

# Hydrilla Eradication Challenges, Partnerships and Lessons Learned

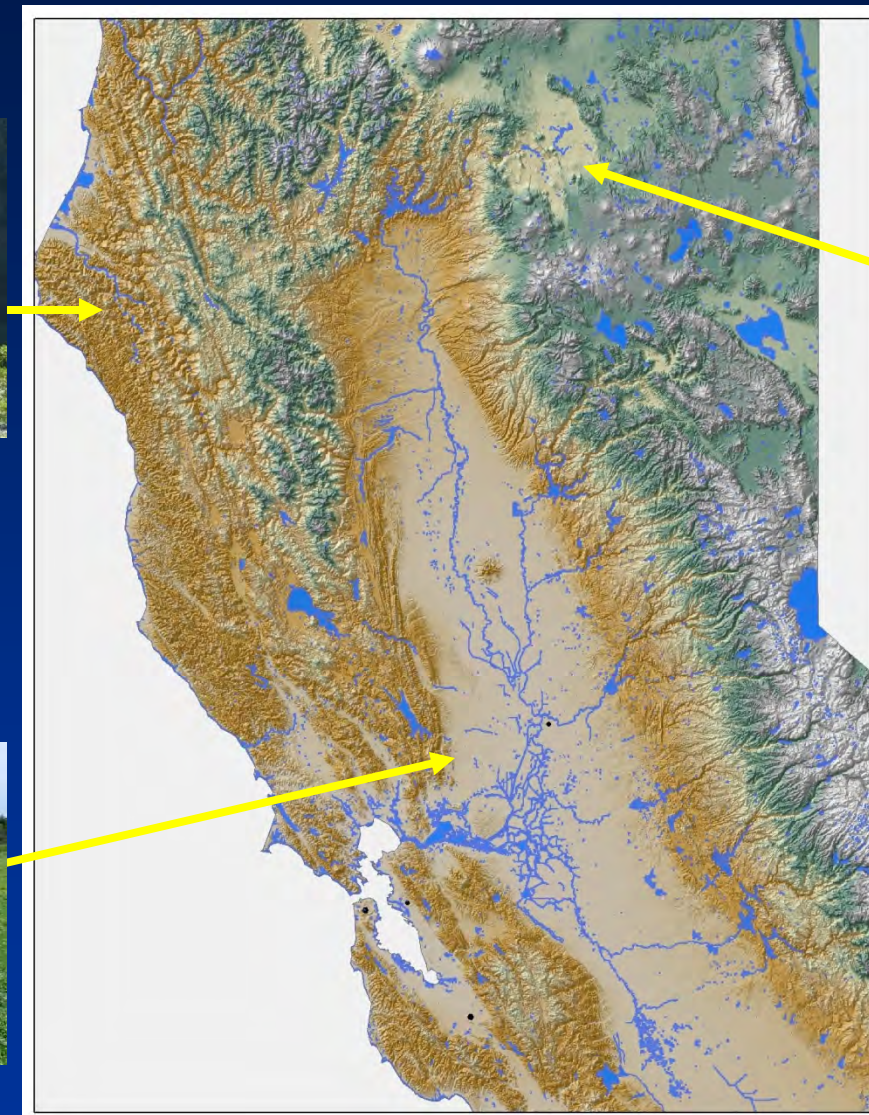
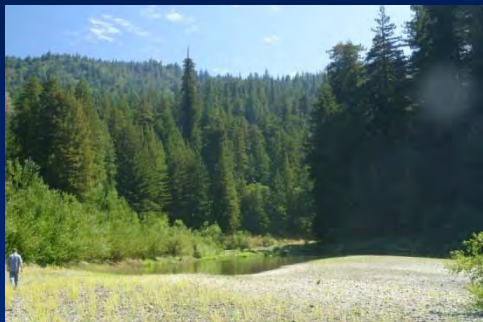
David Kratville

Calif. Department of Food and Agriculture

# California Department of Food and Agriculture

- Food and Ag. Code sec. 7271. (a) The Legislature designates the Department of Food and Agriculture as the lead department in noxious weed management and the department is responsible for the implementation of this article in cooperation with the Secretary of the Natural Resources Agency.

# California Department of Food and Agriculture Purple Loosestrife Control Project



## California Department of Food and Agriculture Central California South District

### Noxious Weed Program Regional Districts 2008



Integrated Pest Control Branch

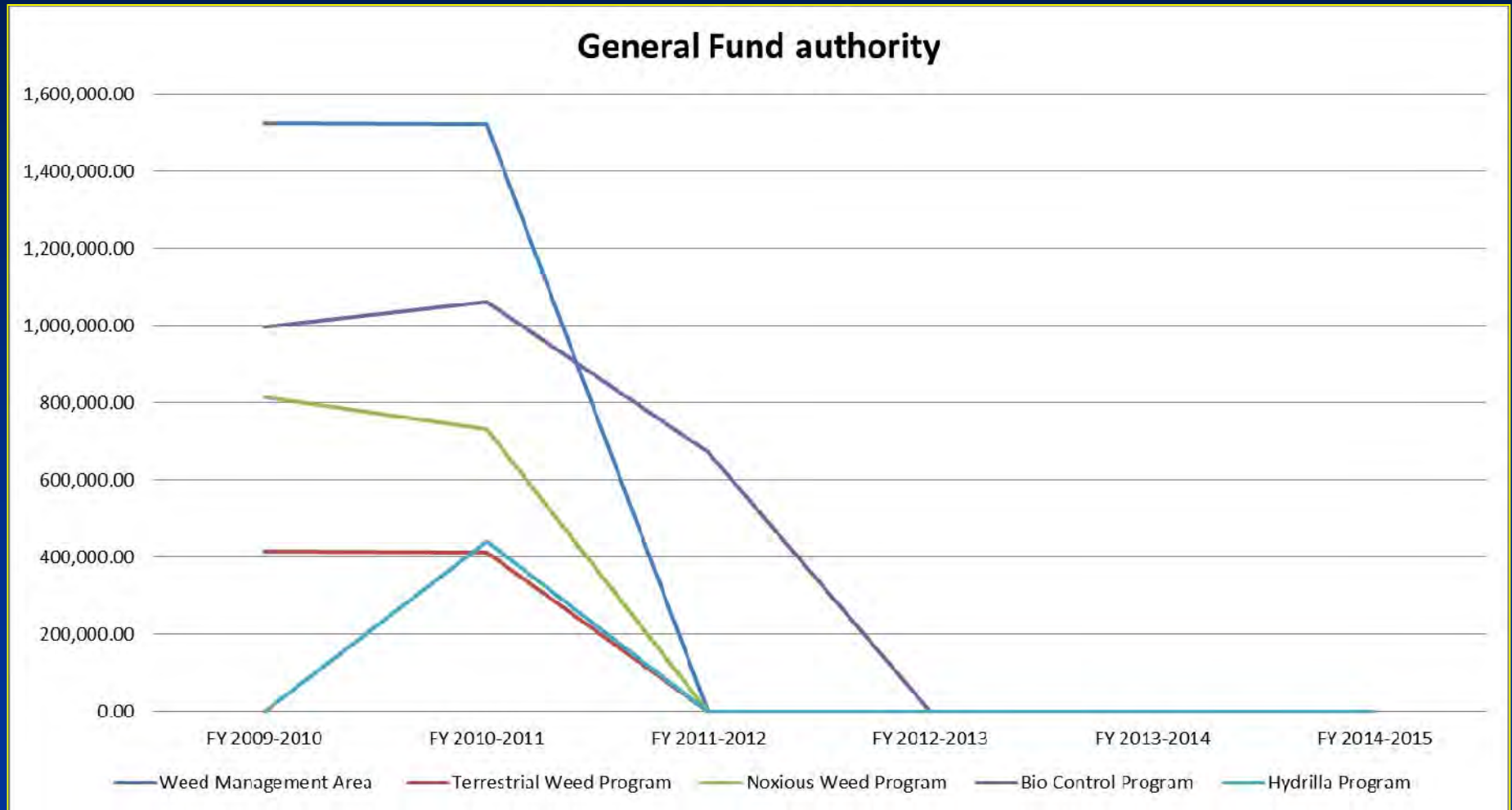
Map Produced By: Colleen Murphy-Vierra

Map/Info/01/01/01/01/01/01

- Conducted noxious weed survey, mapping and eradication
- Administered Weed Management Area agreements
- Noxious Weed training
- Assisted Biological Control Program



# Integrated Pest Control Funding Issues



# Sec. 4500 Noxious Weed List & Weed Pest Rating

## Amend Section 4500 to read:

### § 4500. Noxious Weed Species.

It has been determined that the following species of plants are noxious weeds within the meaning of Section 5004 of the Food and Agricultural Code:

*Acacia paradoxa* (Kangaroo thorn)  
*Acaena anserinifolia* (biddy biddy)  
*Acaena novae-zelandiae* (biddy biddy)  
*Acaena pallida* (biddy biddy)  
*Achnatherum brachychaetum* (punagrass)  
*Acroptilon repens* (= *Rhaponticum r.*) (Russian knapweed)  
*Aegilops cylindrica* (jointed goatgrass)  
*Aegilops ovata* (ovate goatgrass)  
*Aegilops triuncialis* (barb goatgrass)  
*Aeschynomene* spp. (joint-vetch)  
*Aeschynomene rudis* (rough-jointvetch)  
*Alhagi maurorum* (camelthorn)  
*Ailanthus altissima* (tree of heaven)  
*Allium paniculatum* (panicked onion)  
*Allium vineale* (wild garlic)  
*Alternanthera philoxeroides* (alligatorweed)  
*Alternanthera sessilis* (sessile joyweed)  
*Ambrosia trifida* (giant ragweed)  
*Araujia sericifera* (bladderflower)  
*Arctotheca calendula* (capeweed, as seed or fertile plants)  
*Arundo donax* (giant reed)  
*Asphodelus fistulosus* (onionweed)  
*Atriplex amnicola* (swamp saltbush)  
*Berteroa incana* (hoary alyssum)  
*Brachypodium sylvaticum* (slender false-brome)  
*Cabomba caroliniana* (Carolina fanwort)  
*Cardaras chalepensis* (lens-podded hoary cress)  
*Cardaria draba* (heart-podded hoary cress)  
*Cardaria pubescens* (globe-podded hoary cress)  
*Carduus acanthoides* (plumeless thistle)  
*Carduus crispus* (curly plumeless thistle)  
*Carduus nutans* (musk thistle)  
*Carduus pycnocephalus* (Italian slender-flowered thistle)  
*Carduus tenuiflorus* (Italian thistle)  
*Carthamus baeticus* (smooth distaff thistle)

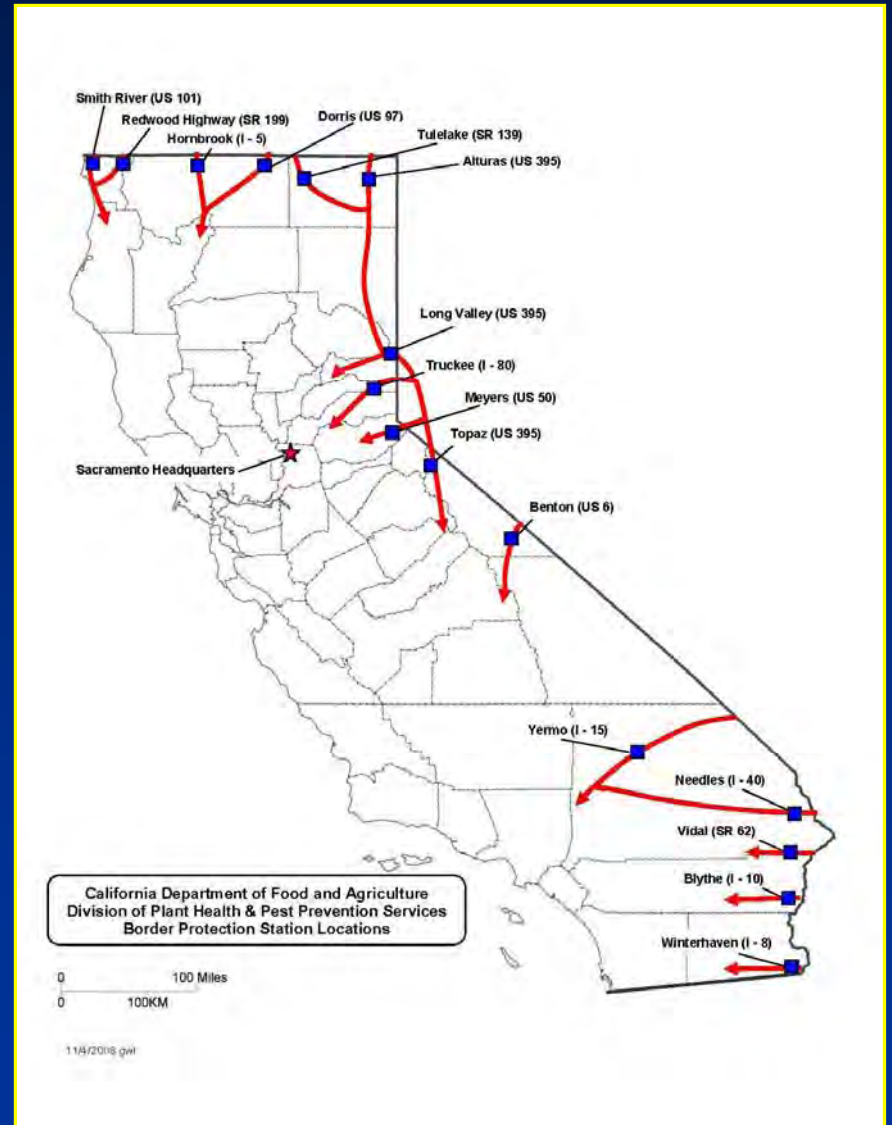
## Weeds

Title	Common Name	Scientific Name Genus Species	Proposed Pest Rating	45-Day Comment Period	Final Pest Rating Seed Rating
<a href="#">Bearded Creeper</a>   <a href="#">Crupina vulgaris Pers. Ex. Cass</a>	Bearded Creeper	<i>Crupina vulgaris</i>	Proposed Pest Rating: <b>A</b> Proposed Seed Rating: <b>P</b>	7/8/16 through 8/22/16	Pest Rating: <b>A</b> Seed Rating: <b>P</b>
<a href="#">Bermuda grass</a> [ <a href="#">Cynodon dactylon</a> ]	Bermuda grass	<i>Cynodon dactylon</i>	Proposed Pest Rating: <b>D</b> Proposed Seed Rating: <b>None</b>	3/16/15 through 4/30/15	Pest Rating: <b>D</b> Seed Rating: <b>None</b>
<a href="#">Bitou bush</a> [ <a href="#">Chrysanthemoides monilifera</a> ]	Bitou bush	<i>Chrysanthemoides monilifera</i>	Proposed Pest Rating: <b>A</b> Proposed Seed Rating: <b>R</b>	3/16/15 through 4/30/15	Pest Rating: <b>A</b> Seed Rating: <b>R</b>
<a href="#">Buffel grass</a> [ <a href="#">Pennisetum ciliare</a> ]	Buffel grass	<i>Pennisetum ciliare</i>	Proposed Pest Rating: <b>D</b> Proposed Seed Rating: <b>None</b>	3/16/15 through 4/30/15	Pest Rating: <b>D</b> Seed Rating: <b>None</b>
<a href="#">Chamberbitter</a>   <a href="#">Phyllanthus urinaria L.</a>	Chamberbitter	<i>Phyllanthus urinaria L.</i>	Proposed Pest Rating: <b>C</b> Proposed Seed Rating: <b>R</b>	4/05/16 through 5/20/16	Pest Rating: <b>C</b> Seed Rating: <b>R</b>
<a href="#">Cheatgrass</a>   <a href="#">Bromus tectorum</a>	Cheatgrass	<i>Bromus tectorum</i>	Proposed Pest Rating: <b>C</b> Proposed Seed Rating: <b>None</b>	12/21/15 through 2/4/16	Pest Rating: <b>C</b> Seed Rating: <b>None</b>
<a href="#">Common reed</a>   <a href="#">Phragmites australis</a>	Common Reed	<i>Phragmites australis</i> cf. subsp. <i>atissimus</i> (non-native)	Proposed Pest Rating: <b>C</b> Proposed Seed Rating: <b>R</b>	4/05/16 through 5/20/16	Pest Rating: <b>C</b> Seed Rating: <b>R</b>
		<i>Phragmites australis</i> subsp. <i>americanus</i> (native)	Proposed Pest Rating: <b>D</b> Proposed Seed Rating: <b>None</b>		Pest Rating: <b>D</b> Seed Rating: <b>None</b>

# CDFA Border Protection Stations



Approximately 135,000 boats/yr.  
1.2 million inspected since 2007



# Why Hydrilla?

- Legislation established in 1977 in the Food and Agricultural Code mandates an on-going statewide survey program and eradication where feasible. Makes it unlawful to produce, propagate, harvest, possess, sell, or distribute hydrilla as such or incidental to the sale of fish, aquatic plants, or other hosts or possible carriers of hydrilla. First offense is an infraction, second offense is a misdemeanor (Food and Ag. Code sec. 6048(b)).
- \* Funding cuts in 2014 ended statewide survey program.



# Why Hydrilla?

## FUNDING!

- Div. Boating & Waterways – Harbors & Watercraft: \$1.5 million
- CA Dept. Water Resources: \$612,000
- US Bureau Reclamation: \$132,000
- General Fund: \$0.00

# Hydrilla in Irrigation Canal (CA)

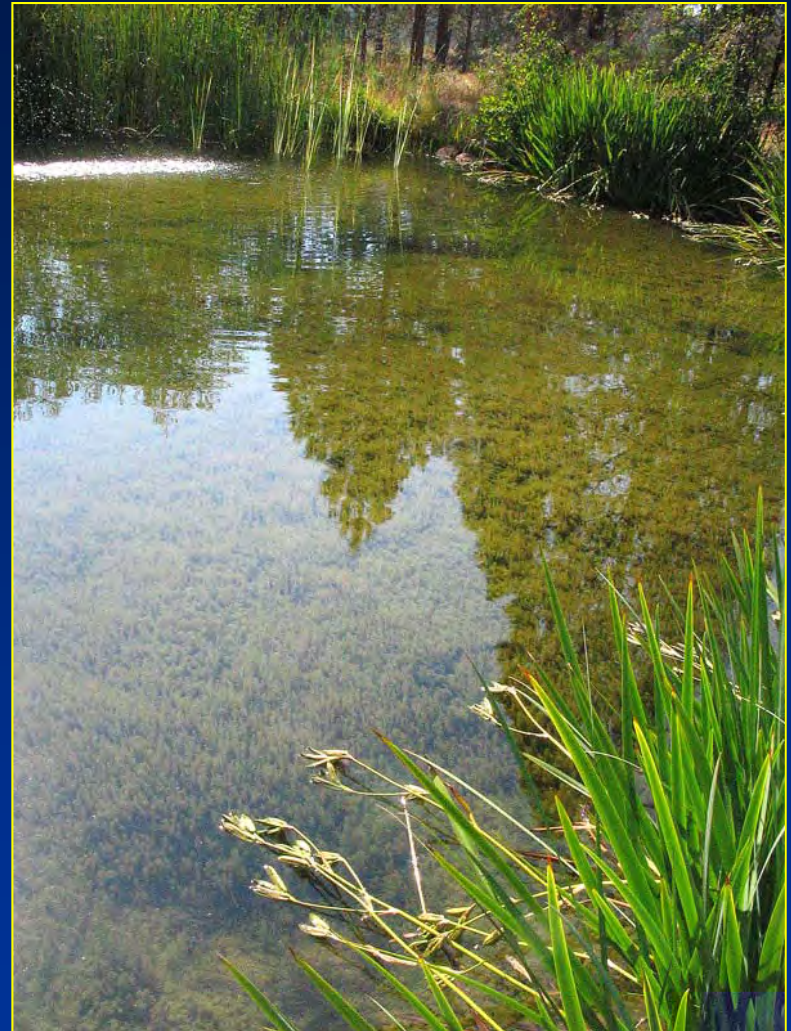


85% reduction in water storage and conveyance



# Hydrilla in Foothill Fire Pond (Yuba County)

~ 10 feet deep





# Hydrilla, *Hydrilla verticillata*

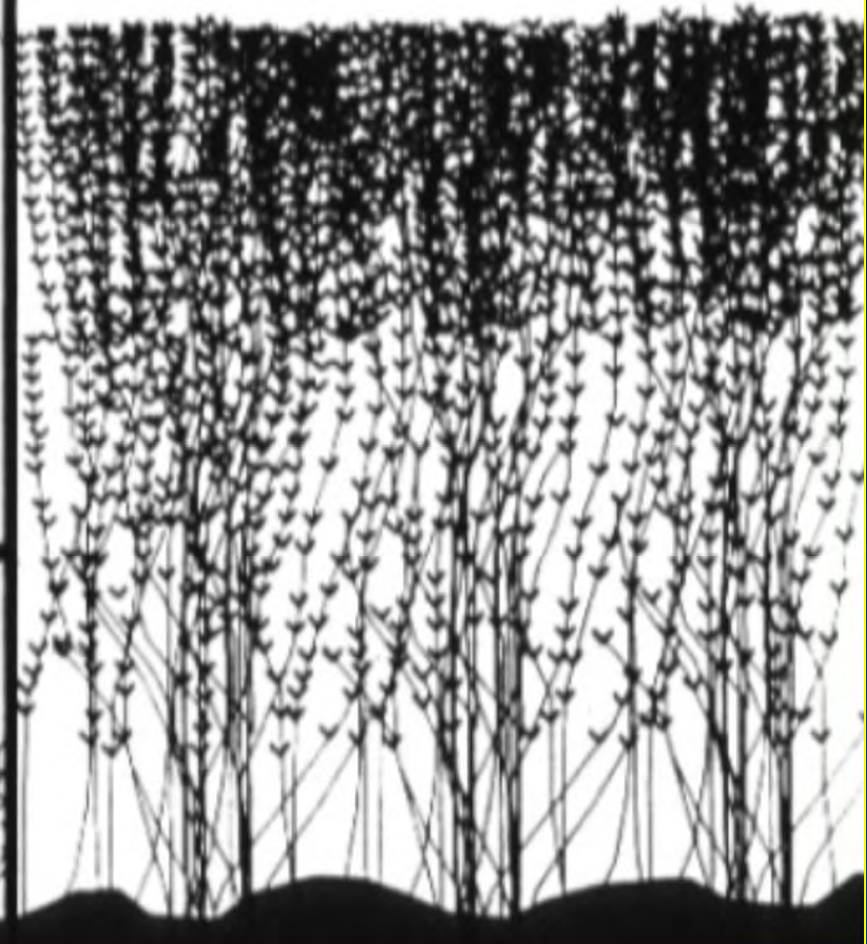




Diverse native community



Monospecific non-indigenous population



# Hydrilla – reproductive capabilities

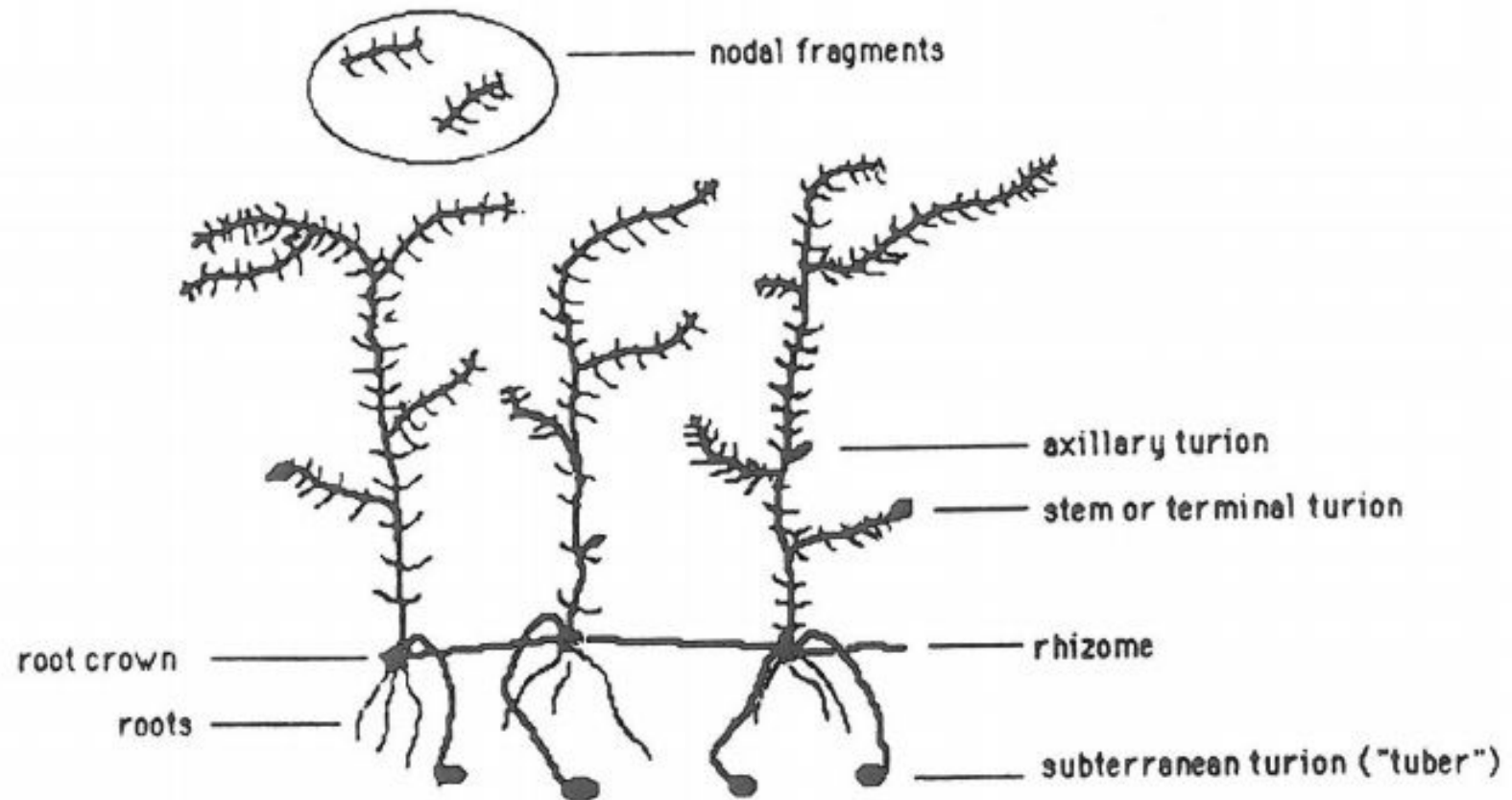
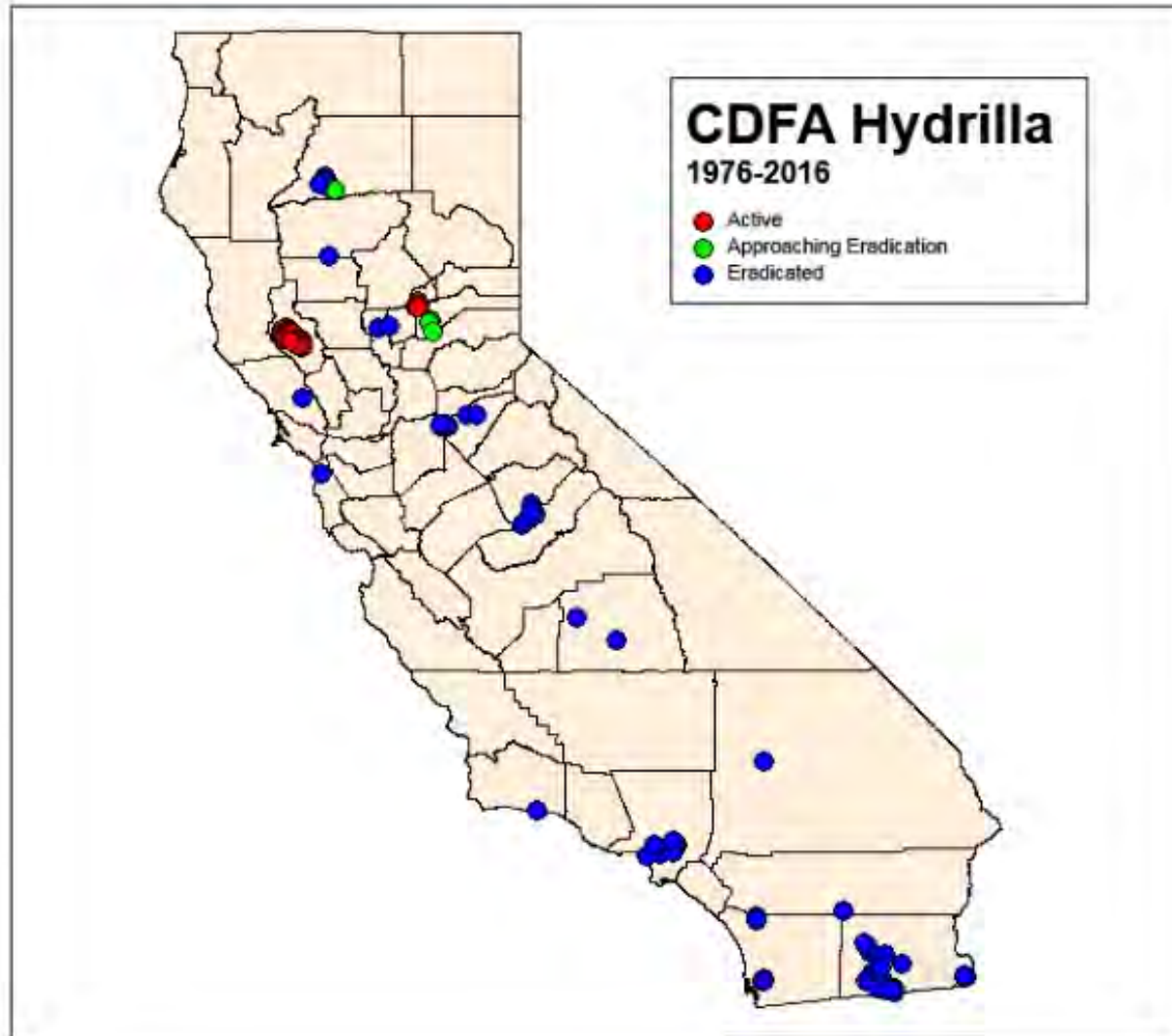


Figure 2. Position of various vegetative propagules on monoecious *Hydrilla verticillata*.

# Successful eradications!



# Chemical Control



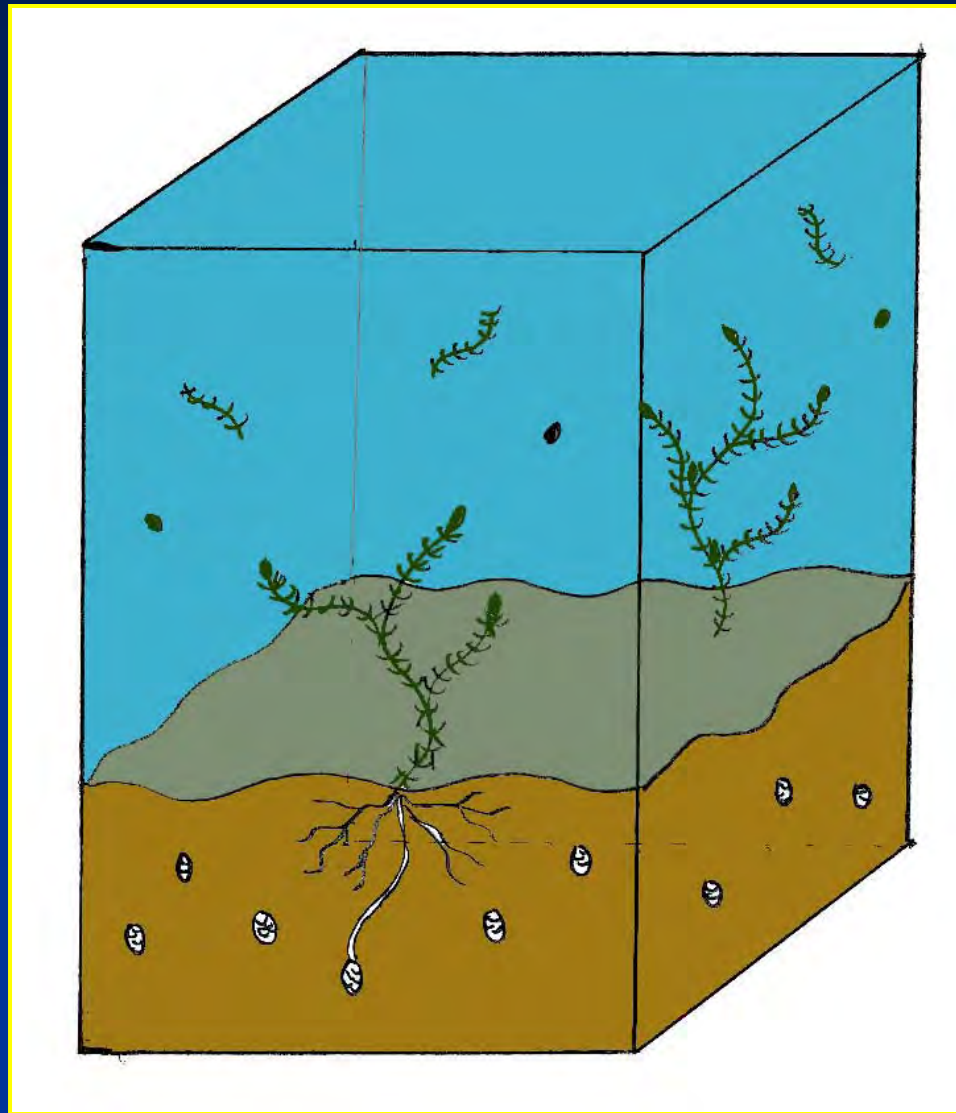
Contact herbicide burndown (copper),  
also used in irrigation water.



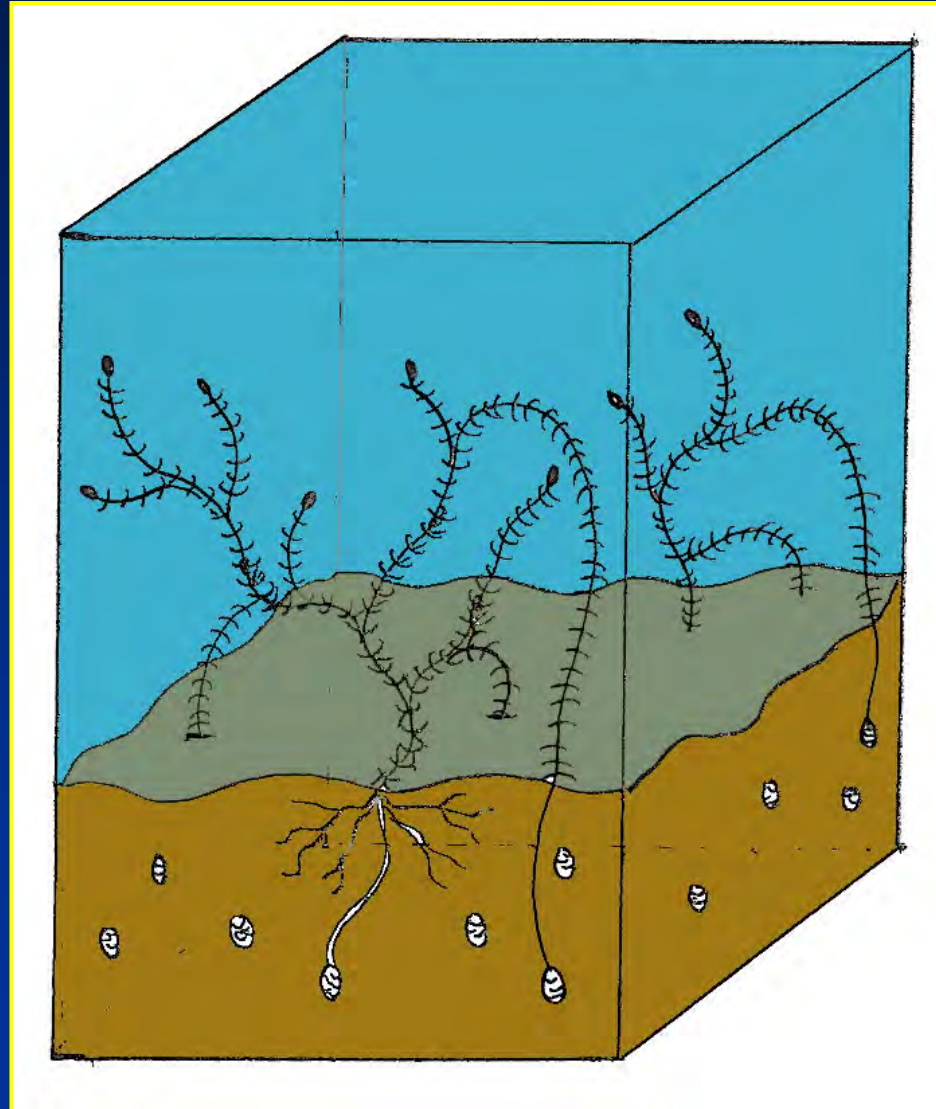
# Chemical Control



# Tubers, turions and fragments

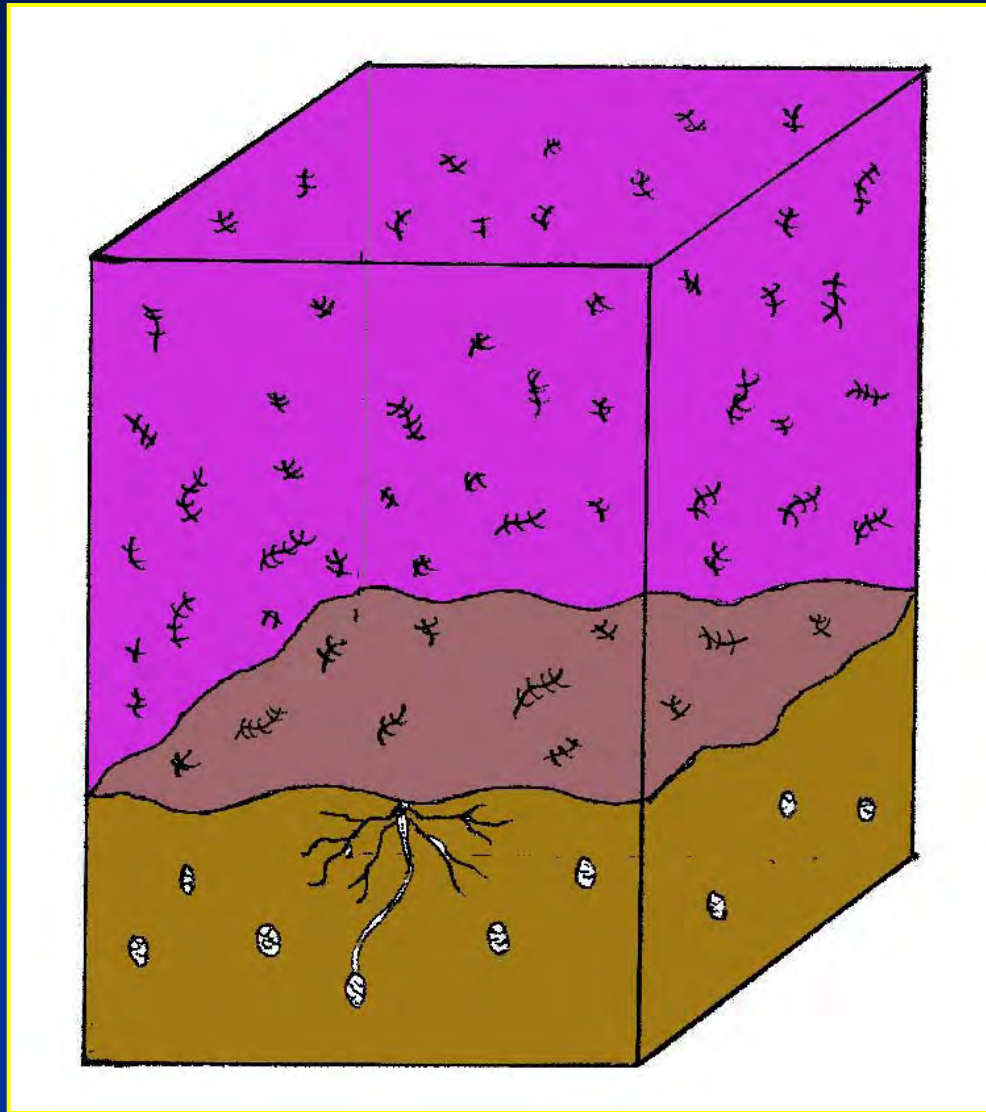


Tubers form underground at  
end of shoots.



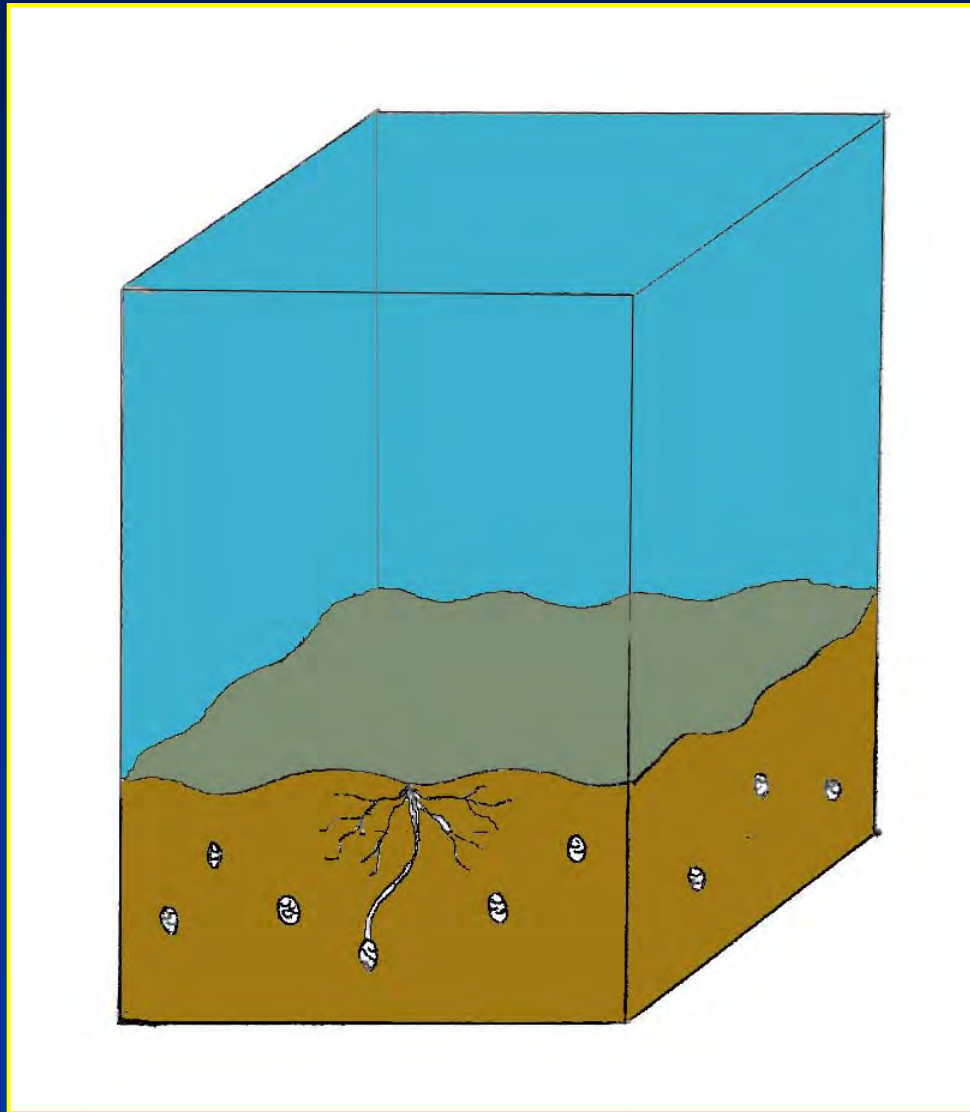


# Contact Herbicide Burndown

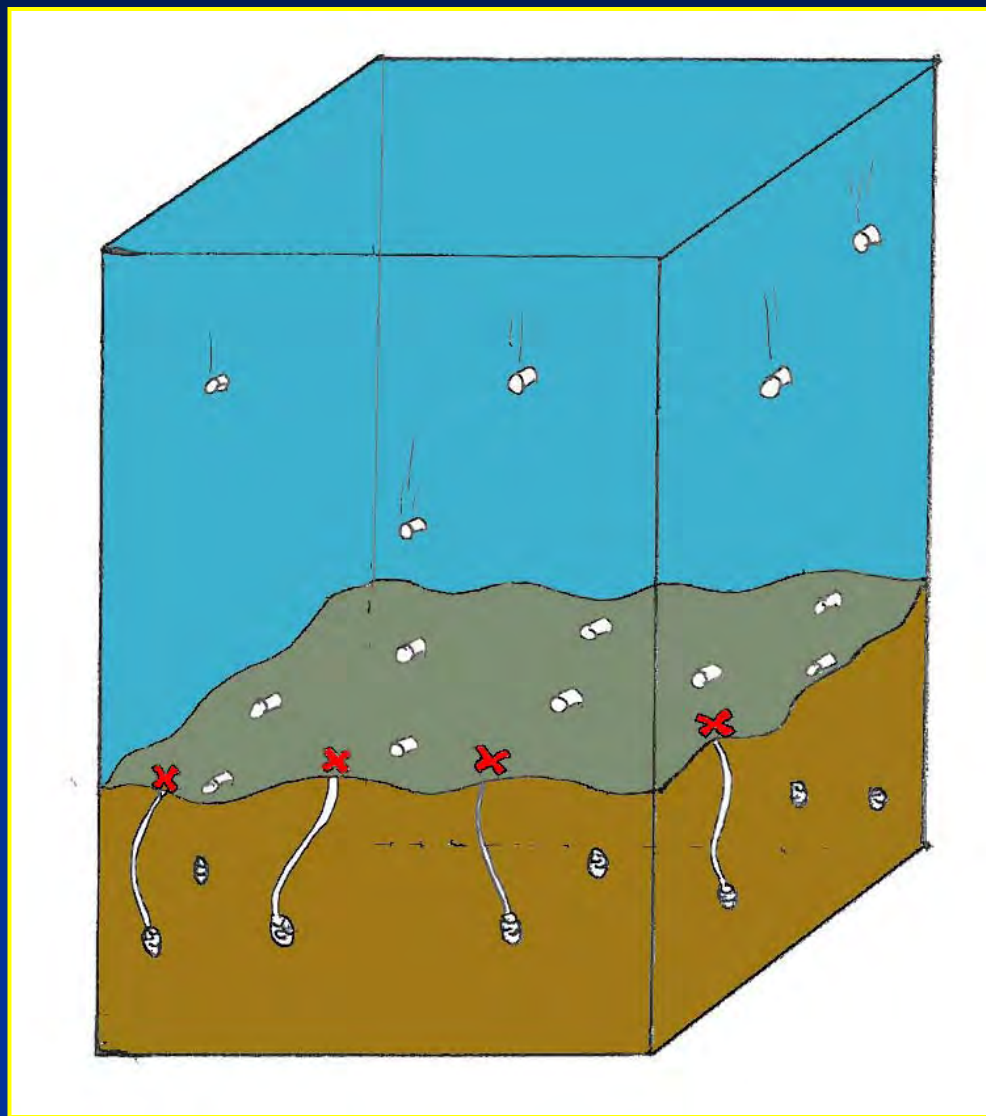




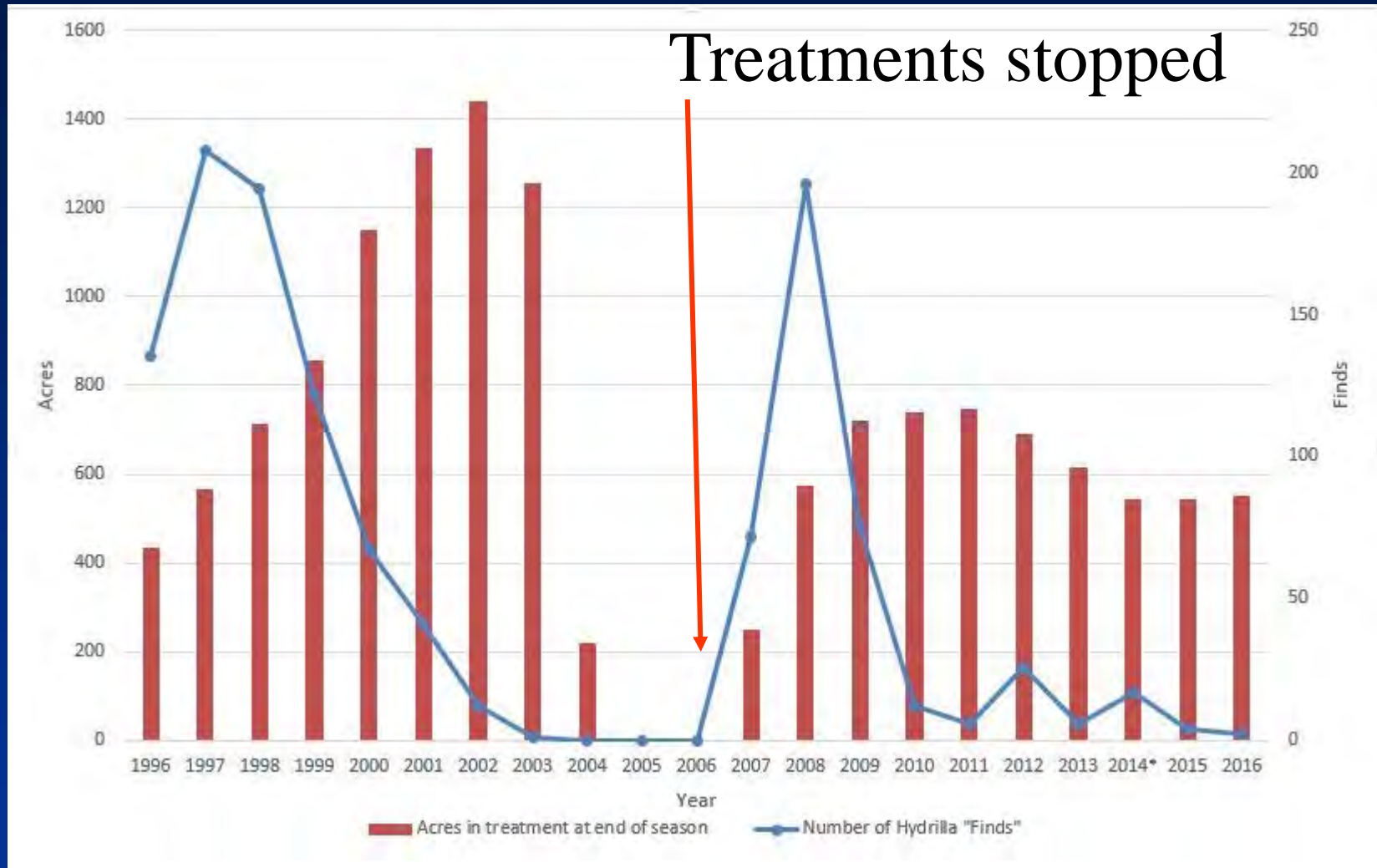
# Submerged tubers and root crowns protected from contact herbicide



# Slow release systemic acts as premergent on sprouting tubers



# “Eradication”



Protocol extended to continue treatments through 7 years of no finds.

# Cooperation and Oversight

Water Resources Control Board – NPDES Permit  
Div. Boating & Waterways – Delta Authority  
Dept. Water Resources – Cooperation (map/fund)  
CA Dept. Fish Wildlife – Weed Risk Assessment  
CDFA – Weed lists, ID, exclusion, survey, map  
County Ag. Comm. – local enforcement



# National Pollution Discharge Elimination System

- Sixth Circuit Court ruling 2009, aquatic pesticide applications require NPDES permit
- Requires monitoring prior to, during and after applications for:
  - pesticide levels
  - Dissolved Oxygen, pH, temperature, conductivity, water color/odor, etc.

# Continuous temperature readings DO will be added in 2017



# 2016 Water Temperatures

Month	Lakeport		State Park		Clearlake Oaks	
Jan. 2016	Average	46.83	Average	46.59	Average	47.05
	Low	41.04	Low	43.26	Low	44.81
	High	50.80	High	49.65	High	50.14
Feb. 2016	Average	51.42	Average	50.80	Average	51.49
	Low	47.87	Low	47.74	Low	47.91
	High	55.47	High	55.26	High	56.64
Mar. 2016	Average	54.41	Average	54.60	Average	55.55
	Low	52.25	Low	50.45	Low	52.03
	High	56.99	High	58.58	High	59.96
Apr. 2016	Average	60.33	Average	60.36	Average	61.90
	Low	56.51	Low	56.17	Low	57.16
	High	64.42	High	63.90	High	67.93
May. 2016	Average	64.90	Average	66.53	Average	67.05
	Low	61.85	Low	60.86	Low	60.73
	High	70.85	High	72.70	High	76.03
June, 2016	Average	70.64	Average	72.89	Average	74.65
	Low	67.24	Low	68.01	Low	68.87
	High	75.12	High	77.25	High	80.10
July, 2016	Average	73.66	Average	76.53	Average	79.16
	Low	70.85	Low	72.70	Low	74.81
	High	78.69	High	80.89	High	84.81
Aug. 2016	Average	75.74	Average	77.32	Average	80.07
	Low	61.55	Low	75.68	Low	75.25
	High	85.08	High	80.54	High	83.15

# Division of Boating and Waterways

- **Harbors and Navigation Code sec 64.5. (a)** The division is designated as the lead agency of the state for the purpose of cooperating with other state, .... to manage invasive aquatic plants in the Sacramento-San Joaquin Delta, its tributaries, and the Suisun Marsh.
- Current authority to control: Egeria densa, Water Hyacinth, Spongeplant and Curlyleaf Pondweed
- Potential problems: Eurasian watermilfoil, Waterprimrose, Coontail and Fanwort
- Funded through Harbors and Watercraft Revolving Fund: boat registration fees and gas taxes.



# CA Dept. Fish & Wildlife

- Invasive Species Program:
  - Conducts aquatic weed risk assessments for DBW control projects in the Delta
- Wildlife Investigations Lab:
  - Investigates potential pesticide poisonings
- Endangered Species – Clear Lake Hitch

# Calif. Dept. Water Resources

- Manages aquatic weeds in State Water Project facilities/infrastructure
- Early detection program for Quagga/Zebra mussels



# Conclusion

- Don't reinvent the wheel!
- Use appropriate authority/jurisdiction
- Coordinate and communicate

Thank you!

