2020 OGCSA Pest Management Webinar Series

Thank you for joining us.

We will begin at the top of the hour.

Presented By

Simplot PARTNERS

GCSAA Oregon Chapter

A Sound Approach for Golf Course Aquatic Maintenance

Mike Pearce
SePRO Corporation – Portfolio Leader

Topics of Discussion

- Purpose of Management
- The Process

  Assessment → Prescription → Implementation
- Aquatic Technologies
- Water Quality Management

Purpose of Management

- Aesthetics
- Operational uses
- Safety
- Stop the spread of invasive plants
- Stop the impacts of Harmful Algae Blooms
  - Phytophthora spores can act as a source for infecting turf (fungus-like)
  - Cyanobacteria can be sources of allelopathic toxins that can cause stunted roots and discolored grass
  - Can develop toxins that put humans and wildlife at risk

City addresses hydrilla concerns after man drowns in a Central Texas lake

Officials want swimmers to know they are managing the hydrilla, which was first discovered in the lake in 2009.

Man gets Caught in Milfoil in Columbia River and Drowns

Aug 25, 2007

LOCAL

Milfoil may have tangled swimmer who drowned in Horseshoe Lake

Milfoil may have tangled swimmer who drowned in Horseshoe Lake

Blue-green algae outbreak kills 32 cattle in Oregon

by Associated Press | Thursday, July 13th 2017

Blue-green algae bloom on Lake Winnebago in Menasha, July 6, 2016 (WLUK/Eric Peterson)

Botswana: Mystery elephant deaths caused by cyanobacteria

21 September

University of Florida scientists say airborne toxins from harmful algae blooms can travel 10 miles, linger for hours

'It's scary. It's your home, it's your family. It's the air they breathe daily,' resident says

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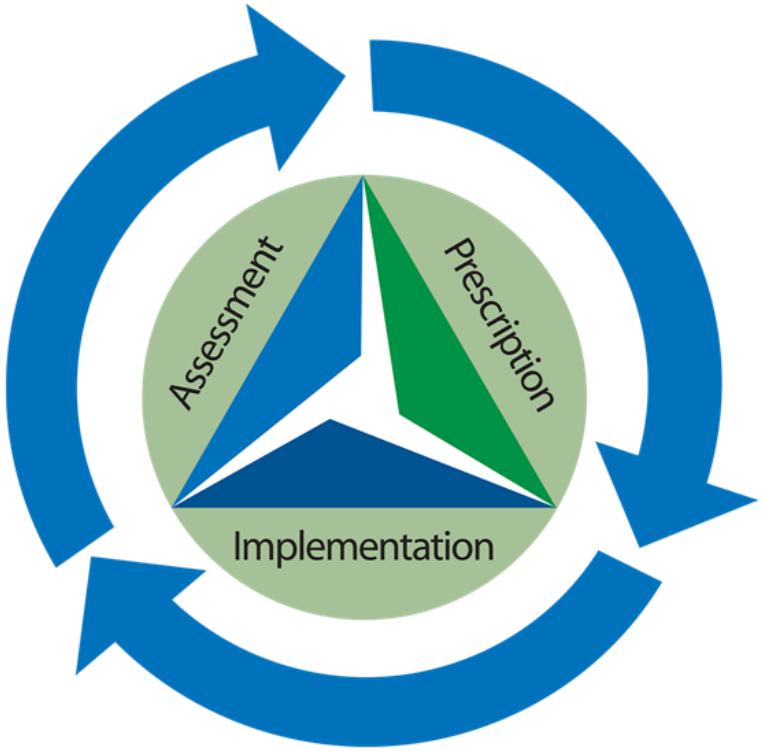
The Process



Assessment

Key Questions

- What is causing the problem?
- What is the water used for?
  - e.g. irrigation, aesthetics, swimming, fishing, potable
- Are there any fish present?
- What is the water volume (surface acres x avg. depth) and flow?
- Is the problem re-occurring or new?
- What is the source of the problem?
- What are my current weed and algae control options?
- What is the management budget?

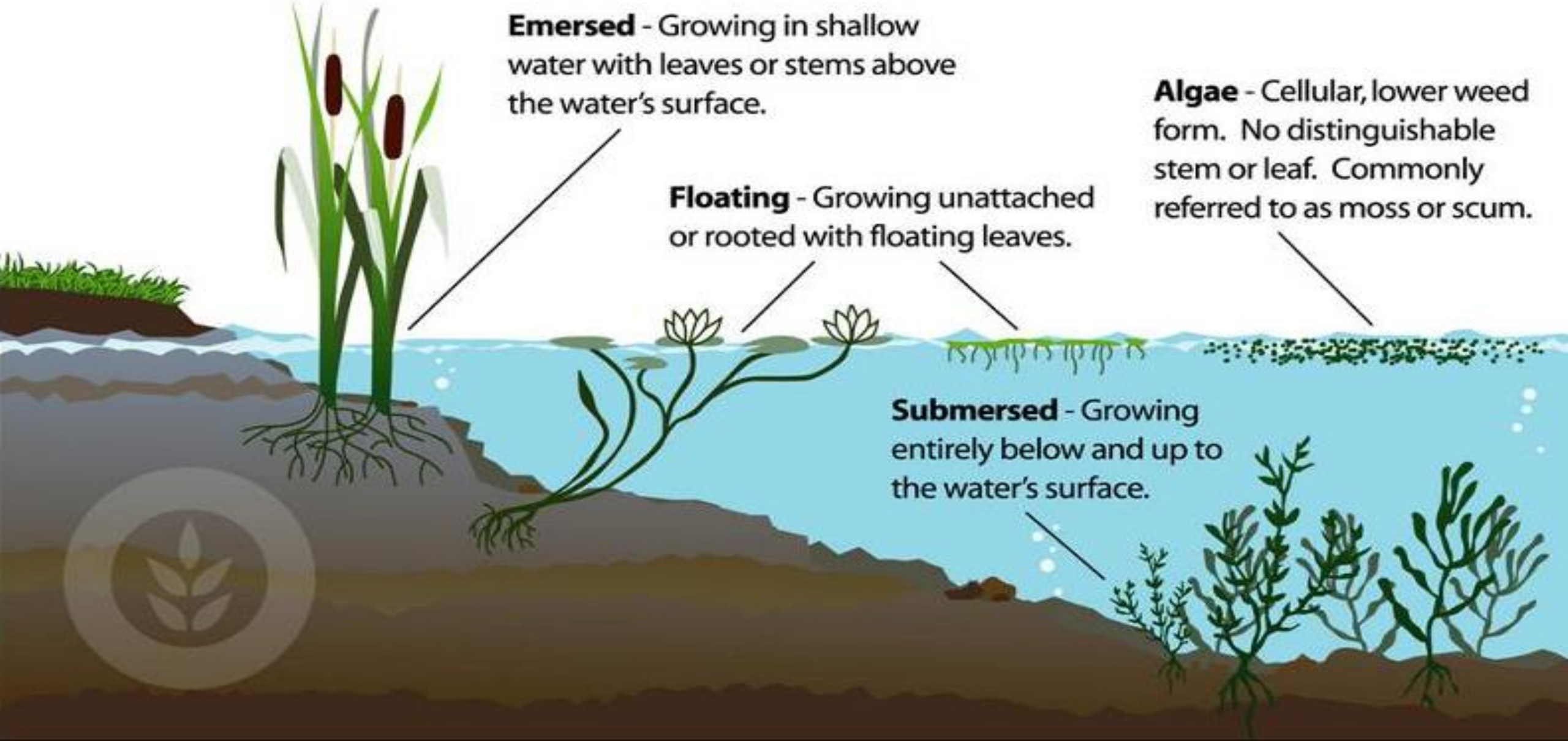
What is causing the problem?

- This is an important question!

- **Proper plant and algae ID** leads to using the right rates and right products!

Determining the type of weed you want to control

The most common aquatic weeds fall into the categories listed below.



Emersed Aquatics Plants

Cattails

Yellow Flag Iris

Flowering Rush

Floating Aquatics Plants

Floating Primrose

Duckweed

Yellow Floating Heart

Submersed Aquatics Plants

Elodea

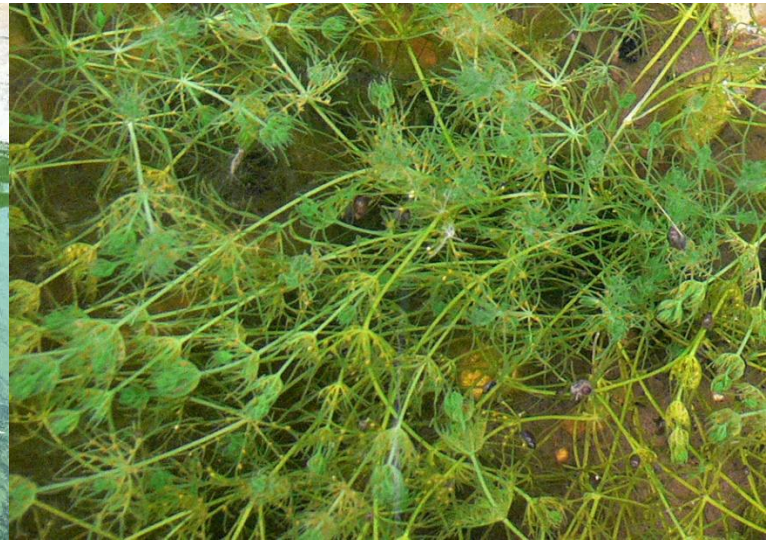
Eurasian Watermilfoil

Curly-leaf Pondweed

Algae

Filamentous algae

Planktonic algae



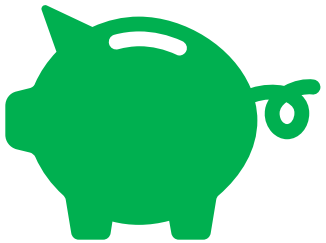
Macro-algae

Need Help?

- Take a photo
- Send it to . . . . .

Identifying your plants and algae leads to . . .

- Right Products
- Correct Rates
- Save you Time, Money, and Labor



What is the water volume?

- The volume of water in a pond or lake (in acre-feet) is calculated by multiplying the area (surface acres) by the average depth (in feet).
  - 1 acre-foot of water = 325,851 gallons

- Example:
  - 8 surface acres x 5 feet avg. depth = 40 acre-feet of water or 13,034,040 gallons

Understanding Flow

- **Water Retention Time** – Knowing how long the water stays in place.

- **Concentration Exposure Time (CET)** – Knowing the expected exposure times for treatments.

What Information is Needed for Calculating Water Retention Time?

- Surface Area (Acres)
- Average Depth
- Water Volume (Acre Feet)
- Water In-Flow or Discharge (CFS or GPM)

Retention Time Example

Waterbody - 5 Surface Acres, 4 foot avg. depth

Acre Feet = Surface Acres X Avg Depth

Discharge = 1 ac-ft/day (Example)

Water Volume = 5 Acres X 4 FT = 20 Acre-Feet

20 Acre-Feet – 1 Acre-Feet per day = 20 Days of Retention

WATER CONVERSION TABLE

GPM = Gallons per minute CFS = Cubic feet per second AF = Acre-feet

1 Cubic foot of water equals	7.48	Gallons
1 AF of water equals		1 foot of water on 1 acre
	325,851	Gallons
	43,560	Cubic feet
1 CFS equals	448.8	GPM
	1.98	AF per day
	40	Miner's inches
1 GPM equals	1,440	Gallons per 24 hour day
	1.61	AF per year
1 Surface Acre equals	Size of area in square feet ÷ 43,560	

QUICK CONVERSIONS

MI X 11.22 = GPM
MI ÷ 40 = CFS
MI X .0495 = AF/DAY

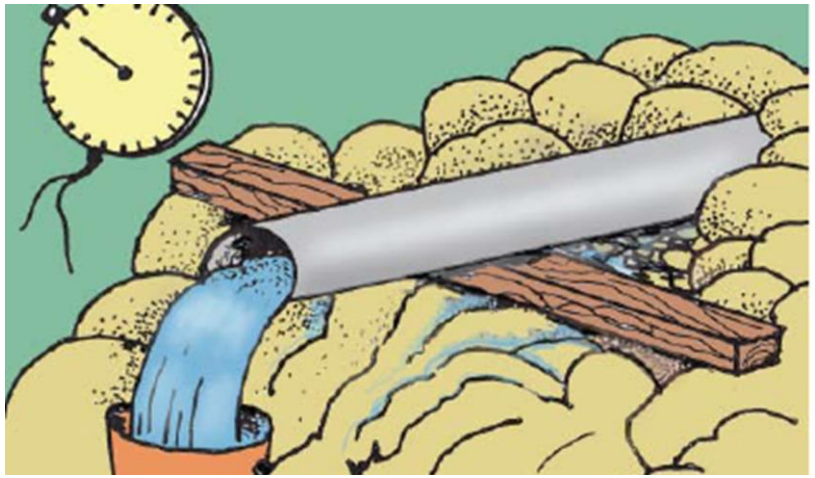
GPM ÷ 11.22 = MI
GPM ÷ 448.8 = CFS
GPM ÷ 226.67 = AF/DAY

CFS X 40 = MI
CFS X 448.8 = GPM
CFS X 1.98 = AF/DAY

AF/DAY ÷ 1.98 = CFS
AF/DAY X 226.67 = GPM
AF/DAY ÷ .0495 = MI

A Simple Technique For Estimating Discharge

Bucket and Stopwatch Method



Using a container of a known volume (e.g., 5-gallon bucket) and a stopwatch to time how long it takes to fill it.

Bucket and Stopwatch Example

- Calculate Avg. Time to Fill the 5 Gallon Bucket

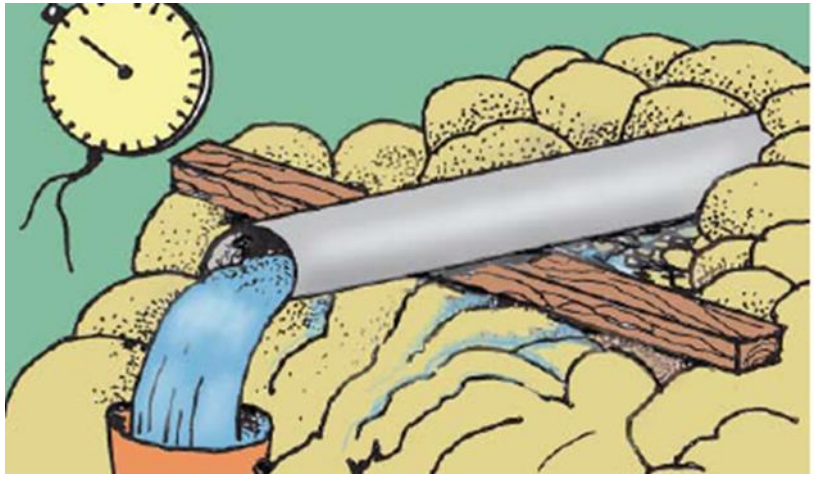
  5s + 7s + 6s ÷ 3 fills = 6 Seconds

- Convert Avg. Time in Seconds to Minutes

  6 Seconds ÷ 60 Seconds/Min. = 0.10 Minutes

- Calculate Discharge in Gallons Per Minute (GPM)

  5 Gallons ÷ 0.10 Minutes = 50 Gallons Per Minute



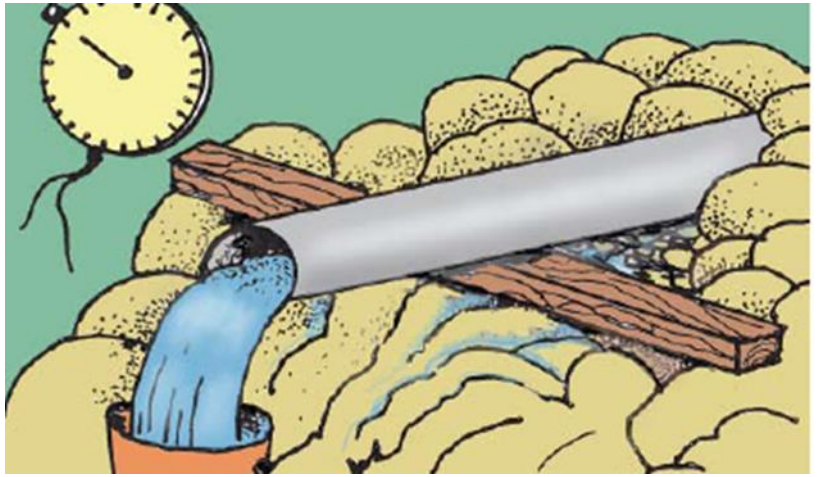
Bucket and Stopwatch Example

- Convert GPM to Cubic Ft/Sec (CFS)

  50 GPM ÷ 448.8 Gal = 0.11 CFS

- Convert CFS to Acre Feet Per Day (AF/Day)

  0.11 CFS x 1.98 = 0.22 AF/Day



Prescription

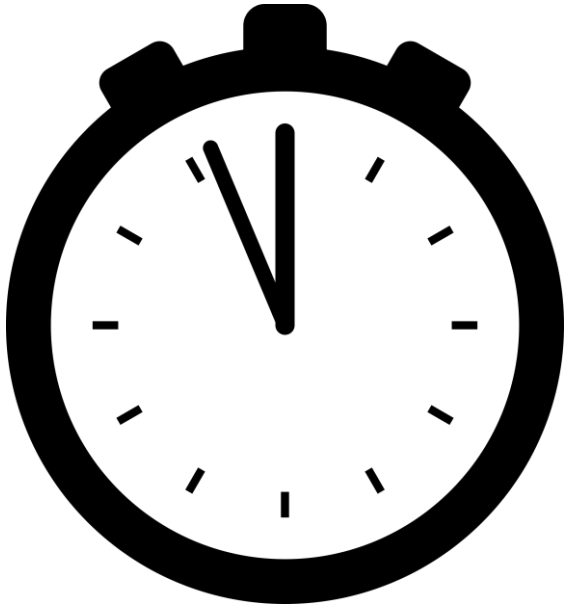
Concentration Levels
(Putting Things Into Perspective)

1 ppm (mg/L)

1 ppm = 1 mg/L = 1 out of 1 million = 0.000001

1 ppm (mg/L)

1 ppm (mg/L)

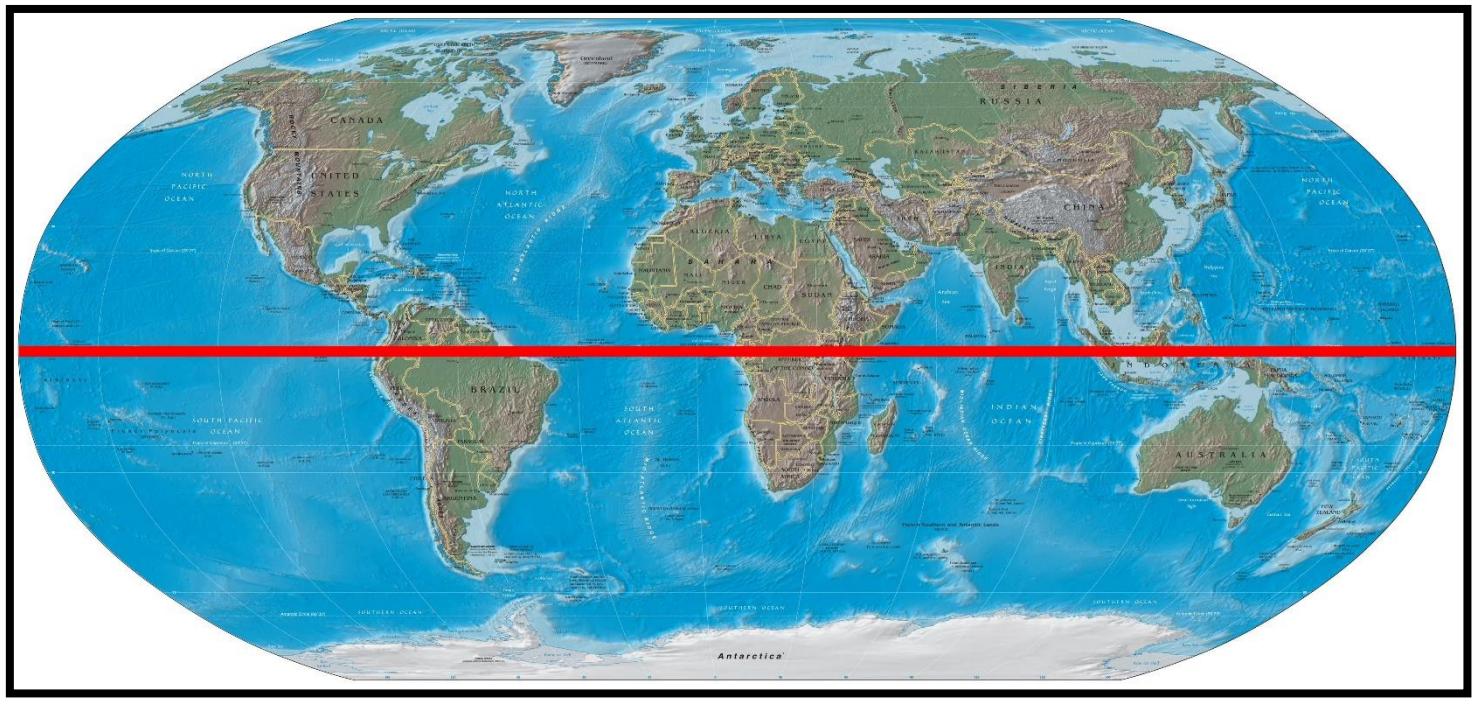


32 Seconds out of a Year

1 ppb (ug/L)

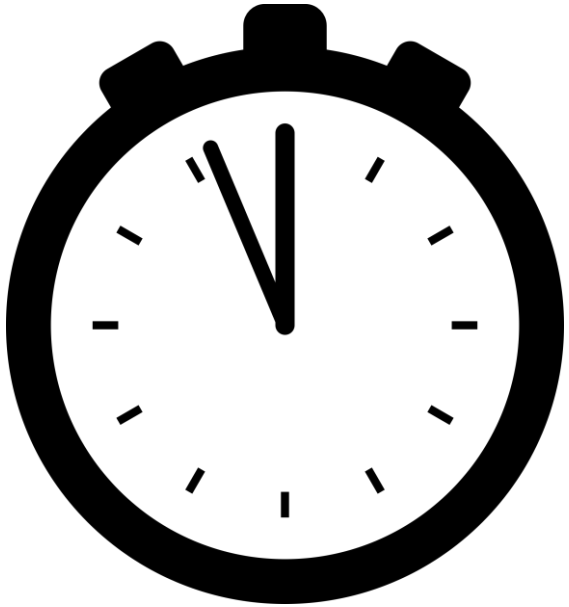
1 ppb = 1 ug/L = 1 out of 1 billion = 0.000000001

1 ppb (ug/L)



“1 5/8 inches” On The Equator = 1 ppb

1 ppb (ug/L)



3 Seconds out of 100 Years

Aquatic Management Solutions

Currently 15 USEPA Aquatic Registered Active Ingredients:

"CONTACTS"

– **Coppers** (SO_4, CO_3, OH^-)	**Photosynthesis inhibition (PSII, PSI, CytB6-F_Fe-S)**
– **Acrolein/ Magnacide H^+**	**Broad spectrum biocide**
– **Diquat**	**PS1 Inhibitor**
– **Carfentrazone-ethyl**	**Protoporphyrinogen Oxidase (PPO) inhibitor**
– **Flumioxazin**	**Protoporphyrinogen Oxidase (PPO) inhibitor**
– **Endothall (diacid)**	**"Multiple", plant protein phosphatases 1 (PP1) and 2A (PP2A)**

"SYSTEMICS"

– **2,4-D**	**Synthetic Auxin/ Growth Regulator**
– **Triclopyr**	**Synthetic Auxin/ Growth Regulator**
– **Fluridone**	**Carotenoid biosynthesis inhibitor/ PDS**
– **Glyphosate**	**Aromatic Amino Acid Inhibitor (EPSPS)**
– **Imazapyr**	**Branched Chain Amino Acid (ALS/AHAS) inhibitor**
– **Imazamox**	**Branched Chain Amino Acid (ALS/AHAS) inhibitor**
– **Bispyribac-sodium**	**Branched Chain Amino Acid (ALS/AHAS) inhibitor**
– **Penoxsulam**	**Branched Chain Amino Acid (ALS/AHAS) inhibitor**
– **Topramezone**	**HPPD-inhibitor (P-hydroxyphenylpyruvate dioxygenase)**
– **Florpyrauxifen-benzyl**	**Aryl-picolinates**

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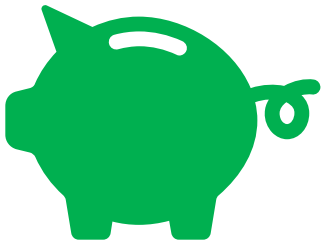
Understanding your toolbox leads to . . .

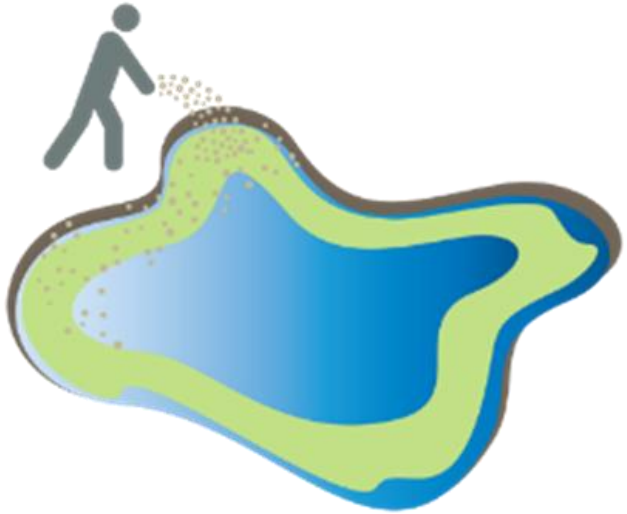
- Right Products
- Correct Rates
- Save you Time, Money, and Labor



Implementation

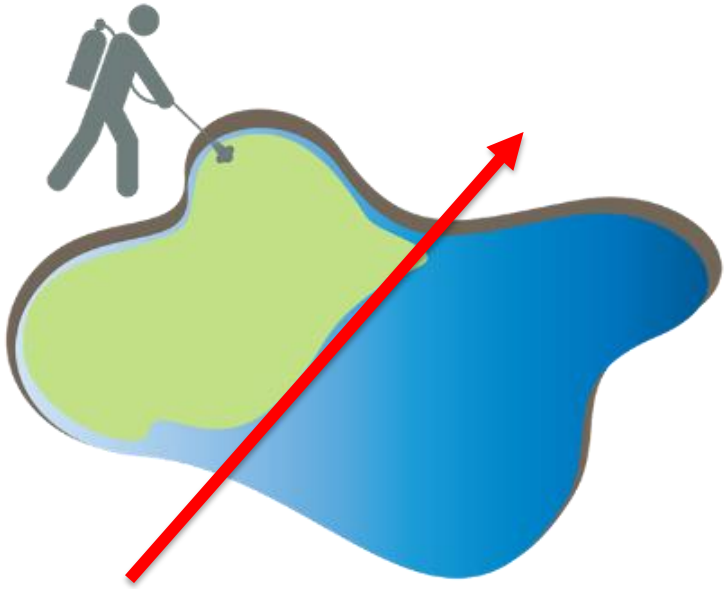
- **Key Questions:**
  - Application Method
  - Timing
  - Frequency of Treatments

Surface Spray Application



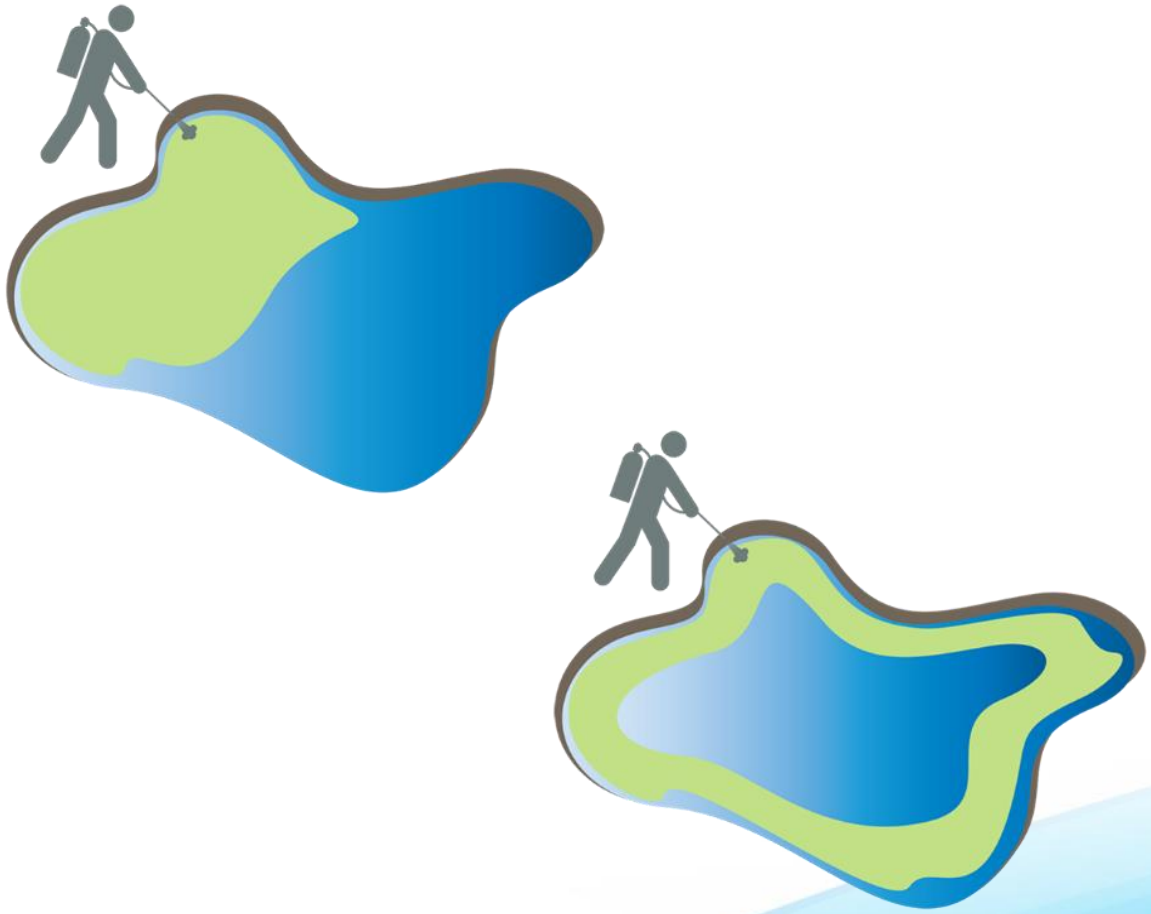
Granular Application

What does it mean to spray half the pond?



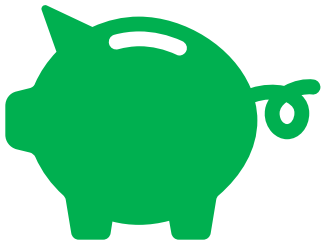
Pro Tips – Application Considerations

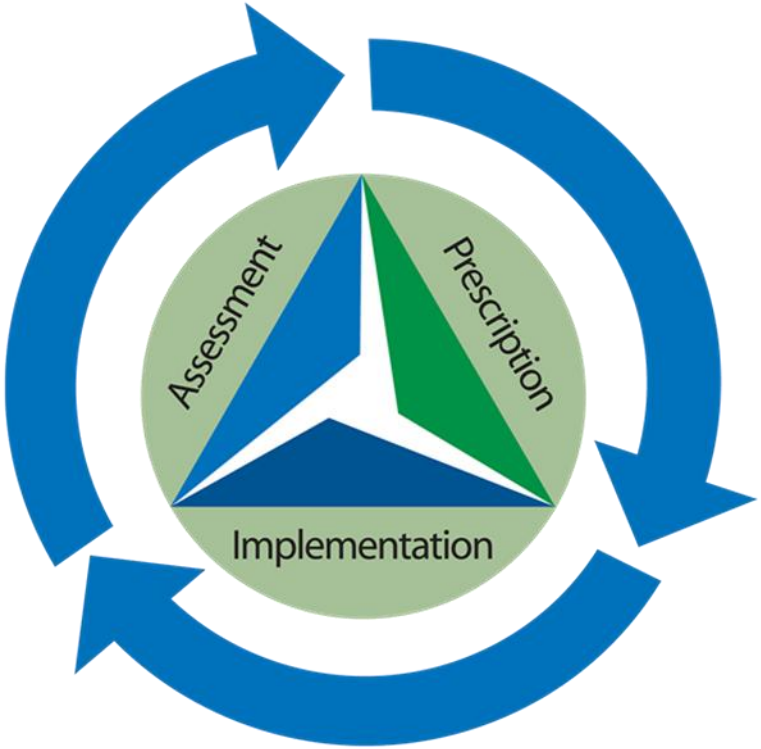
- Oxygen loss from treatments on aquatic weeds and algae may cause fish and invertebrate suffocation; do not treat more than ½ of the water body at one time.
- When applying, start at the shoreline and work your way out.
- Check labels for application intervals. Coppers require minimum 14 days between treatments.



Proper application methods lead to . . .

- Safety
- Better control
- Save you Time, Money, and Labor




Assessment
Prescription
Implementation

Aquatic Technologies

SonarOne*
Aquatic Herbicide

- **Active: Fluridone**
- Fully labeled for aquatic use in and around water.
- Caution Label
- < 10 ppb, no turf and ornamental irrigation restrictions
- **Pellet formulation maintains concentration levels through sustained release**
  - In Water
  - Pre-Emergent

Proactive Weed Management

SonarOne*
Aquatic Herbicide

- **Preemergent herbicide for your ponds**
  - Proactive solution - *don't see the problem*
  - Easing dosing
  - Controlled-release Pellet
    - Best for all conditions
  - Non-irrigation Ponds
  - *Off-season option for irrigation ponds*

SePRO

ECOS

Preventative Aquatic Weed Control

Early

Control

Optimized

Sonar Performance

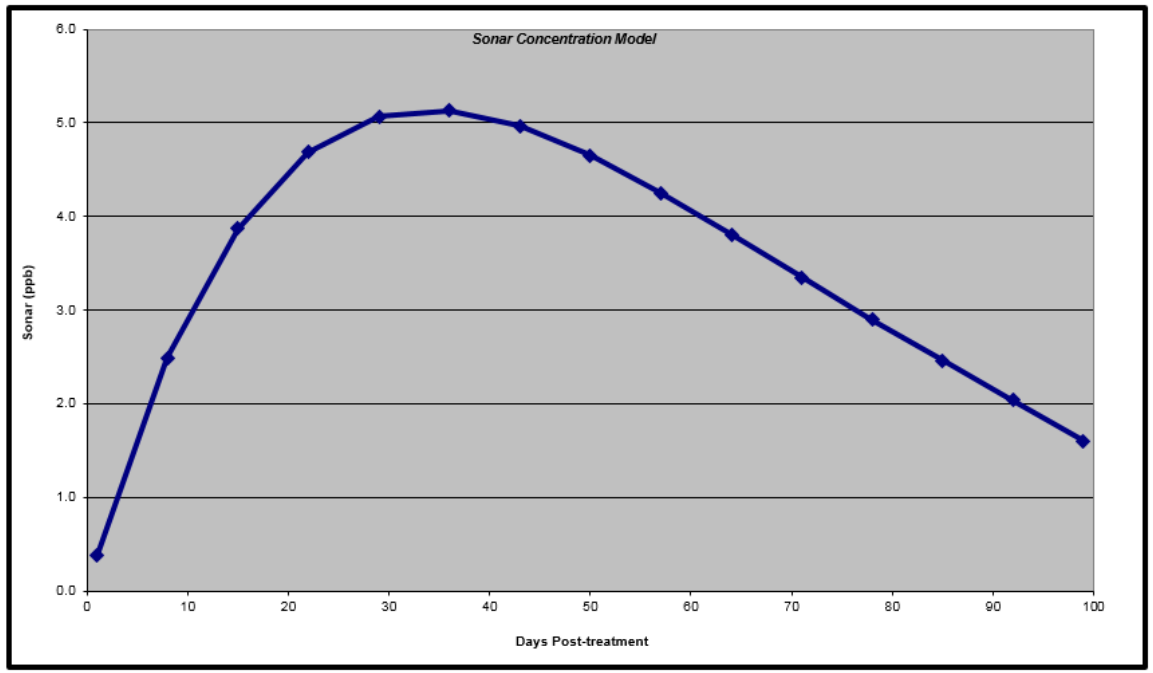
SonarOne*

Aquatic Herbicide

SePRO

ECOS
Preventative Aquatic Weed Control

SonarOne*
Aquatic Herbicide



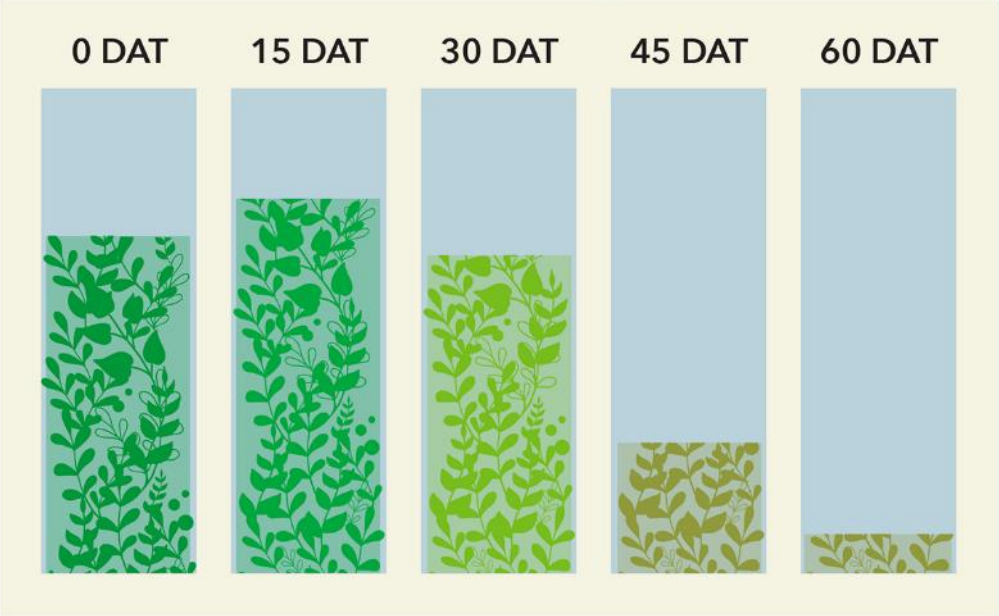
- SonarOne provides a slow-release of herbicide into the water
- The formulation helps ensure concentration exposure times (CET) are met to provide control
- Even with fluctuating flow or rain events

SePRO

ECOS

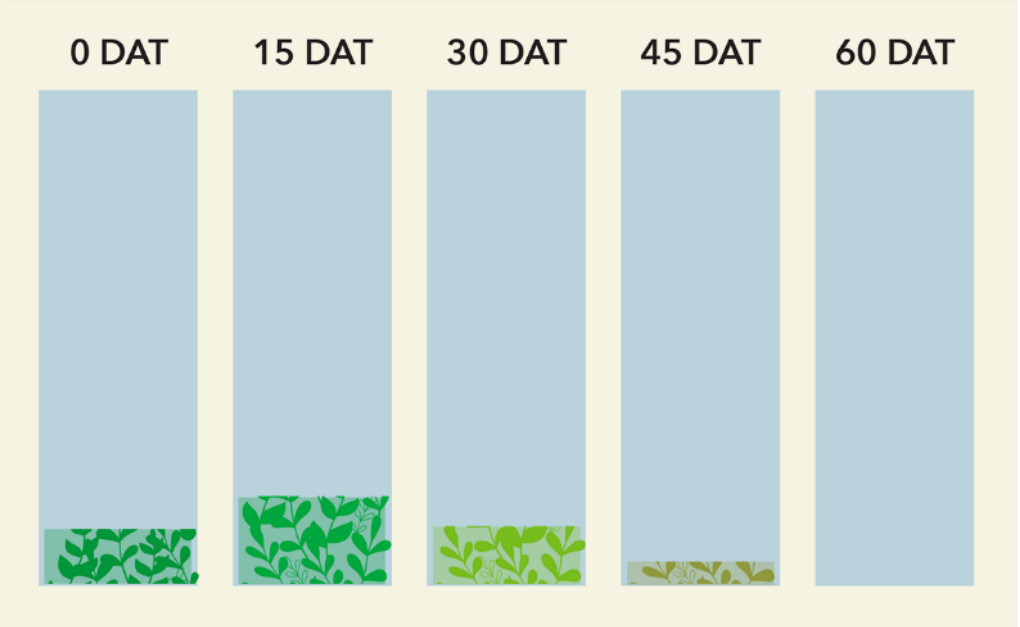
Preventative Aquatic Weed Control

Standard Sonar Use Prescription



Reactive – Weeds are visible for longer

ECOS Use Prescription



Proactive – Never see the weeds!

SePRO

ECOS
Preventative Aquatic Weed Control

In Season (non-irrigation ponds)

- Static Ponds
  - 10 lbs. per surface acre
- Flowing Ponds
  - 6 lbs. per surface acre
  - 2 lbs. per surface acre
  - 2 lbs. per surface acre
    - Apply 4 weeks apart

Off Season (irrigation ponds)

- 10 lbs. per surface acre
- Apply November 1st
  - Or immediately after irrigation is off.

Rates assume waters with average depth of 4 ft. Adjust accordingly based on depth.
Always read and follow label directions.

SePRO

ECOS

Preventative Aquatic Weed Control

- Simple
- Excellent Control
  - Broad-spectrum
  - Season-long

SePRO

Clearcast® Herbicide

- **Active: Imazamox**
- Fully labeled for aquatic use in and around water.
- Caution Label, with very low toxicity
- < 50 ppb, no irrigation restriction
- **One of the most versatile and safe aquatic herbicides available today**
  - Foliar
  - In Water
  - Pre-Emergent

Cattail Management

- Management historically focused on:
  - mechanical (digging)
  - chemical (Glyphosate) means
- Is mechanical better than chemical?
- Glyphosate applications recommended to occur post-flowering, prior to senescence
- Glyphosate! Diquat! But….
- Control of an established stand typically requires 3-5 treatments over 3-5 years

Clearcast®
Herbicide

Cattail Use Patterns

- Increased Application Window – 16 inches of green growth up to the first heavy frost (April – Nov.)
- 4 oz/gal in your tank
- Apply with a 1% v/v MSO
- Slow Acting

SePRO

Clearcast®
Herbicide

Cattail Control

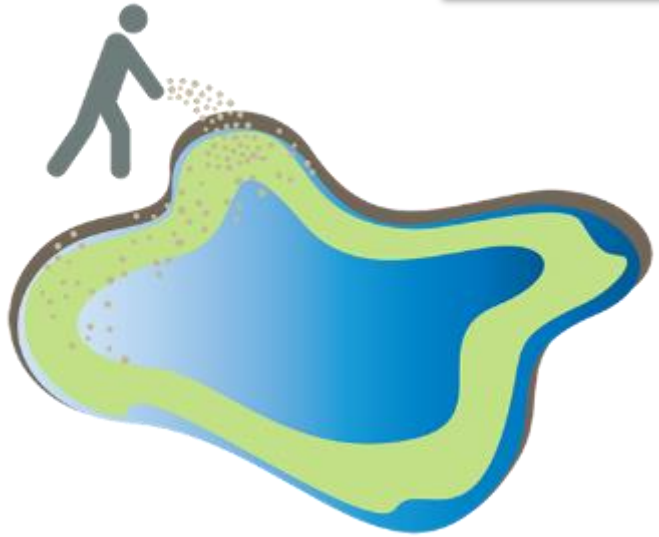
Before

3% Clearcast + MSO, 3 weeks


3% Solution w/MSO
Untreated

Komeen* Crystal
Aquatic Herbicide

- Spot Treatment Solution for Submersed Weeds and Charophytes in All Ponds
- 20 – 60 lbs. / acre (1-3 bags)
  - 2-3 apps/season
- ***No Irrigation Restrictions***
- Easy to apply by hand, spreader, or scoop



SePRO

Komeen* Crystal
Aquatic Herbicide

1 – 2 – 3 Bags
Use Rate Recommendations / acre of weeds

Depth	Early Season Bottom Algae	'Routine' Weeds / Algae	Hard-to-Control Weeds / Algae
Shallow (~ 4 feet)	20 lbs (**1** bag) (0.33 ppm)	40 lbs (**2** bags) (0.66 ppm)	60 lbs (**3** bags) (1 ppm)

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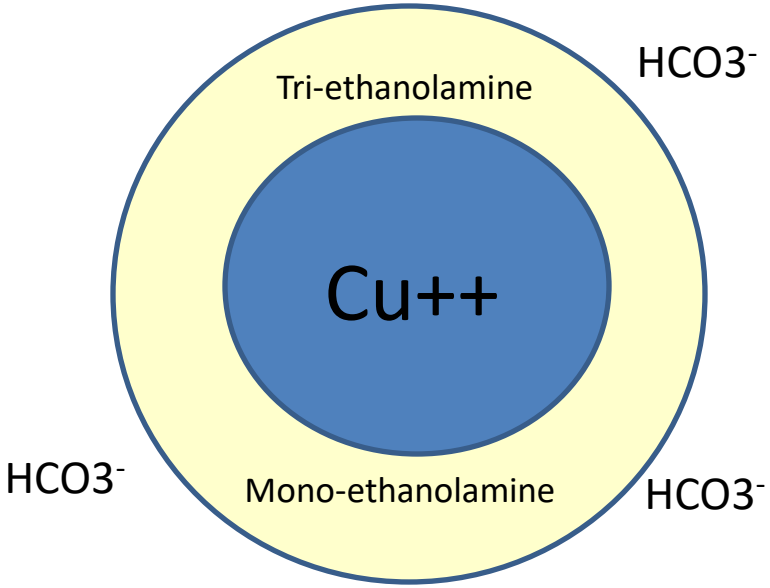
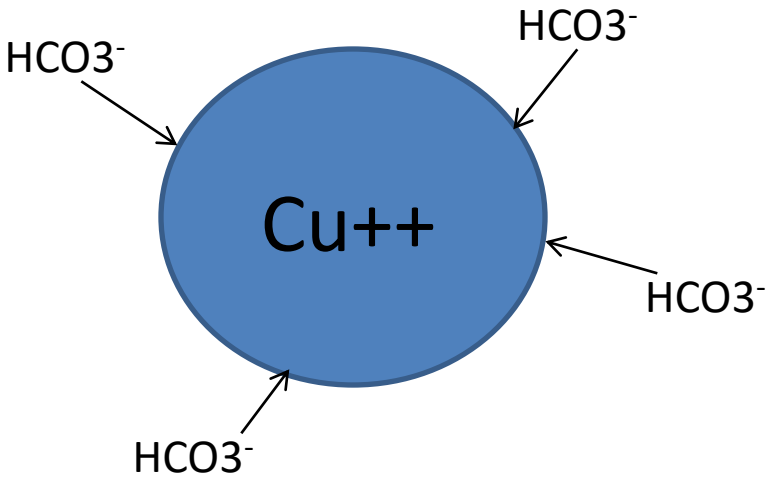
Komeen* Crystal
Aquatic Herbicide
NC State University Demonstrations
Dead hydrilla @ two weeks post

Algaecides

CaptainXTR Algaecide (Chelated)



Copper Sulfate (CuSO4)



More rapid precipitation of copper ion our of water column, especially in harder water (higher CaCO3)

Chelated Copper Algaecides

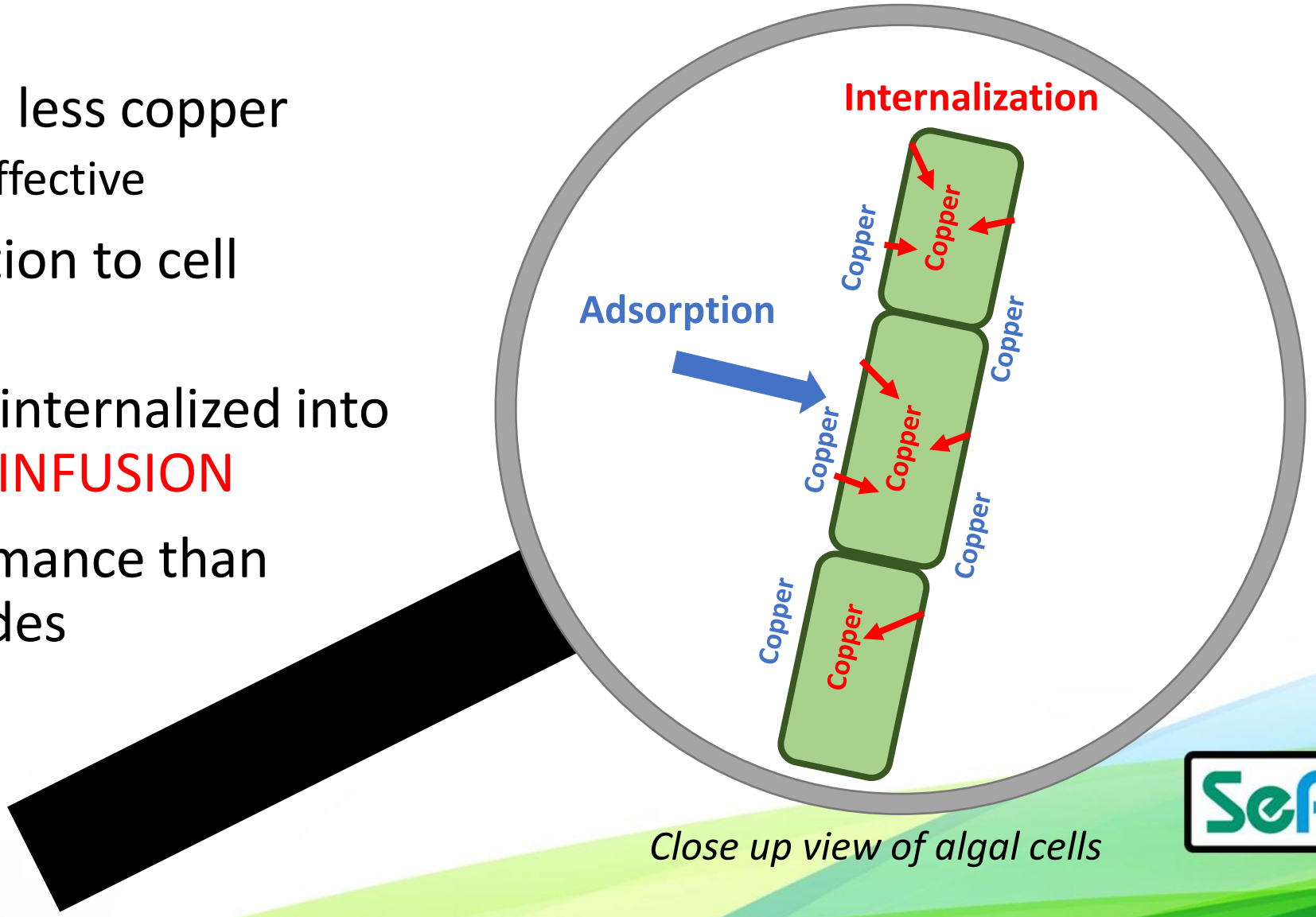
Captain® XTR

Algaecide

Captain® XTR
Algaecide

The Research

- Kill algae with less copper
  - 36% more effective
- Same absorption to cell surfaces
- More copper internalized into cells through INFUSION
- Better Performance than other algaecides



Close up view of algal cells

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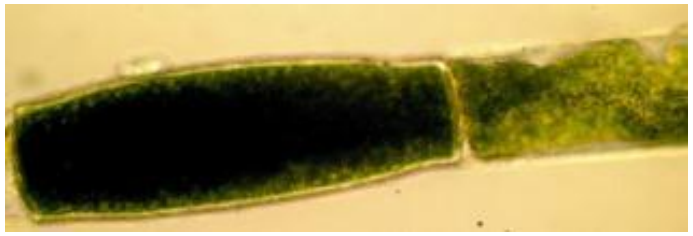
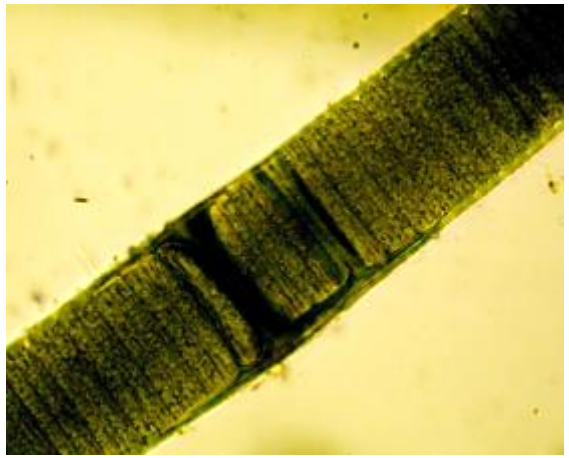
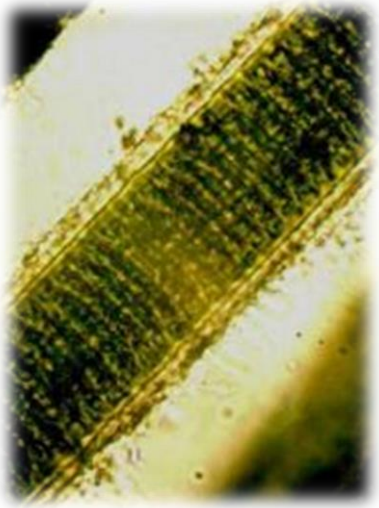
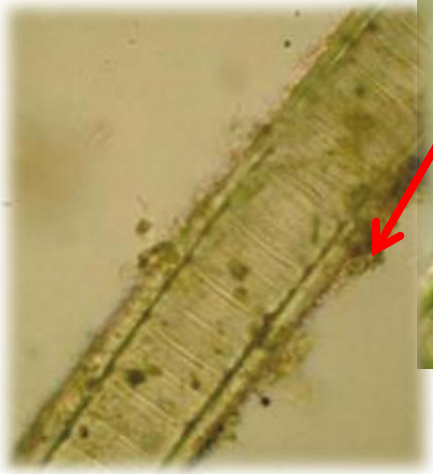
Healthy Algae Cells







Captain XTR Treated

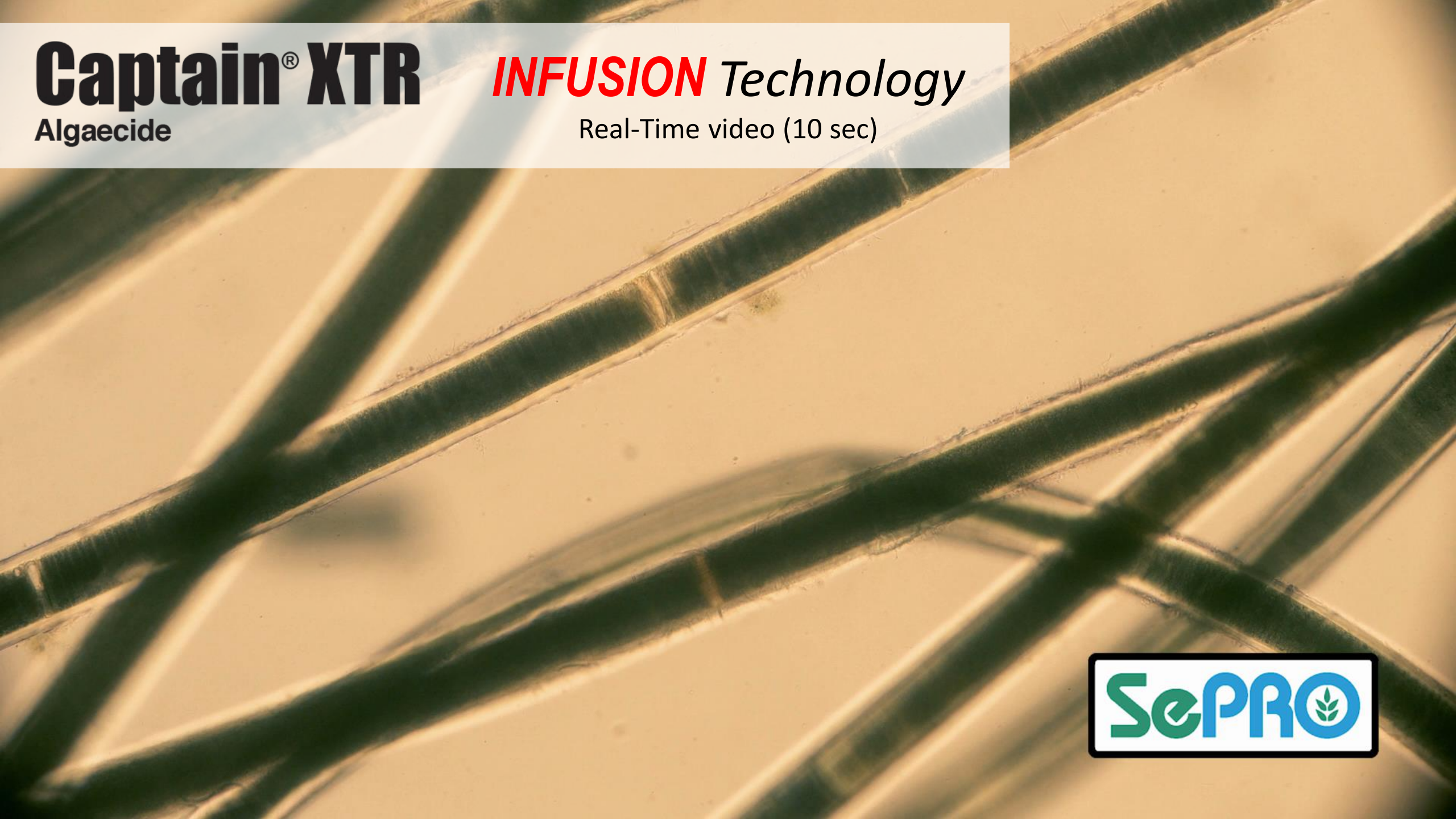


INFUSION

Captain® XTR
Algaecide

INFUSION Technology

Real-Time video (10 sec)



Captain® XTR
Algaecide

Rescue . . . Hammer tough to control algae with CaptainXTR.

- *INFUSION* Technology
- Rapid and Reliable
- 2 gal/acre
- No Irrigation Restrictions

SePRO

Algae Management

SeClear*

Algaecide & Water Quality Enhancer

Sweep away ALGAE and NUTRIENTS . . .

- Controls Algae and Reduces Phosphorus
- Improves Water Quality & Clarity
- SeClear – 5 gal./acre, every 2-3 weeks
- SeClear G – 15 lbs./acre, every 2-3 weeks
- No Irrigation Restrictions

SePRO

SeClear*

Algaecide & Water Quality Enhancer

Pre-treatment

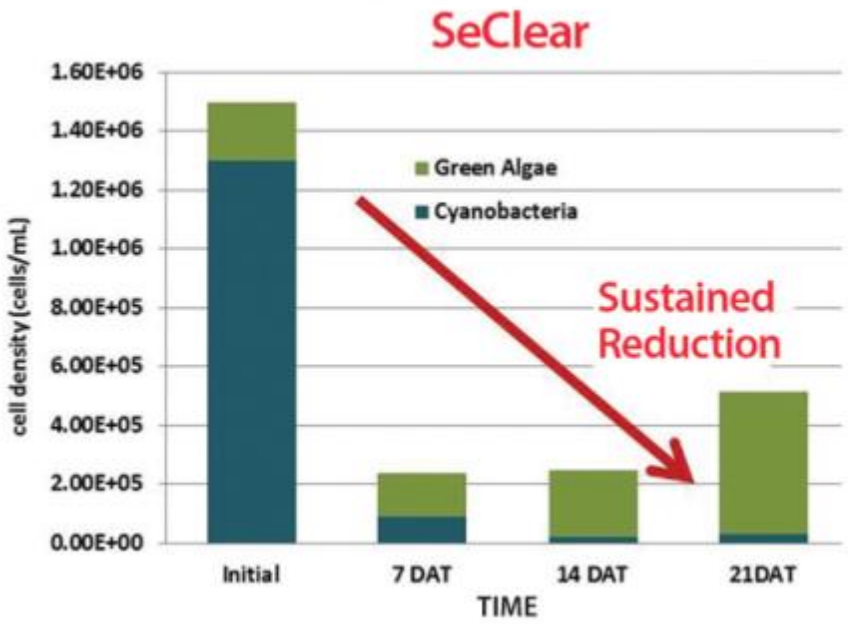
14 days after treatment

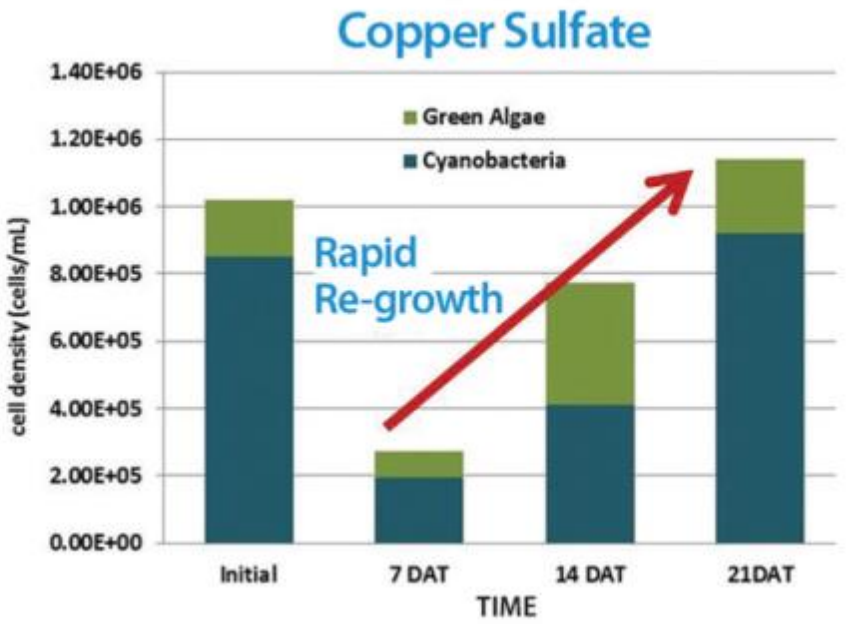
30 days after treatment

SePRO

SeClear Algaecide & Water Quality Enhancer

Sustained Cyanobacteria Control





Cyanobacteria (Blue-green algae)

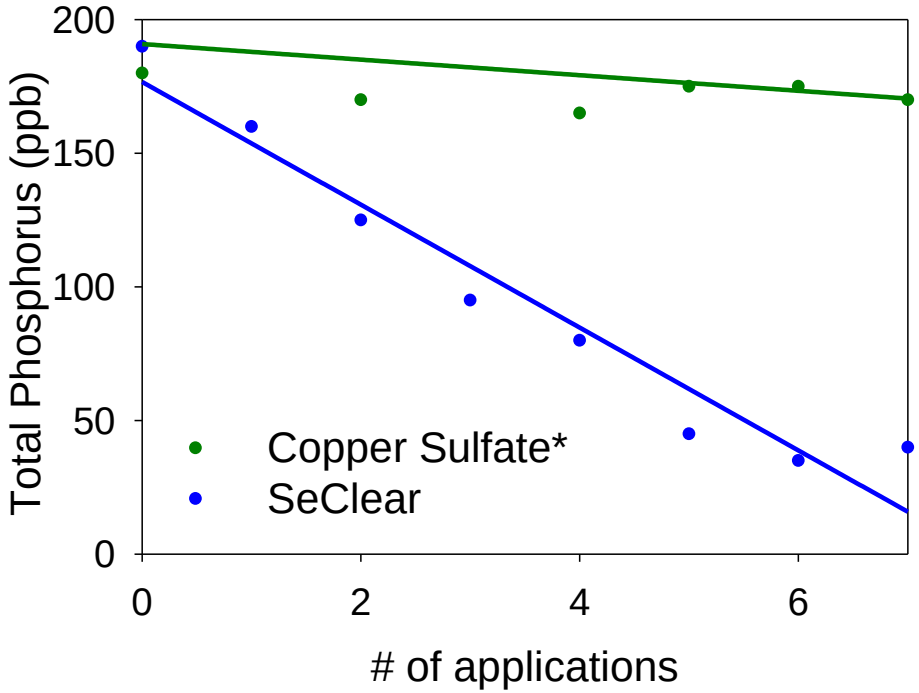
Green algae

Total P vs. Number Applications

SeClear*
Algaecide & Water Quality Enhancer

7 applications resulted in algae control and ~80% reduction in total P

* **Copper sulfate does not reduce phosphorus levels**



SePRO

SeClear*

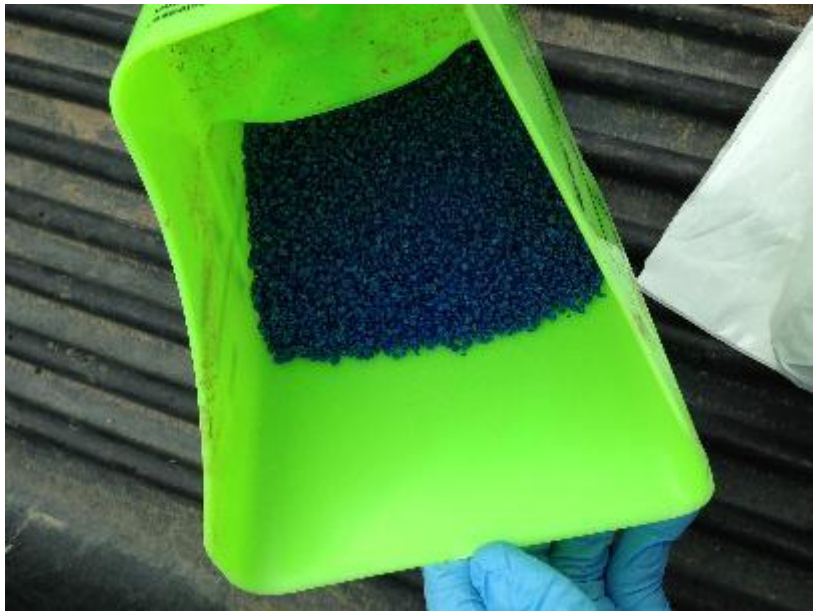
Algaecide & Water Quality Enhancer

- **The SeClear Solution**
  - 30% Less treatments
  - 40% Less copper
  - 3X Improvement in Water Clarity
- **New foundation for routine algae management**
  - Typical Rate: 5-7 gallons per acre
  - Max Rate = 6.5 gal per acre foot *1ppm

SePRO

SeClear G

Algaecide and Water Quality Enhancer™

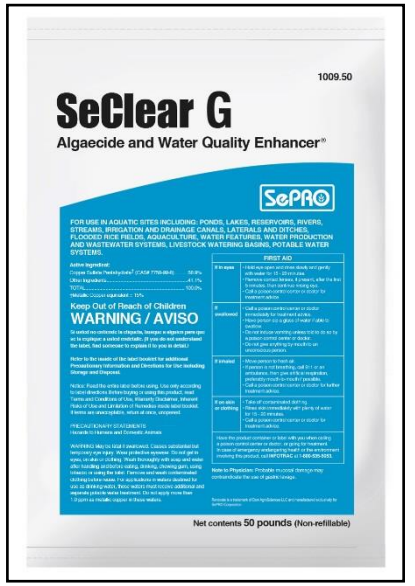


- Operational efficiency
  - Precision formulation
- Targeted efficacy
  - Apply as granule or dissolved in tank and spray
- 60% Copper Sulfate Pentahydrate
- NSF certification in process
- No water use restrictions

SeClear G

Algaecide and Water Quality Enhancer™

- Algae control, phosphorus reduction and water quality enhancement
- Apply as granule or dissolved in tank & spray
- Typical Rate: 15-20 pounds per acre
  - Max Rate = 18 lbs per acre foot *1ppm
  - 2.8 pounds G = 1 gallon liquid (14lbs = 5 gallons)
  - Tank Mix Solution = 2:1



SeClear G

Algaecide and Water Quality Enhancer™

Pre-Treatment

1 Day Post

3 Days Post

PAK®27

Algaecide

- Fast acting with no residual
- Selective control of blue green algae (low rates)
- OMRI Listed – Certified Organic Use
- NSF ANSI certified for use in drinking water

Rate (#/Acre-foot)	Species Controlled
3 - 17	Selective for Cyanobacteria/Blue-greens
17 – 30	Cyanobacteria/Blue-greens & Sensitive Green Algae
30 – 50	Cyanobacteria/Blue-greens, More Tolerant Green Algae & Diatoms
50 - 100	Tough to Control Green Algae & Cyanobacteria (i.e. *Rhizoclonium spp., Pithophora spp., Oscillatoria spp. & Lyngbya spp.)*

NSF®

OMRI LISTED
For Organic Use

SePRO

PAK®27

Algaecide

- Use Opportunities
  - Selective cyanobacteria/toxic algae control
  - Copper use restricted or not preferred
  - Canals, Ponds, Lakes, Reservoirs, Fountains
  - Koi/Gold fish
  - Organic irrigation (OMRI Listed)
  - **GREEN** Alternative

NSF

OMRI LISTED
For Organic Use

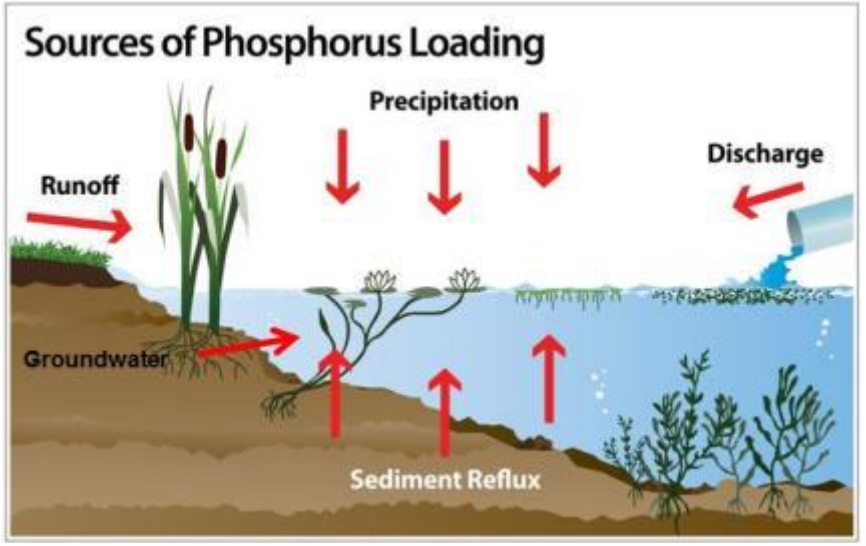
SePRO

Water Quality Management

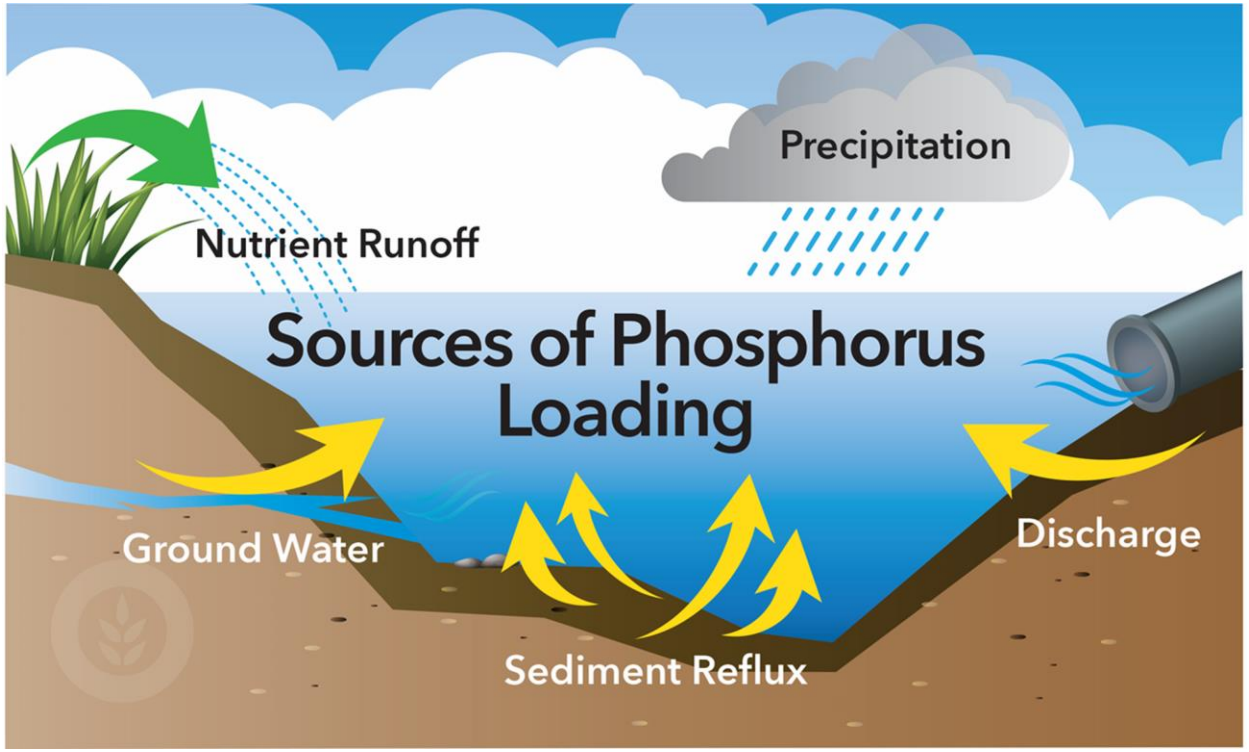
Eutrophication

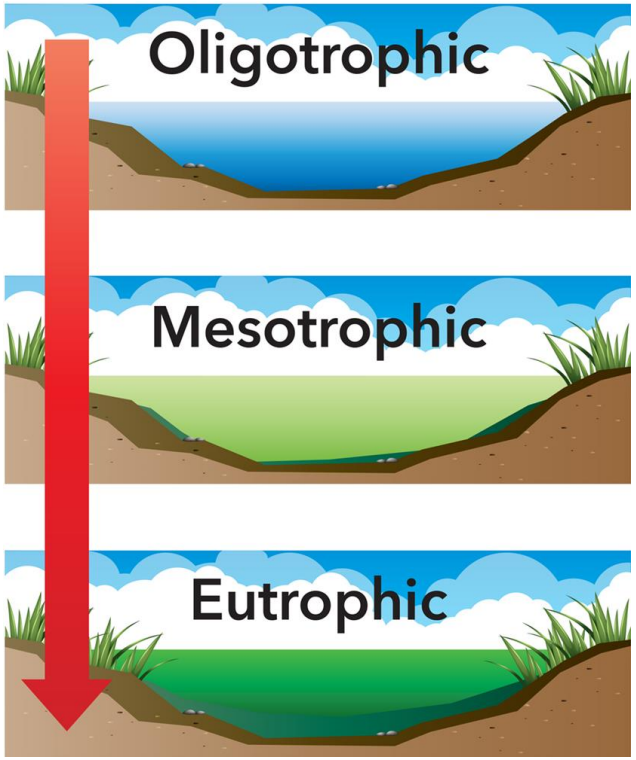
The aging process….. accumulation of nutrients.

When the effects are undesirable, eutrophication may be considered **a form of pollution**.



Target the Source





- Phosphorus is the key limiting nutrient in aquatic ecosystems

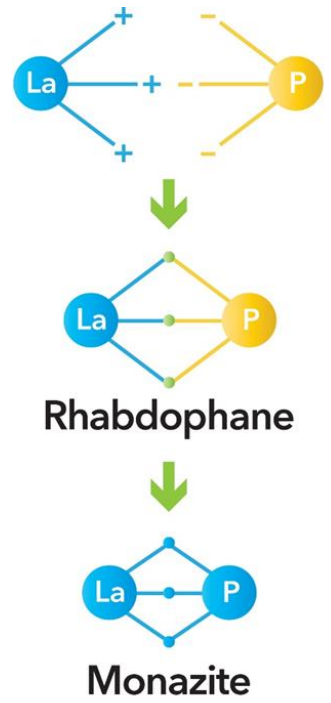
1 lb. of Phosphorus can support 500 lbs. of algae growth

Phoslock®

Phosphorus Locking Technology

Features

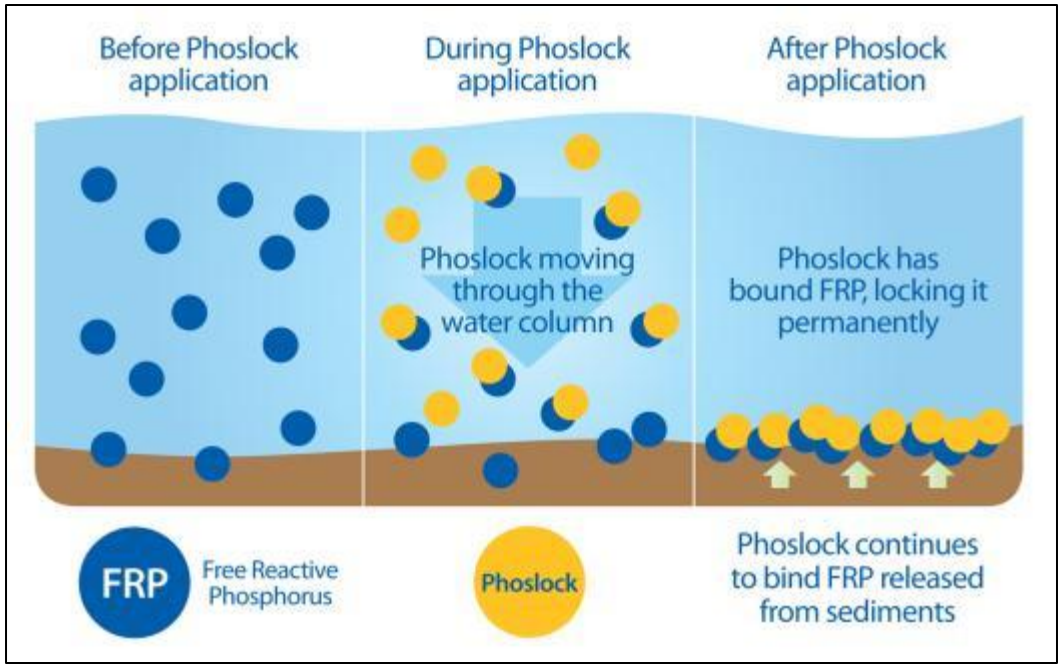
- Lanthanum (5%) + Bentonite Clay (95%)
- Not impacted by water chemistry (no pH buffering)
- NSF/ANSI 60 certified
- Not a pesticide!
- Specific to phosphorus binding
  - 100 lbs. locks up 1 lb. of P



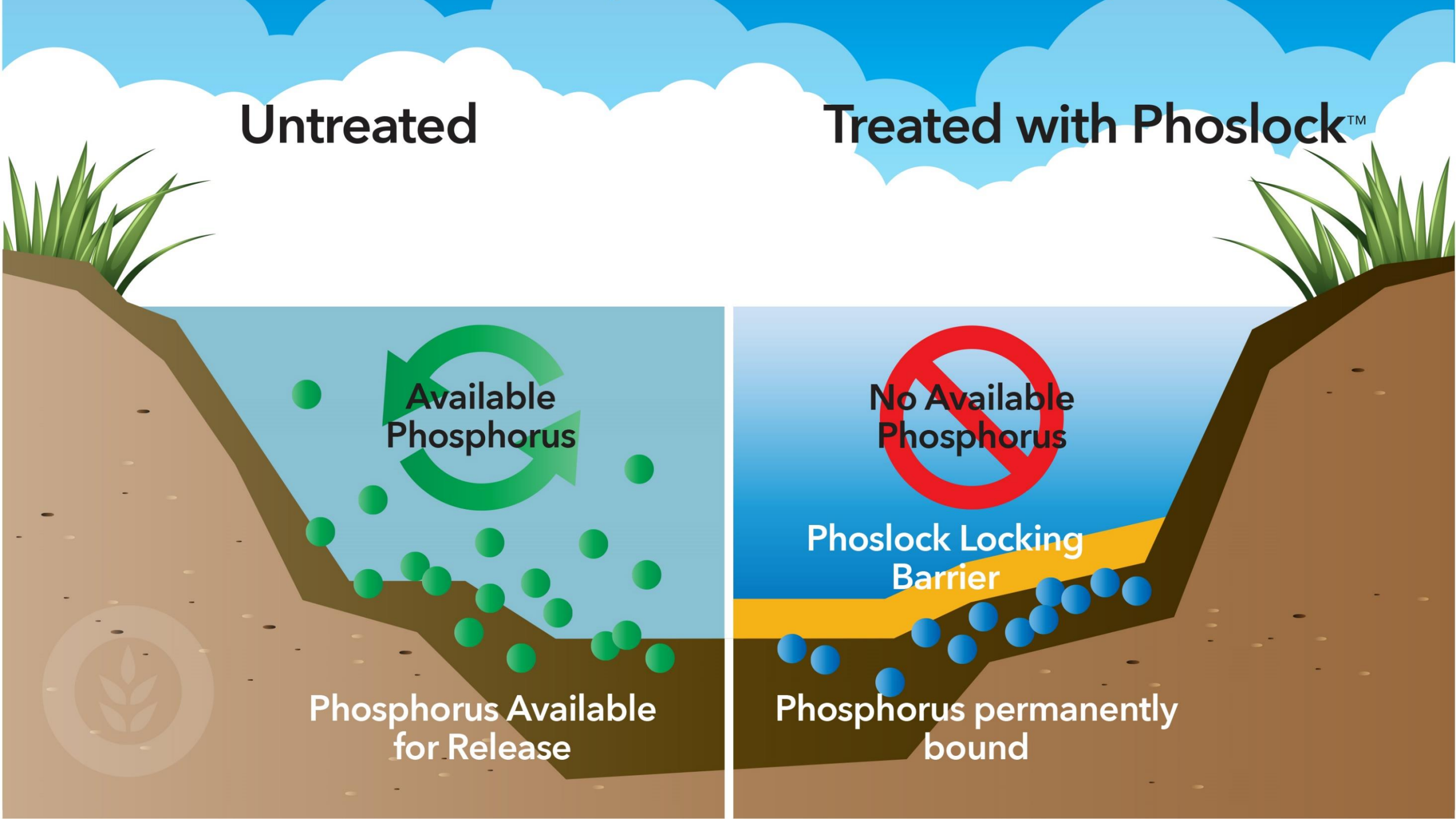
PHOSLOCK®

Phosphorus Locking Technology

A natural technology that inactivates bio-available phosphorus & restores water quality



FRP


Untreated
Treated with Phoslock™
Available Phosphorus
No Available Phosphorus
Phoslock Locking Barrier
Phosphorus Available for Release
Phosphorus permanently bound

Phoslock Applications

- **Slurry** – Immediately targets water column P
- **Granular** – Immediately targets sediment P

Reset Program

PHOSLOCK®
Phosphorus Locking Technology

Lake Lorene, WA

- 72% decline of total phosphorus
- 53% decline of reactive phosphorus
- No blue-green algae blooms (May-Nov. 2012)
- Secchi depth transparency to bottom

August 2011

July 2012

SePRO

Pond Application Systems

Phoslock Applications

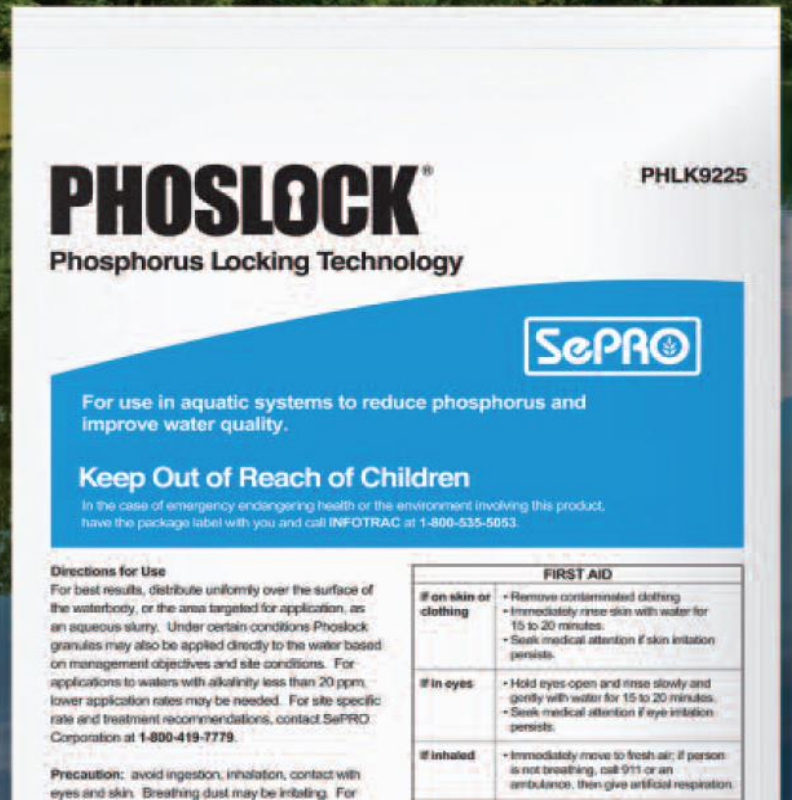
- Phoslock slurry injected or surface applied
- Tank mix granule with H2O, constant agitation. 1:1 to 3:1 ratio based on equipment.
- Even coverage to maximize performance

SePRO

SePRO Aquatic Solutions

PHOSLOCK®
T.R.A.P.

Tactical Remediation Advantage Program



PHOSLOCK®

PHLK9225

Phosphorus Locking Technology

SePRO

For use in aquatic systems to reduce phosphorus and improve water quality.

Keep Out of Reach of Children

In the case of emergency endangering health or the environment involving this product, have the package label with you and call **INFOTRAC** at **1-800-535-5053**.

Directions for Use

For best results, distribute uniformly over the surface of the waterbody, or the area targeted for application, as an aqueous slurry. Under certain conditions Phoslock granules may also be applied directly to the water based on management objectives and site conditions. For applications to waters with alkalinity less than 20 ppm, lower application rates may be needed. For site specific rate and treatment recommendations, contact SePRO Corporation at **1-800-419-7779**.

Precaution: avoid ingestion, inhalation, contact with eyes and skin. Breathing dust may be irritating. For

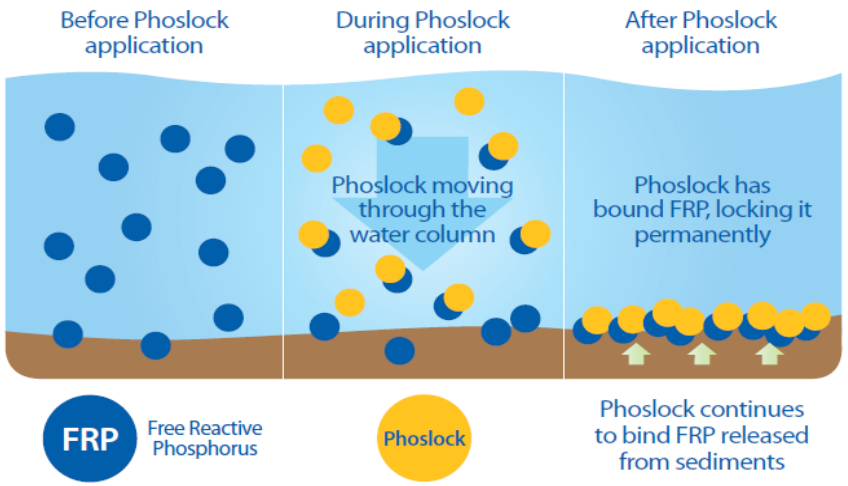
FIRST AID	
If on skin or clothing	• Remove contaminated clothing • Immediately rinse skin with water for 15 to 20 minutes. • Seek medical attention if skin irritation persists.
If in eyes	• Hold eyes open and rinse slowly and gently with water for 15 to 20 minutes. • Seek medical attention if eye irritation persists.
If inhaled	• Immediately move to fresh air; if person is not breathing, call 911 or an ambulance, then give artificial respiration.

TRAP PHOSPHORUS

T.R.A.P. Tactical Remediation Advantage Program

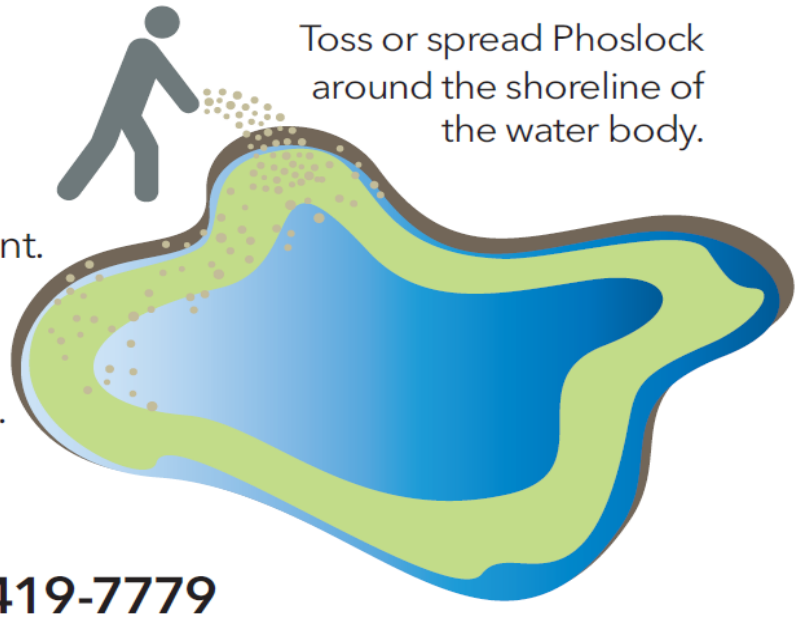
Phoslock T.R.A.P. is an early-season nutrient remediation program designed to target the phosphorus levels in water and sediments around the shoreline. Excessive levels of phosphorus degrade water quality, often creating a disadvantage in your water body. T.R.A.P. phosphorus early and shift water quality back in your favor.

How Phoslock Works



Application Guidelines

- Apply 2 bags (110 lbs.) per 10,000 sq. ft.
- Toss by hand or spread by equipment.
- Make applications prior to algae growth or 3-5 days after a Captain® XTR or SeClear application.
- Easy. Effective. Economical.



SePRO

Contact your SePRO Technical Specialist or call **1-800-419-7779**

The use of Phoslock Phosphorus Locking Technology in this prescription provides strategic early-season nutrient reduction specifically targeting phosphorus in the water column and sediments. This approach is designed to improve overall water quality and increase the effectiveness of your algaecide and herbicide program. 1 pound of phosphorus can support 500 pounds of algae growth. 100 pounds of Phoslock removes 1 pound of phosphorus. Always read and follow label directions. Phoslock is a registered trademark of Phoslock Water Solutions, LLC. Captain and SeClear Algaecide and Water Quality Enhancer are registered trademarks of SePRO Corporation.

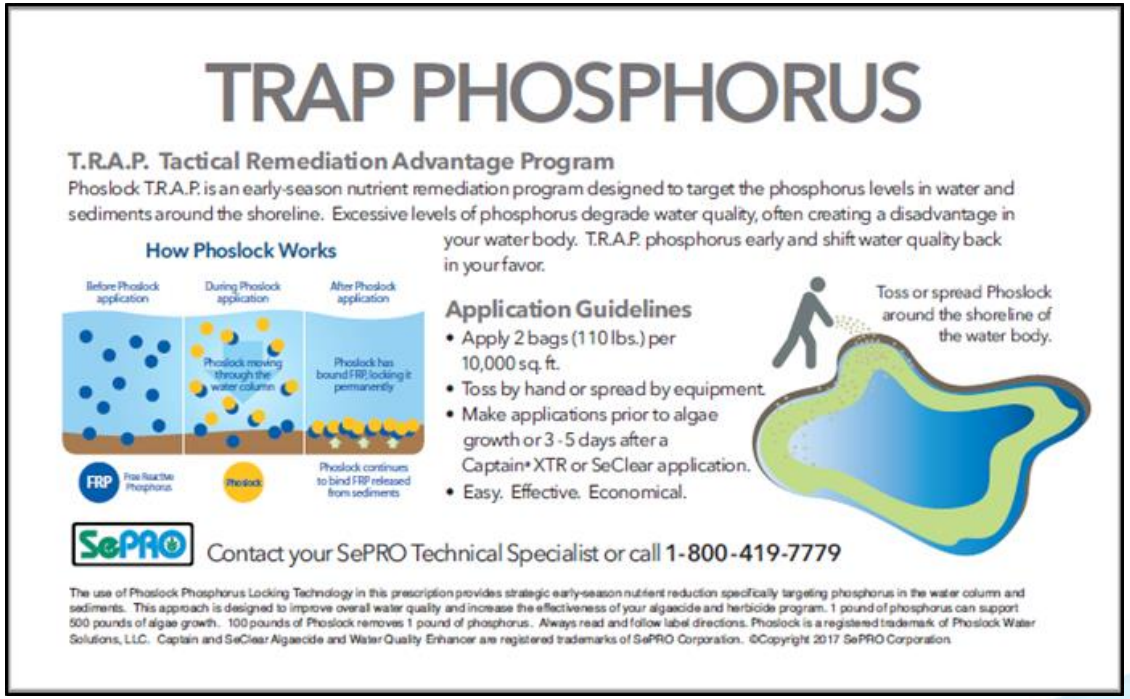
Phoslock T.R.A.P.

Tactical Remediation Advantage Program

Simple maintenance program for nutrient management and water quality protection.

*1lb of P can support 500lbs of algae—100lbs of Phoslock can remove 1lb of P

*Not one pound, ounce, or granule will go to waste



SePRO


Treated with
Phoslock
No Phoslock
Treatment

Polling Question

Join the conversation
@Stewardsofturf
@Stewardsofwater

Thank You!

Mike Pearce
Portfolio Leader
SePRO Corporation
mpearce@sepro.com
317-552-8272

- BREAK –

We will reconvene at 11:00am

Support Turfgrass Research & Education at OSU

For Tickets: Scan QR code or visit:www.oregonturfgrassfoundation.org

Break - We will reconvene at 11:00am

Creating or Enhancing Monarch Habitat on Golf Course Properties & Landscapes

Part One: Status of Western Monarchs & Ways of Creating Pollinator Habitat

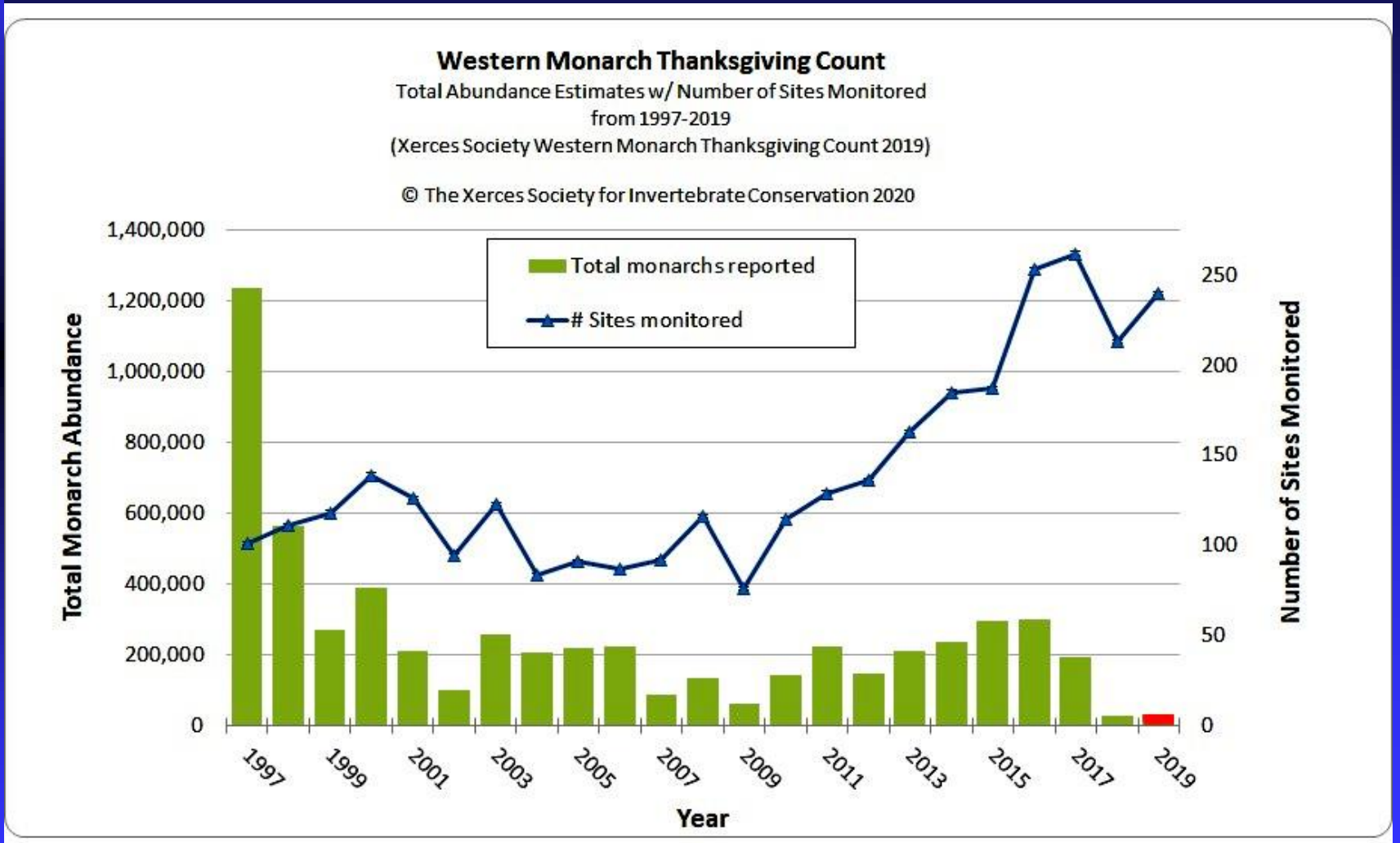
Tom D. Landis

SOMA CoFounder

Retired US Forest Service

Nursery Specialist

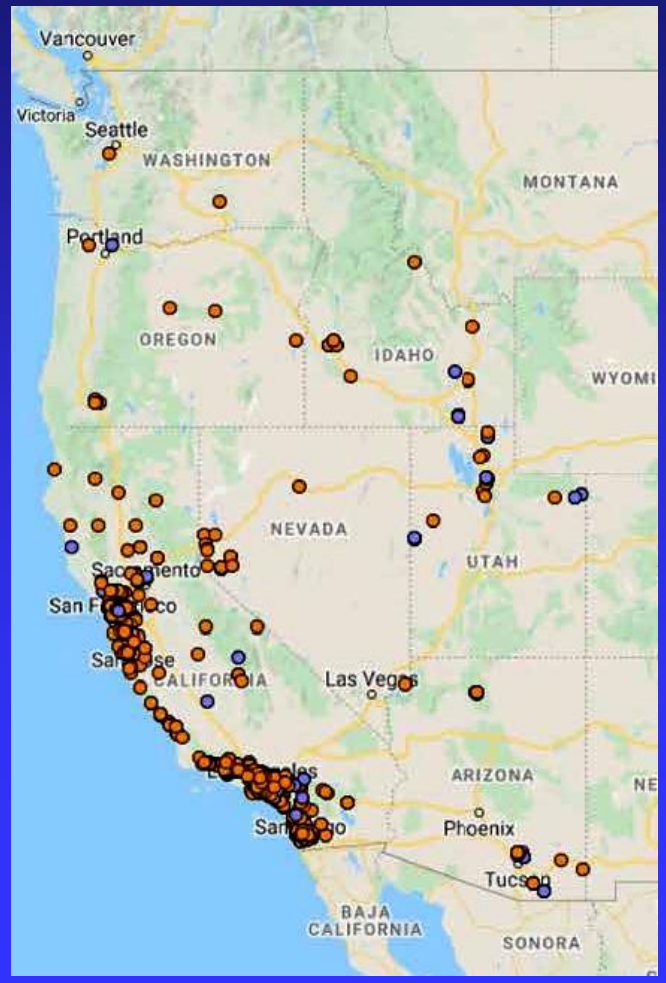
Western Monarch Butterfly Population Crash



Predictions are Even Worse for 2020 – 2021: As Few As 5,000 Monarchs

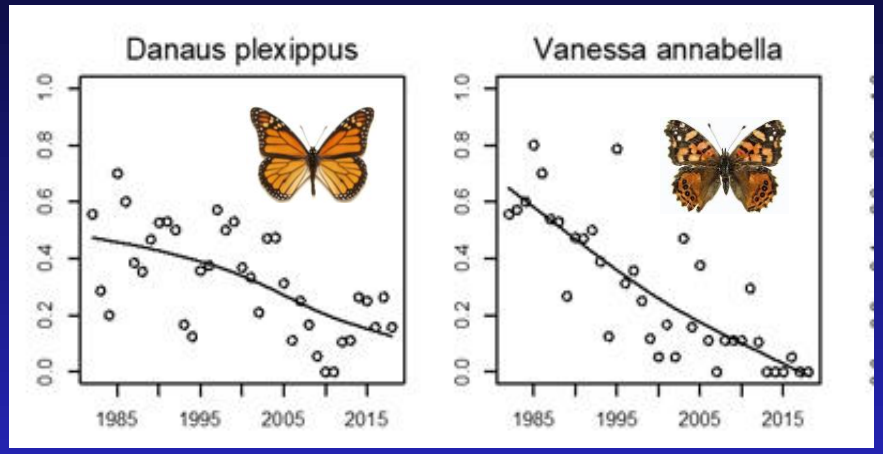
Few Monarchs in the Pacific Northwest This Year

Western Monarch and Milkweed Mapper



In Contrast, Monarch Advocates in Bay Area & Southern CA Saw 400 to 500% Increase This Season

It's About More than Just Monarchs



Creating Monarch Habitat Benefits Other Butterflies & Bees

Monarchs Were 10th in List of Butterflies with Decreasing Populations in last 40 years on Al Shapiro's Transects (Forister & Others 2011)

Causes for Population Crash of Monarch Butterflies

1. **Overwinter Habitat Loss**
2. **Breeding Habitat Loss ***
3. **Diseases, Parasites & Predation**
4. **Climate Change**
5. **Pesticide Use**

Real Cause is Likely Synergistic

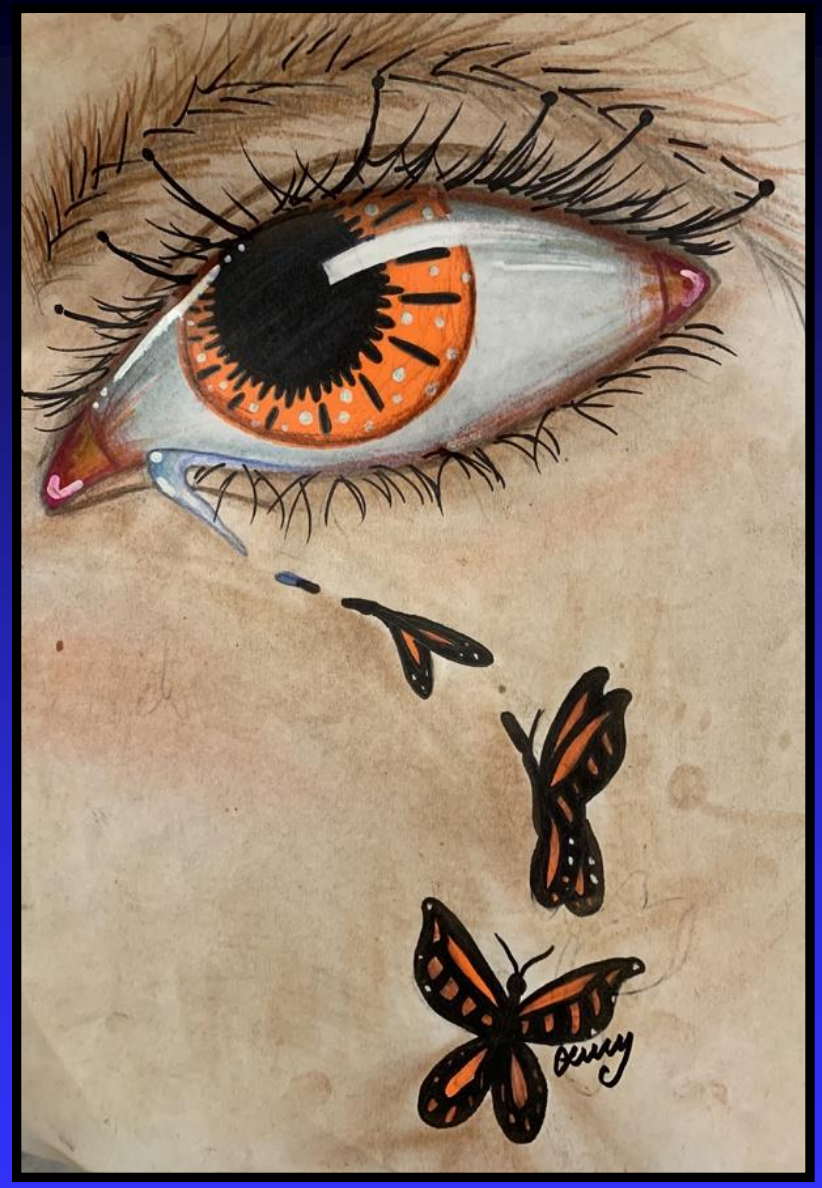
Commission for Environmental Cooperation, 2008

Are We Watching the End of the Monarch Butterfly?

New York Times article by
Mary Hannibal – Jan. 25, 2019

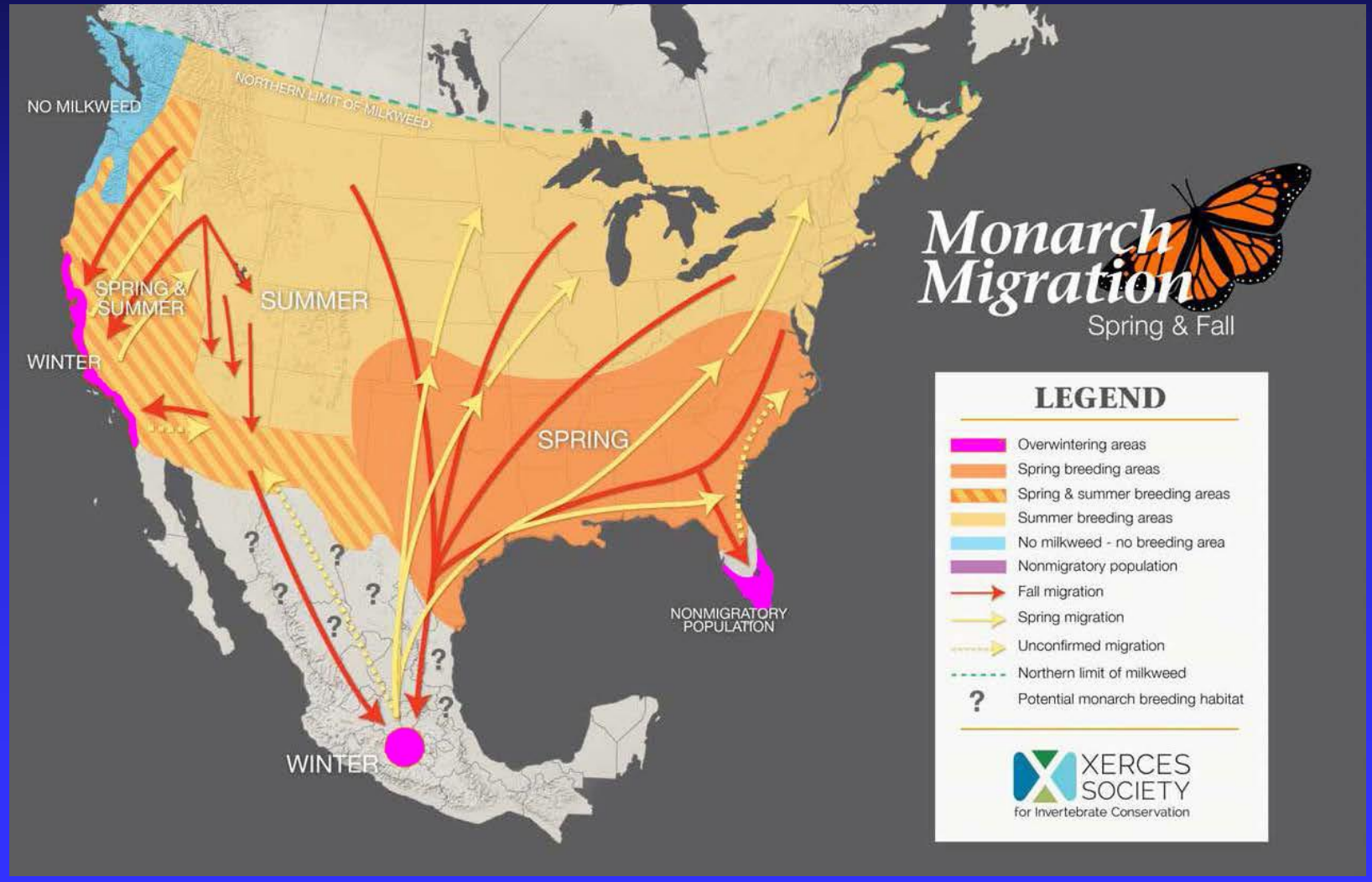
People's Response to Monarchs is Emotional, Rather than Rational

Monarchs are "Charismatic Microfauna"



Lucy Egertson – 6th Grade

Eastern Monarchs Overwinter in Mexico
Western Monarchs on California Coast



Four Monarch Generations per Year

First Generation: February to April: Eggs laid by females after overwintering. Total lifespan = 6 to 10 weeks

Second Generation: May to June: Total lifespan = 6 to 10 weeks

Third Generation: July to August: Total lifespan = 6 to 10 weeks

Fourth (Super) Generation: Sept to February Total lifespan = 6 to 7 months

Location of Western Monarch Generations

- CA is the Only State to Have All 4 Generations
- Some monarchs in CA are non-migratory
- We See Monarchs from May to October in OR
- Few Made it to WA This Last Season

Climate Change is Affecting Many Aspects of Monarch Behavior

"Monarchs are le**aving overwintering grounds earlier,** when many varieties of milkweed have not yet sprouted or grown enough to be usable"

"It's possible that **monarchs are making their return migration later in the year**, so nectar availability in the late fall may be limiting"

Neonicotinoids: Another Silent Spring?

Milkweed Plant Sold By Home Deport

Sublethal Effects Are Most Worrisome: Disorientation

https://www.monbiot.com/2014/07/15/another-silent-spring/

Support Local Nurseries & Garden Stores That Don't Use Neonicotinoids

Home Use Products Contain Much Higher Levels

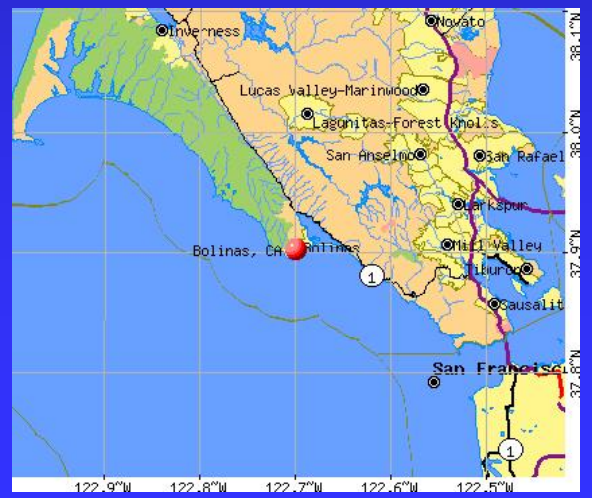
Ace Hardware Won't Sell Neonic Pesticides

The Good News: Creating Pollinator Habitat Works!

January 1, 2016:

Tagged monarch found at Coyote Trails Nature Center in Medford

Was Found Overwintering in Bolinas, CA



Creating Pollinator Habitat with Monarch Waystations

Habitat =

Food,

Shelter,

& Water

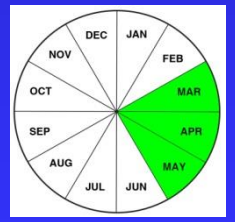
Plant Palette for Monarch Waystations

Milkweed for Caterpillars

Narrowleaf Milkweed

Showy Milkweed

Nectar Flowers for Butterflies



Spring Flowering

Oregon grape

Summer Flowering

Coyote mint

Fall Flowering

Rubber rabbitbrush

1A. Food: Host Plants

- ✓ Different butterflies have different host plants
- ✓ **Monarch caterpillars eat *only* milkweed leaves**
- ✓ Host plants for western tiger swallowtail belong to 8 different genera: willows, cottonwoods, birch, maple, alder and others

Native Milkweed Species

Narrowleaf milkweed
(*Asclepias fascicularis*)
ASFA

- Grows on harsh, dry sites
- More common west of Cascades but can be found throughout Oregon
- Moderately rhizomatous

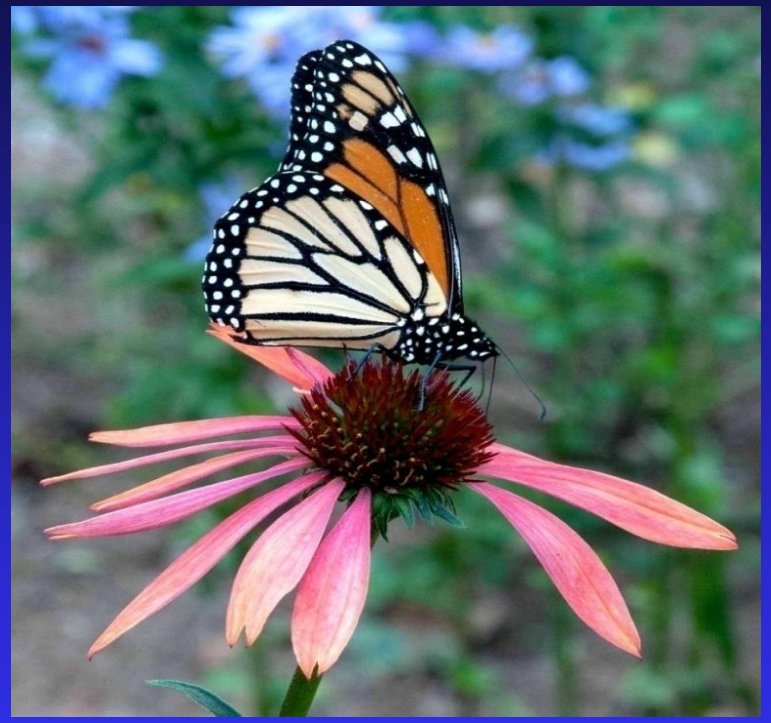
Native Milkweed Species

Showy milkweed
(*Asclepias speciosa*)
ASSP

- Prefers moister sites, but can thrive in drier conditions
- Found throughout Oregon
- Highly rhizomatous

1B. Food: Nectar Plants

Adult Butterflies Get Sugar for Energy from the Nectar in Flowers



- Sugar Content of Nectar Ranges from 8% to 50%
- Nectar also Contains Vitamins, Oils & Amino acids

All Plants Have Pollen, But Not All Plants Have Nectar

California poppy has no nectar = No butterflies
But it is an excellent pollen plant for bees, especially bumblebees

Pollen: small powdery particles produced by anthers (male flower organs) that is carried by pollinators to fertilize the female flower organs and produce seeds. Pollen provides vital protein and fats; honey bees use it to make bee bread.

Nectar: sugary substance, produced by **some** plants to attract pollinators (bees, butterflies and hummingbirds). Sugar is metabolized for energy or stored as fats.

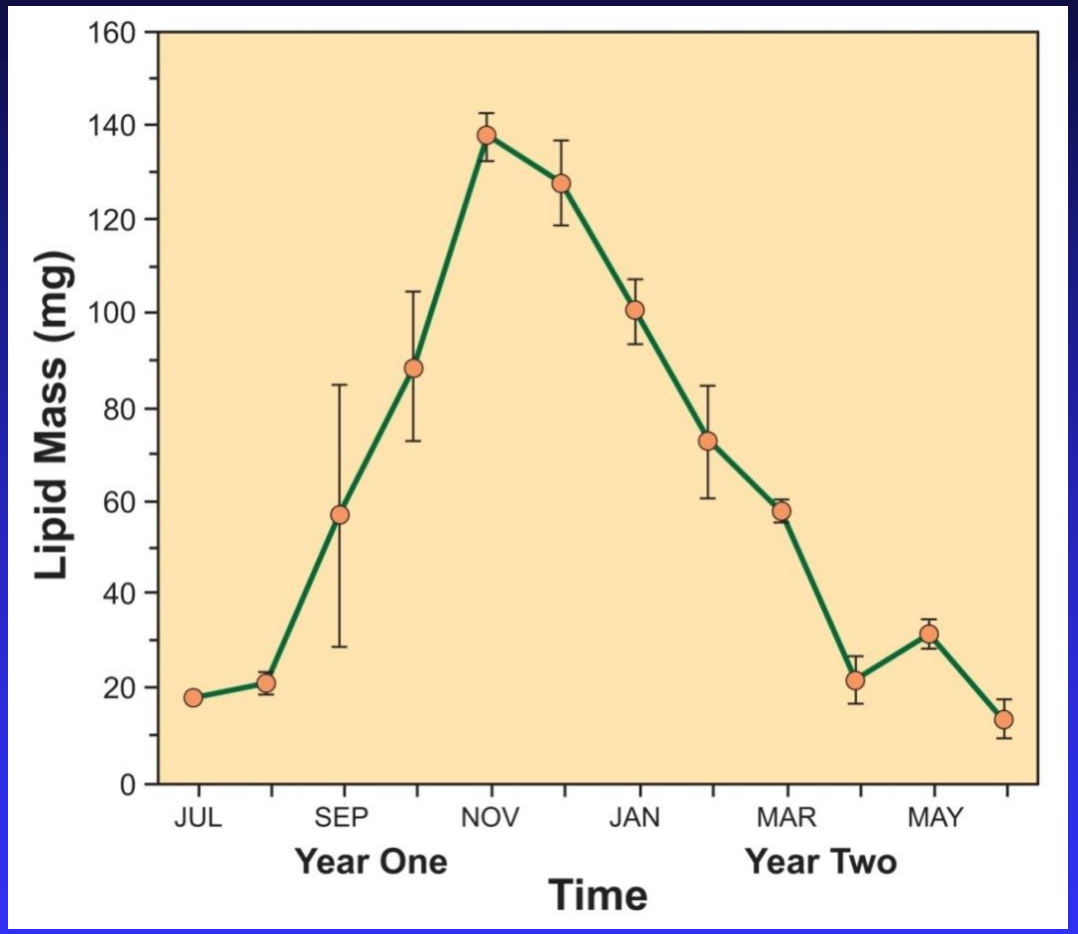
Milkweed Nectar is Favored by Bees

Native Bee on Narrowleaf Milkweed

Bumblebee on Swamp Milkweed Cultivar

Scientists Identified 5 Bee Families and 17 Genera Nectaring on Milkweeds (Baker & Potter, 2019)

Nectar is Stored as Fats in Monarch Butterflies



Nectaring in Late Summer & Fall Builds Up Fat Reserves for Migration & Overwintering

2. Shelter: Woody Shrubs & Trees

Monarch butterflies need places to rest at night and during inclement weather

Protection from Wind, and Excessive Heat

3. Water: Moisture & Minerals

"Puddling" accesses much needed sodium

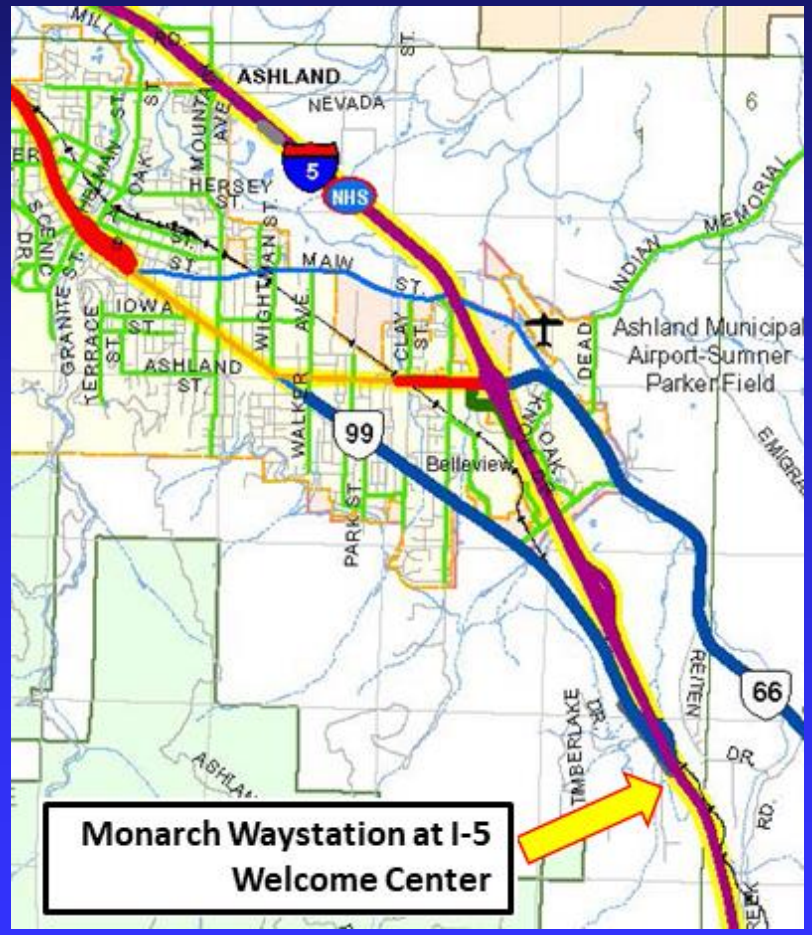
Monarchs puddling at overwintering site in Mexico

Photo: Dennis Curtin

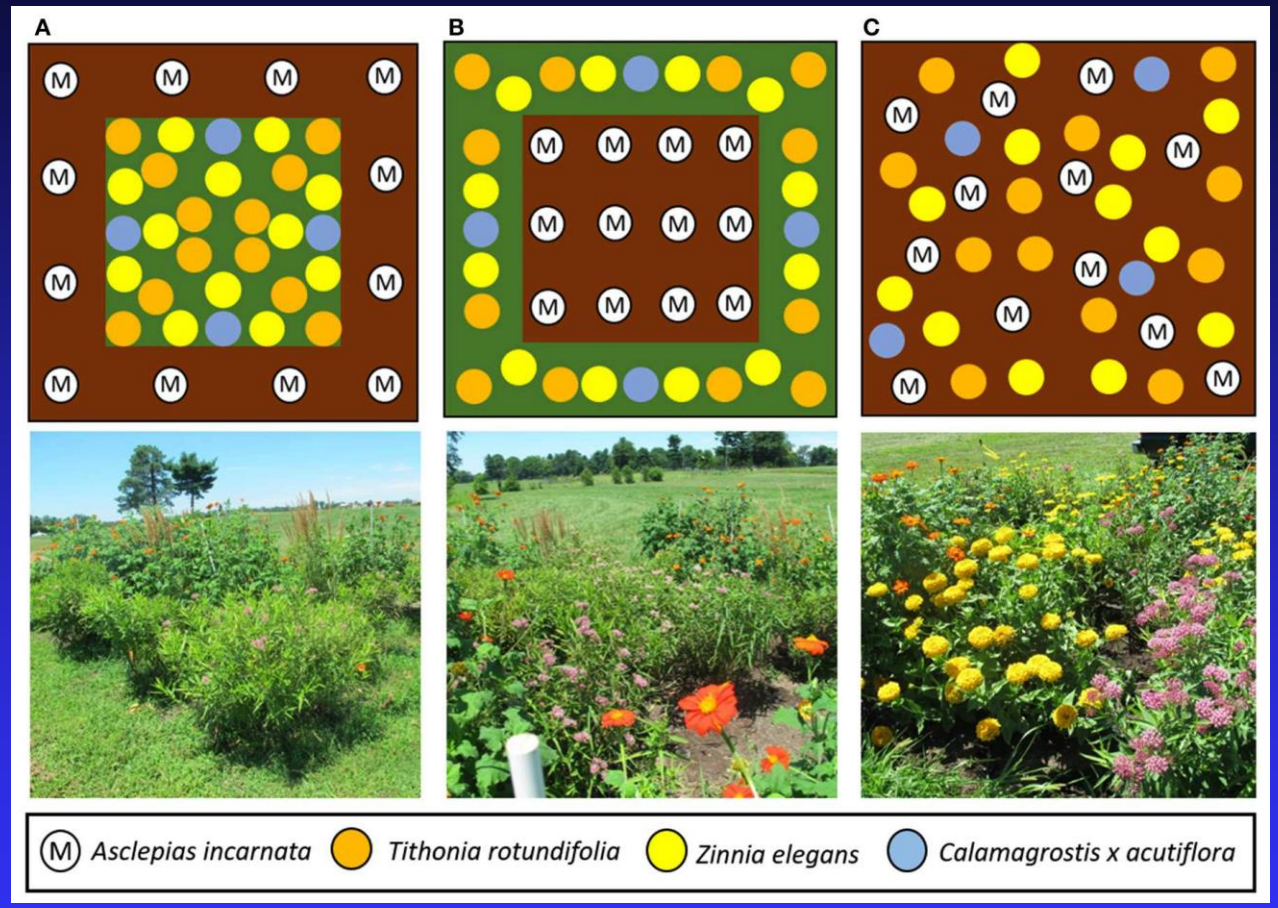
Even in nursery pots

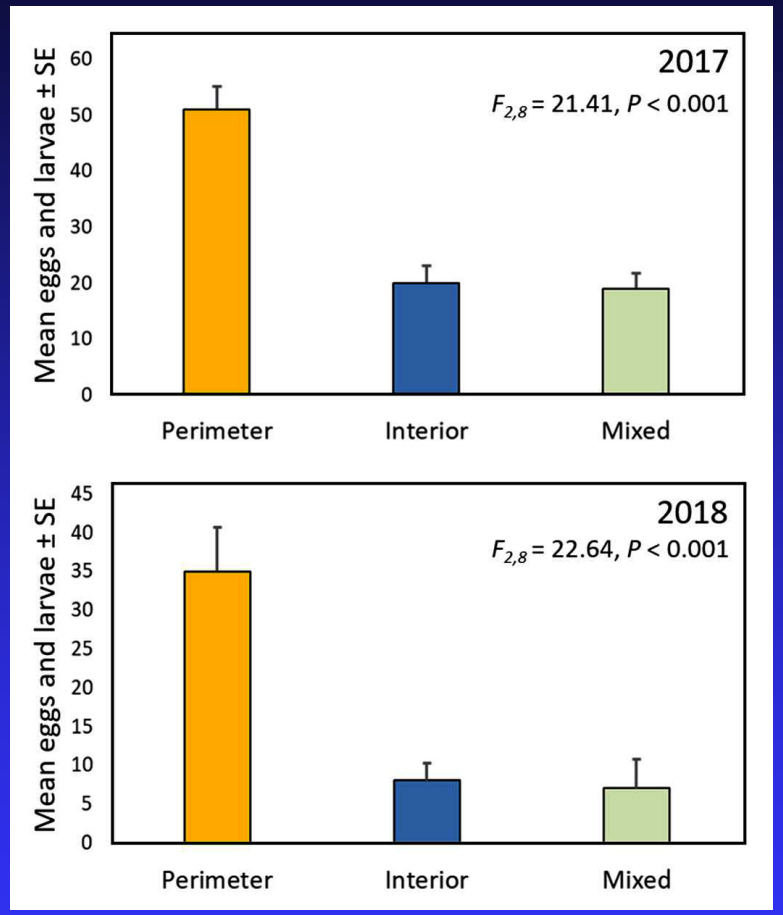
Photo: Suzie Savoie

Locate Monarch Waystations in High Traffic Areas to Promote Environmental Education



Monarchs Prefer Perimeter Milkweeds





Configuration and Location of Small Urban Gardens Affect Colonization by Monarch Butterflies (Baker & Potter, 2019)

Why Use Native Plants?

1. Native plants are adapted to local environment
2. Introduced plants often become noxious pests

Please call 1-866-invader if you suspect you have found this species

Orange hawkweed
Pilosella aurantiacum (Hieracium)

Other common names:
Devil's paintbrush

USDA symbol: HIAU
ODA rating: A and T

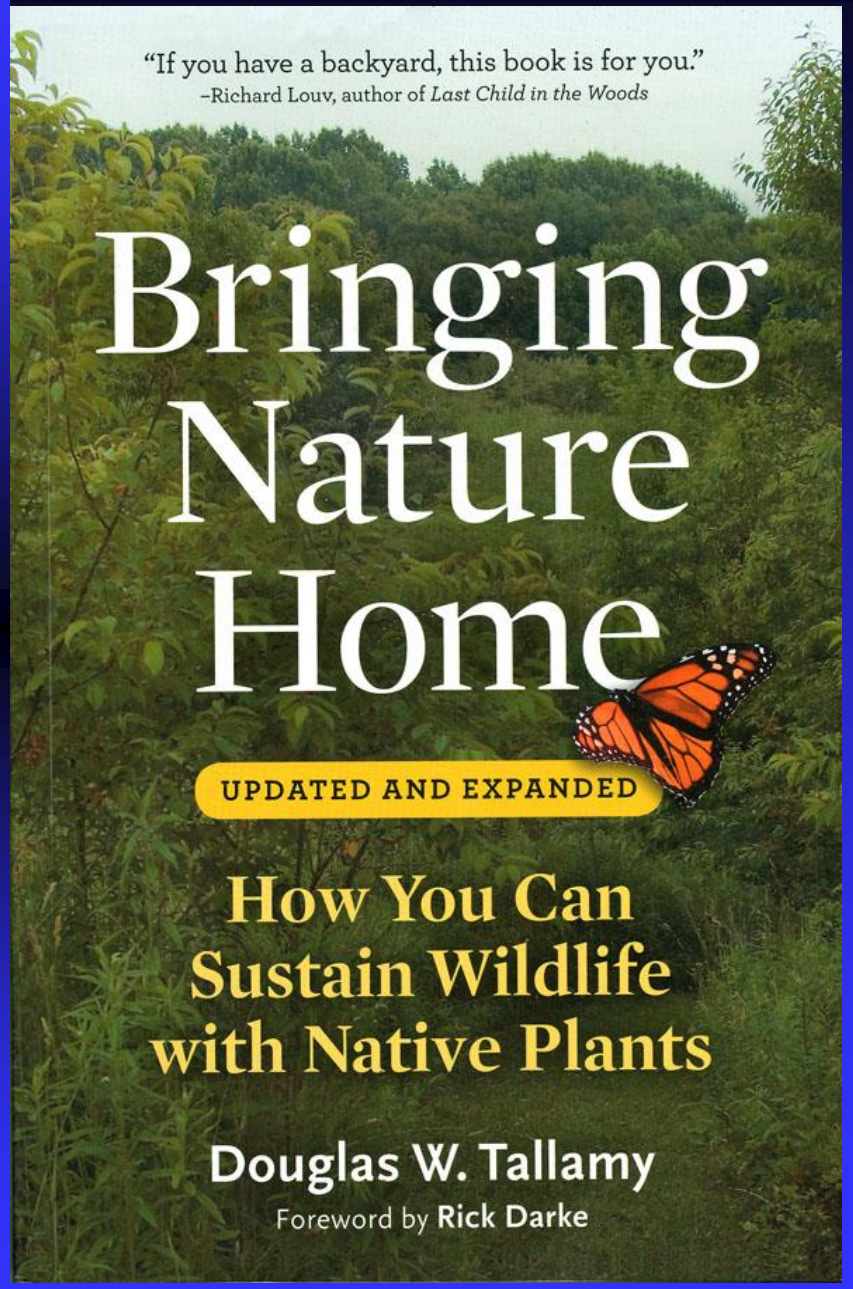
Orange Hawkweed is a Class A Noxious Weed in Oregon

Are ‘Native Only’ Wildlife Gardens Starving Fall Pollinators? (Gomez 2017)

No Other Native Plants
Were Flowering This Late
In the Season

Butterflies
Nectaring
On
Black Knight
Butterfly
Bush

Late October
2017



Native Plants vs. Cultivars

I ♥ Natives

Depends on the Location on Golf Courses

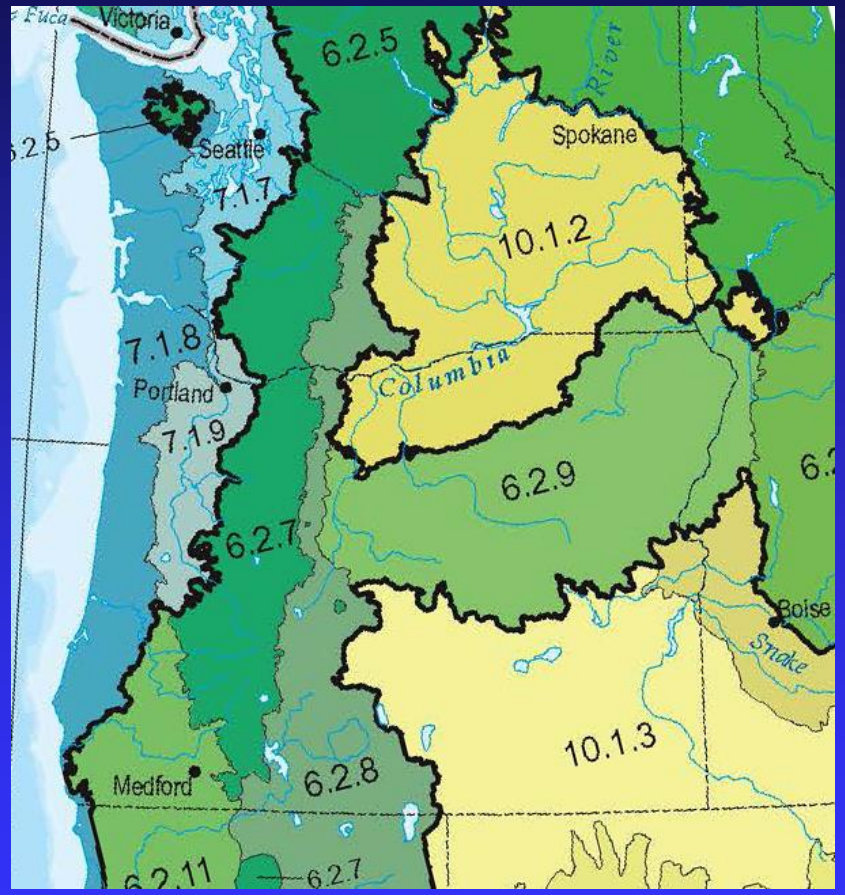
1. Natives and Cultivars in Garden Areas: Clubhouse, Tees, and Fairways

2. Native Plants Only in Rough Areas

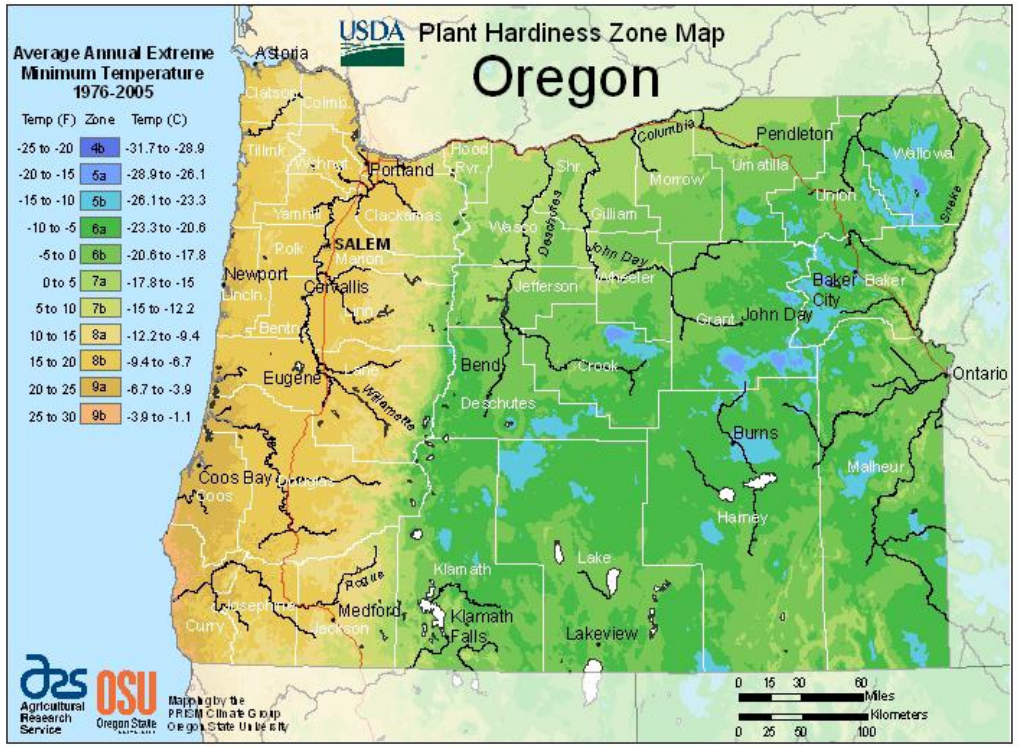
"Mixing native plants with horticultural plants can help retain flexibility around landscape design while maximizing benefits to pollinators"

https://catalog.extension.oregonstate.edu/em9289

Finding Locally-Adapted, Source-Identified Pollinator Plants



Seed Zones for Native Plants



Hardiness Zones for Cultivars

Native Milkweeds Can Become Invasive in Garden Situations

Both Showy and Narrowleaf Milkweed Produce Rhizomes

Non-Rhizomatous, Non-Invasive Milkweeds for Garden Areas

Butterfly weed
(*Asclepias tuberosa*)

"Hello Yellow"

"Gay Butterflies"

Swamp milkweed
(*Asclepias incarnata*)

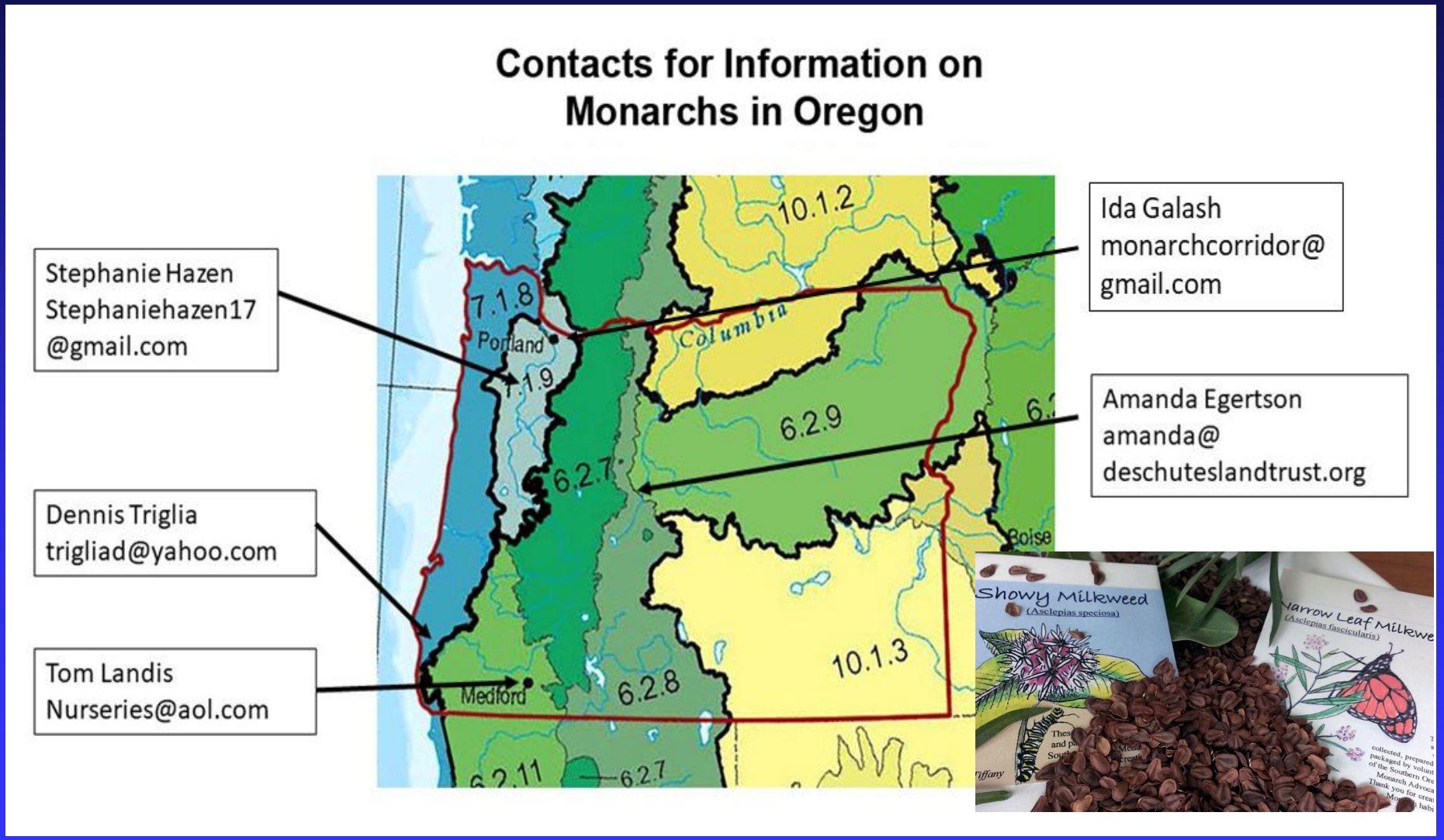
"Ice Ballet"

"Cinderella"

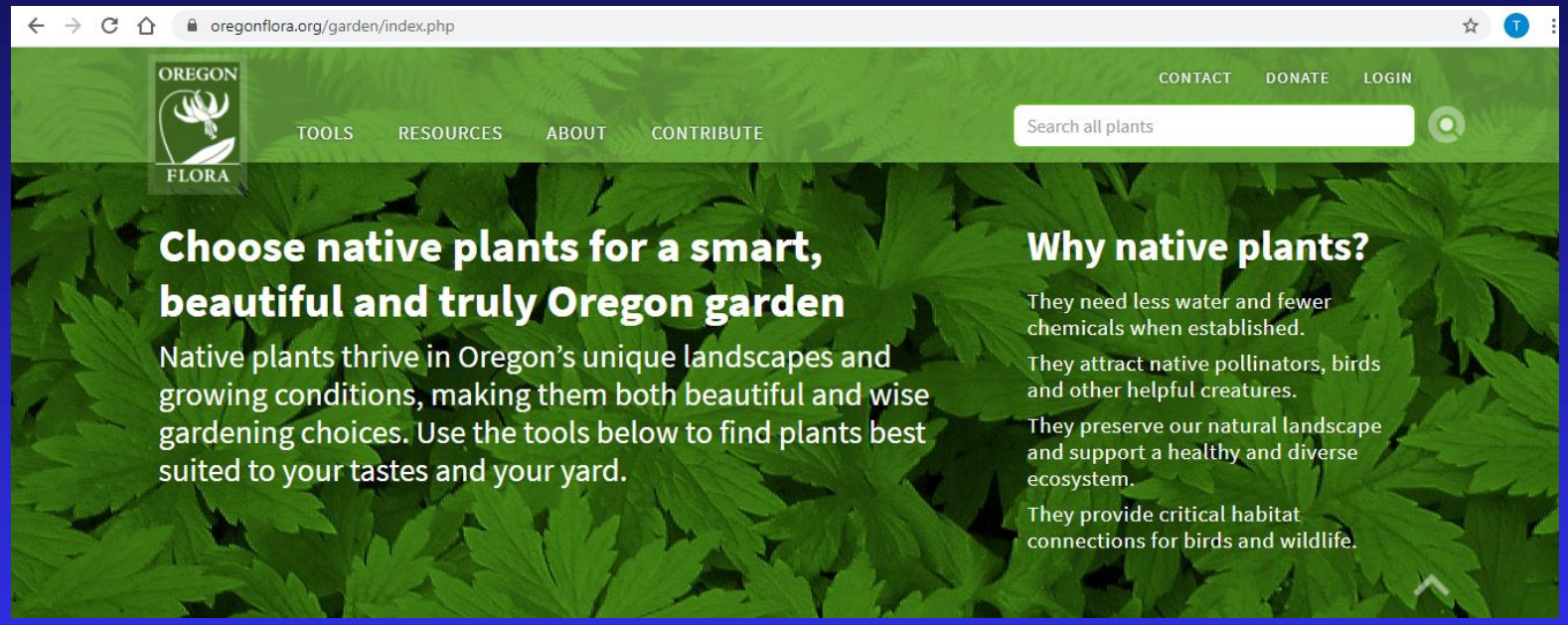
Photos: ForestFarm at Pacifica

Where to Find Locally-Adapted Milkweed Seeds, Nursery Stock & Nectar Plants

Western Monarch Advocates Website – Oregon Page

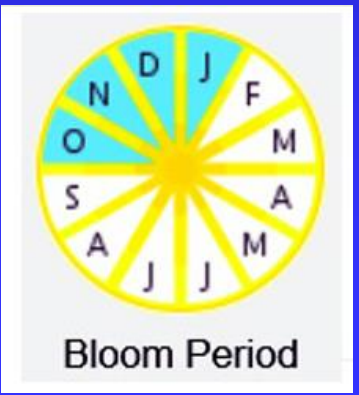


Where to Find Locally-Adapted Milkweeds & Nectar Plants: Oregon Flora.org




Range of Coyote Brush from Oregonflora.org

- Good descriptions and photos to help confirm identification & helpful range maps
- I Prefer CalFlora (www.calflora.org) for Blooming Period



Fireweed
Chamaenerion angustifolium

Bloom time

- ✓ June
- ✓ July
- ✓ August
- ✓ September

Wildlife support

- ✓ Adult butterflies/nectar source
- ✓ Bees and other insect pollinators
- ✓ Caterpillar host plant
- ✓ Hummingbirds

In Summary

1. Western monarch populations are at catastrophic lows
2. Monarchs are leaving overwintering sites earlier & returning later
3. Creating pollinator habitat with monarch waystations is something positive that we can do individually & collectively
4. Monarch waystations are a visible way of expressing environmental concern and action.

Thomas D. "Tom" Landis
Native Plant Nursery Consulting
E-mail: nurseries@aol.com

Western Monarch Advocates
https://www.westernmonarch advocates.com/

Monarchs & Golf Courses ?

What's in it for them?

What's in it for you?

Robert Coffan
Cofounder: SOMA
Chair: Western
Monarch Advocates

It’s not just about Monarchs…

2020 search results for golf courses and pollinators (specifically monarchs)

- 37 Results
- Many organizations
- Nation-wide
- BMPs
- How to
- Good example…

https://www.usga.org/content/usga/home-page/course-care/green-section-record/57/7/establishing-monarch-butterfly-habitat-on-golf-courses.html


MONARCHS
IN THE
ROUGH
EDF
ENVIRONMENTAL
DEFENSE FUND
Finding the ways that work
Audubon
International
syngenta
wadsworth
GOLF CHARITIES FOUNDATION
BrightView
NFWF
USGA

Concept…

MONARCHS IN THE ROUGH

- Hey, land is expensive!
- Maintenance is all-important
- Beneficial insects help
- Great for ALL pollinators
- “We call it MIR, but it’s ‘Monarchs in places you don’t give a damn about!’ ” Marcus Gray, ED of Monarchs in the Rough

Participants…

MONARCHS IN THE ROUGH

- Began in 2017
- ~ 15,000 total GCs in US
- > 700 participating
- > 1000 acres total
- 5 GCs in Oregon
- Lets go to the map!

Oregon Golf Club

- *Lot of rough area*
- *Tried wildflowers before*
- *Problems with spring planting*
- *Will try fall planting*

https://monarchsintherough.org/participants/

Case Study: Stewart Meadows

FRONT | NINE

Andrew Hartsock
ahartsock@gcsaa.org
Twitter: @GCM_Magazine

(environment)

Advocating for the western monarchs

Stewart Meac
Golf Course in
Ore., has installed five
butterfly waystations th
its nine holes, includin
just off the fifth tee bo
believed to be the onl
Watch-certified ways
a golf course in Oreg
among the very few
Northwest. Photo b

Josh Loy has become something of a celebrity in the Pacific Northwest's pollinator scene.

Since Loy — Class A superintendent and a three-year GCSAA member — installed five monarch butterfly waystations at Stewart Golf Course in Medford, Ore., he

Tristyn was 13 at the time, and father asked son if he'd ever seen a monarch in the wild.

"He said, 'Yeah,'" Josh Loy recalls. "I said, 'Are you sure?' The way he said it, I took it that maybe he'd never seen a monarch in person. It made me think I wanted to do something to give kids a chance to experience what I had experienced as a child."

doing this, we're doing somethi
the course."

From the start, Loy wanted t
his waystations didn't become
Milkweed, after all, is a weed
like one.

"One thing we were concern
weed does spread rather rapidl
rhizome," Loy said. "Robert (C


Site Location
Medford
Medford Medford
99
5
← Bear Ck ←
Stewart Meadows Community ←Development
Stewart
Golf Course →
Garfield
Driftwood Pl
Arbor Dr
Anton Dr
© 2018 Google
Image Landsat / Copernicus
Google Earth


Riparian
Area →
Myers Ln
8th Tee →
←5th Hole →
←Crooked Creek→
Garfield St
Café
&
Pro Shop
S Holly St
© 2018 Google
Google Earth

C (5th Tee-Sequoia)

Joepyeweed (3)

Meadow Checkerbloom (1)

Showy (5)

Horsemint (3)

Blazing Star (3)

Purple Coneflower (1)

Oregon Sunshine (3)

?? (3)

Black-Eyed Susan (1)

Narrowleaf (6)

F (8th Tee Forward

Wooly Sunflower (2)

Monks Hood (4)

Lupines (2)

Bigelow sneezeweed(3)

Black-Eyed Susan (1)

Tiger Lily (3)

Showy (4)

Camas (3)

Narrowleaf (3)

Asters (3)

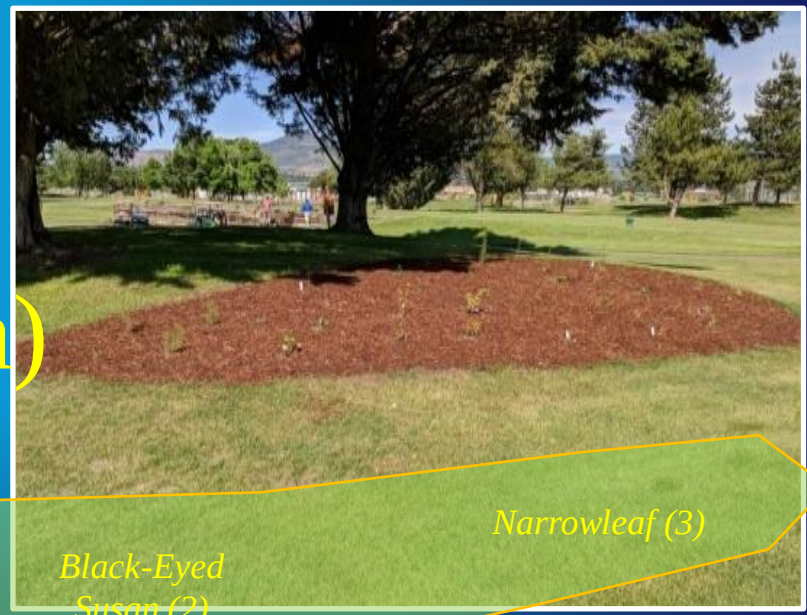
Columbine (1)

← *Day Lilies (6)* →

Narrowleaf (3)

Asters (3)

D (5th Tee Dry Area)



← *Juniper Trees* →

Narrowleaf (3)

Meadow Checkerbloom (1)

Narrowleaf (3)

Black-Eyed Susan (2)

Meadow Checkerbloom (2)

Horsemint (4)

Bigelow Sneezeweed (3)

Asters (3)

Showy (3)

Camas (3)

Five Plant Sources

Riparian Area

Riparian Area

Riparian Area

5th Hole

("problem" areas)

D

Third Waystation sign here- facing the cart path.

C

The Sequoia makes a great backdrop for the waystation

5th Hole

5th Hole

5th Hole

5th Hole

Sept 2020

←June 2018

Showy and Narrowleaf Surprise at the 5th Hole Waystation! 8-13-2018

Big Stewey !

Big Stewey!

(8-28-2018 WSU Tag # C5181)

Josh Loy

Lessons Learned…

- Ladies like it!
- Cost minimal compared to result
- Get technical help and planting plan
- Full sun = best veg success
- Good idea for “dry issue areas”
- Overall maintenance not a problem
- Start small, make a “success” first
- Riparian areas are a headache

Riparian Area

Lessons Learned…

Forward Tee on the 8th!

- *Chamber of Commerce*
- *Golf Course Superintendent*
- *Developer/Owner*
- *Three pollinator groups*
- *Golfers*
- *Maintenance Staff*
- *Land Conservation*
- *GCSAA*
- *Lavender Farmer*
- *University Professor*
- *Watershed Council*

Collaboration !

And… a potentially endangered western monarch!

Polling Question

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THANKS !

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Syngenta
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Thank You For Attending!

Question?

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Oregon Chapter GCSAA Golf Course Superintendents Association of America

OLCA Oregon Landscape Contractors Association