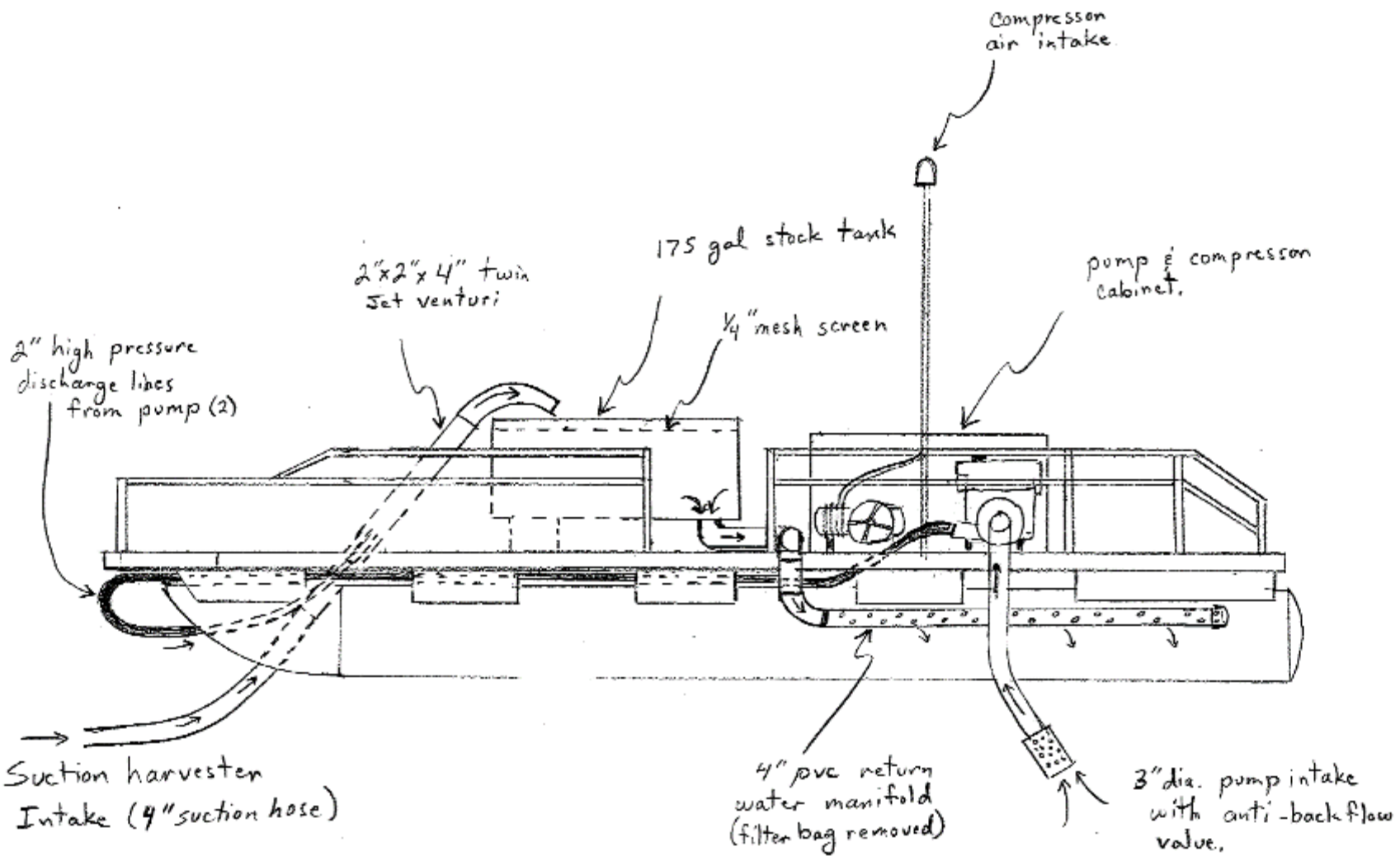


Costs

➢ **Boat (used), Motor (used) and Trailer (new)**	**$8,222.00**
➢ **Hydraulic Gold Dredge Package** • 389cc Honda gas driven pump • 4” 2x2 power jet (venturi) • Integrated surface supply compressor • Accumulator tank and fittings • Hoses and fittings	**$4,924.00**
➢ **150 gallon stock tank, PVC pipe & fittings**	**$340.00**
➢ **Mesh filter bags (min. order of 6 bags)**	**$230.00**
➢ **Miscellaneous supplies, fittings & hardware**	**$1,500.00**
	$15,216.00

What we have learned from this build:

- Get a big boat – the space fills up fast
- Our system has plenty of power
- Quick connectors for the hoses are a must

Any questions about the design and construction process?

DIVE

EQUIPMENT

Surface Supplied Air

Recreational (hookah)

- Small compressor - air hose -second stage regulator

Commercial

- Compressor & accumulator tank – umbilical (air/tether/communications) – full face mask or helmet

- (+) You won't run out
- (-) Unless the compressor quits
- (+) Tethered to the boat
- (-) Tethered to the boat

SCUBA

Self
Contained
Underwater
Breathing
Apparatus

- (-) Limited air supply
- (+) Not tethered to the boat
- (-) Not tethered to the boat

OSHA requirements for commercial diving

- I am not a lawyer or OSHA inspector
- Solo diver must be tethered to the boat
- Primary air supply (surface)
- Backup air supply (tank)
- Communication link
  - Requires a full face mask or helmet
- Diving Safe Practices Manual

Marinette County Air System

- Air compressor
  - Integrated with water pump
  - (+) Less expensive than a stand along engine and compressor
  - (-) Water pump must be primed and running to get air

- Accumulator tank
  - Provides a few minutes of air after the compressor stops
- Scuba tank
  - Backup air supply
  - Air supply for buoyancy control

Wireless Communication

- Face mask with built in microphone
- Underwater receiver
- Top-side receiver with headphones

Use your local dive shop!

More Dive Gear

- Dry/wet suit
- Buoyancy control vest
- Backup air tank
- Fins
- Weights
- First stage, gauges & hoses
- Air selector switch

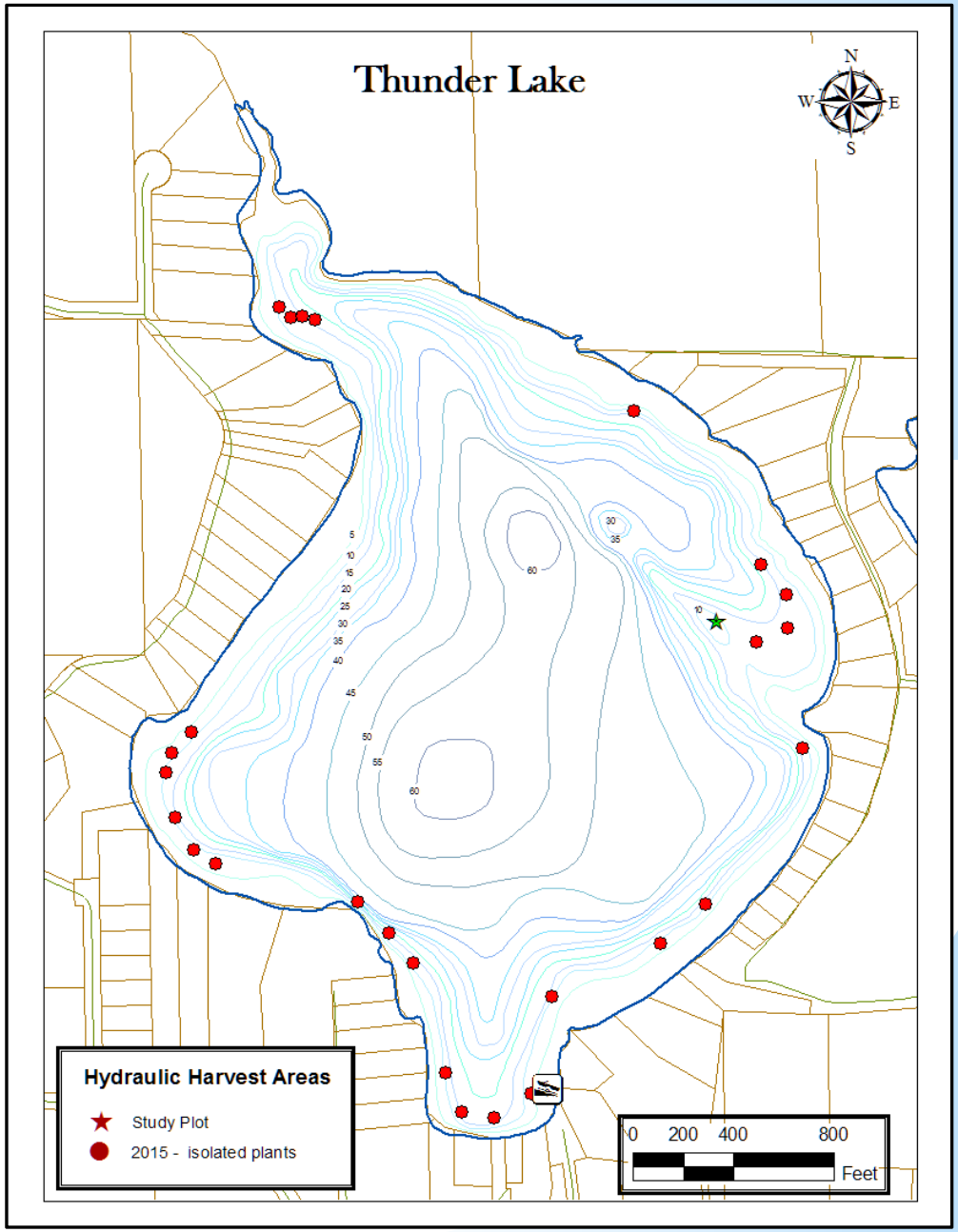
Costs

➢ Dry suits (2)	$2,150.00
➢ Guardian OTS full face mask • Wireless communication system • Surface communication unit	$2,500.00
➢ Buoyancy control vest	$250.00
➢ Personal dive equipment • Masks, snorkels, hoods, gloves, etc.	$600.00
➢ 50 cu ft air tanks (2)	$260.00
➢ Regulator and gauges	$275.00
➢ Isolator valve (air supply selector switch)	$320.00
➢ Misc. hoses and fittings	$250.00
	$6,605.00

Work Planning

Start with EWM reconnaissance (GPS EWM areas for harvesting)

At the start of the day mark individual plants or small stands with buoys



Operating Procedures

- Suit Up
  - Don the wet/dry suit
- Prime the pump
  - You don't want to sit around in full gear if there are pump problems
- Gear Up
  - Don BC and mask
  - Hook up and test air supply
- Connect the suction hoses
- Get to work

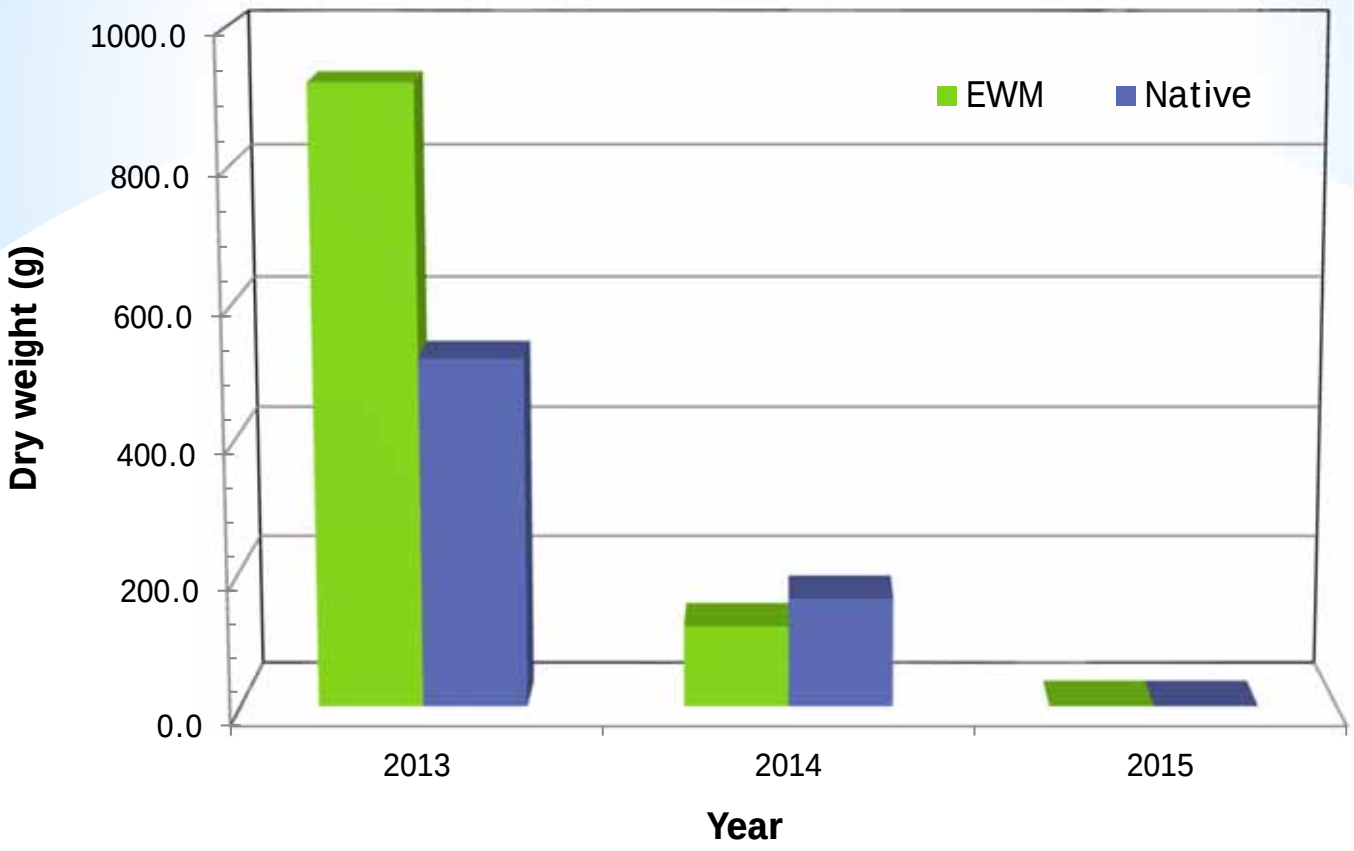
Staff on the boat assists the diver, monitors equipment, and bags aquatic plants.

Grab the root crown, uproot the plant, and feed it into the suction hose… the “above ground” portion of the plant follows and is transported to the surface with minimal fragmentation


Feed the plant in first then follow the stems down
to the root crown with your hand and rip it out


This one’s not coming back!

DASH Test Plot Results



* Test plot is 225 ft^2 square (15ft x15ft) located in 10 feet of water

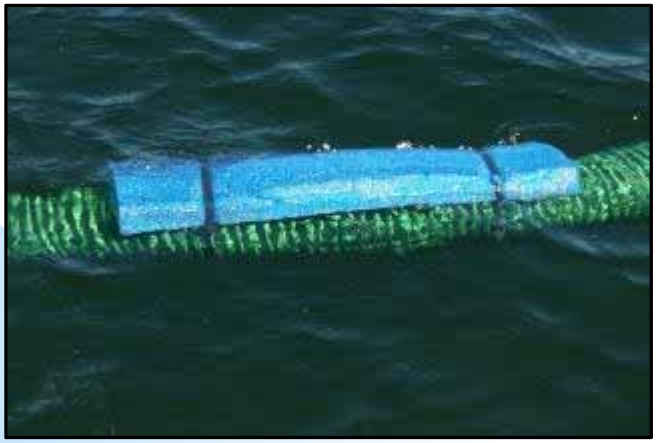
All EWM harvested, air dried, and weighed

Factors Effecting Harvest Efficiency

- Sediment type
- Depth
- Time of year
- Age of plants
- Associated plant community
- EWM density

Lessons Learned

- Shakedown Cruise
  - Pump Priming
  - Filtration
  - Hoses fittings and flotation
  - Things Break
- Operations
  - Positioning/Moving the boat
  - Dealing with wind
  - Live-boating
  - Diver buoyancy control




Questions?