

# Nevada Irrigation District Vegetation Control Program

Presented By:

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# OVERVIEW

- 1. Results From Previous Study, Results of Mow Deck / Glyphosate Alternatives**
- 2. Current Changes / Results from Herbicide Reduction**
- 3. Weeds – Aquatic & Terrestrial**
- 4. Methods of Control**
- 5. Future / Goals**

# Previous Alternatives Study

- Weed Blaster
- Weed Steamer
- Cover Crops
- Organic Herbicides

# Weed Blaster

- Due to heavy amounts of material per acre / mile (2,000 + lbs per acre) the unit is not feasible or cost effective for use on canals.
- It does have possible application in agriculture as fertilizer and seed can be used as abrasive material.



# Weed Steamer

- Due to heavy water use per acre (upwards of 600 gal per acre) and equipment weight (600-750lbs dry) the units are not feasible for use on canal.



# Cover Crops

- None of the cover crops succeeded in controlling native weeds and grew to become a worse problem than before and have required more work to control in all test sites.
- All cover crops have limitations, as no plant can provide every desired benefit. Major limitations include the cost to establish cover crops, the time required to plant during the busy harvest season and required additional management



# Organic Herbicides

List of Organic Herbicides From Alternatives Study		Signal Word	Safe Around Water	Cost Per Acre Per Application
1	Axxe (Ammonium Nonanoate)	Warning	Yes	\$400
2	Avenger (d-limonene)	Caution	No	\$800 (medium mix rate)
3	Finalsan (Ammonium Soap)	Warning	No	\$250
4	Suppress EC ( Cupressic Acid)	Warning	No	\$200
5	Opportune(Plant extract) (Pre Emergent)	Caution	No	N/A
6	EcoBlend (Soybean Oil and Citric Acid)	Warning	Yes	\$300
7	Weed Slayer (Clove Oil) NO LONGER ORGANIC	Caution	Does Not Specify	\$275
8	Phydura (Clove Oil)	Caution	Does Not Specify	\$550

# Non-Organic Herbicides Safe In / Around Water

List of Non-Organic Post Emergent Herbicides For Use Around Water		Signal Word	Water Use Setback	Cost Per Acre Per Application
1	Round Up Custom (Systemic)	Caution	None	30\$
2	Imazamox (Systemic)	Caution	None @ Current Method	\$110
3	Imazapyr (Systemic)	Caution	120 Days	\$25
4	Diquat (Contact)	Caution	5 Days	\$35
5	Triclopyr (Broad Leaf Only)	Caution/Danger	120 Days	\$75
6	2-4D (District Does Not Use)	Danger	3 Days	N/A
7	Flumioxazin (Minimal Control)	Caution	30 Days	\$60



# Mowing Program

- In 2020 to 2021 NID maintenance planned on initiating a mowing program to utilize current equipment.
- Due to COVID, California Air Quality Regulations and district restructuring the program has been put on hold.

# Changes Over Last Two Years

- Re-Calibration and Focus of Herbicide Management (Not Opposite bank)(reducing application rates)
- Herbicide Rotation (Lower use per product and Resistance)
- Increasing vegetation monitoring to improve application efficacy and reduce herbicide waste.
- Bank Naturalization on Larger Canals

# Results of Changes on Herbicide Use

- Total yearly Glyphosate Use
- Total yearly terrestrial herbicide use
- Total yearly Copper Use

Yearly Comparison	2019 (Gal)	2020 (Gal)	2021 (Gal)	2022 (Gal)
Total Glyphosate	963	1085	690	386
Total Alternatives	N/A	N/A	66.25	180
Total Copper	6870	7174	6430	5524

# Results of Glyphosate Alternatives as Observed on Canals

- Diquat: 90% Control on Broadleaves, 40% Control on Grasses
- Imazamox: 70% Control Both Broadleaf and Grasses
- Imazapyr: 90% Control or Better for Both Broadleaf and Grasses
- Flumioxazin: 70% Control on Saplings, Minimal Control on 4 inch or Higher

# What we are trying to Control



# Current METHODS of CONTROL

## 4 Types of IPM (Integrated Pest Management) And Each Type Has Pros and Cons

- Biological
  - Pros: Using Animals to Control Vegetation Through Natural Means
  - Cons: Control (Don't want goats eating people's gardens!), Feces
- Chemical
  - Pros: Cost Effective, Longer Control with Few Applications
  - Cons: Introducing Man-Made Chemicals to the Environment
- Cultural
  - Pros: Non-Invasive, Natural Control
  - Cons: Expensive to Rehab Structure, Requires Extensive Monitoring
- Mechanical
  - Pros: Minimize Use of Herbicide
  - Cons: Expensive, Slow, Increased Emissions, Increased Fire Danger

# CULTURAL

- Improving Canal Shape
  - Canal Shape Greatly Affects the Flow Rate
  - Flow Rate Can Greatly Affect Weed Pressure
- Leaving More Canal Banks Natural
  - Keep in State to Minimize the Chemical Use and Improve Bank Stabilization  
(This is Greatly Affected by Canal Flow / Shape)



# CHEMICAL

NID Applies Aquatic and Pre-emergent Herbicides on Yearly Schedule, and Spray Weeds on As Needed Basis





# BIOLOGICAL

- Goats and Livestock (Due to Control Issues, Introduction of Non-Native Species and Water Quality, Biological Methods are Very Limited)



# MECHANICAL

- Excavators / Tractors



- Mowing

- Weed Whacking



# Livingston Mechanical Cleaning and Newtown Hand Cleaning

Livingston Canal	Mechanical Cleaning		
Length	Time to Clear w/ Excavator	Time To Clean Boxes / Clear Path	# of Times Per Season
1.3 Miles	7 Hours (1 operator)	2-3 Hours	One or Two
Newtown Canal	Manual Clearing		
Length	Time to Clear	Time To Clean Boxes / Clear Path	# of Times Per Season
1 Mile	10 hours (6 person team)	2-3 Hours	One or Two

# Goats: Fire Fuels Reduction

- Total Acreage 2023: 40 Acres up from 4 Acres in 2022
- One time per year project.
- Where can we not use Livestock:
  - Canal: Logistics for keeping livestock in target area is not feasible and has increased liability.
  - Water treatment locations: Due to transmission of bacteria and disease from feces NID will not have livestock in treatment plant locations.
- Plenty of room for growth of biological controls throughout District territory.

# Natural Bank Management

- NID maintenance has begun trialing leaving banks in a natural growth state on larger canals to reduce herbicide use and promote bank stability.
- Basis for initial trials:
  - Canal CFS (15 CFS plus)
  - Canal Width  
(10ft or more with proper flow)

Picture is of (upper) Tarr Canal



# Drone Technology

- NID has partnered with Clean Lakes Inc. to trial and implement Drone application technology in our vegetation program as both monitoring and application work.



# Aquatic Vegetation

- NID primary Aquatic herbicides are copper based.
- Due to environmental concerns of overuse, NID maintenance aims to begin studies on alternatives to copper based herbicides in 2024 to create a base to rebuild the program.
- Factors to include:
  - California Air and Water regulations and permitting.
  - Vegetation types
  - Mechanical Cleaning cost, time and frequency.
  - Alternative Herbicides cost, time and frequency.
  - Alternatives to Herbicide and Mechanical

# Near Future Plans

- NID has reached out to UC IPM for further information on new trials and product information.
- NID has been invited to work with an Aquatics vegetation work group with Blankinship consulting and other Aquatic vegetation management groups in Northern California. (We were unable to attend the first meeting do to snow)
- Increase canal re-build to maintain desired canal shape, which will regulate flows which lead to reduced need for Herbicide application.