



# AMERICAN CONSERVATION EXPERIENCE

Data Management and Label  
Interpretation Tools in Invasive  
Plant Management



## Dan McLendon

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## Our Model:

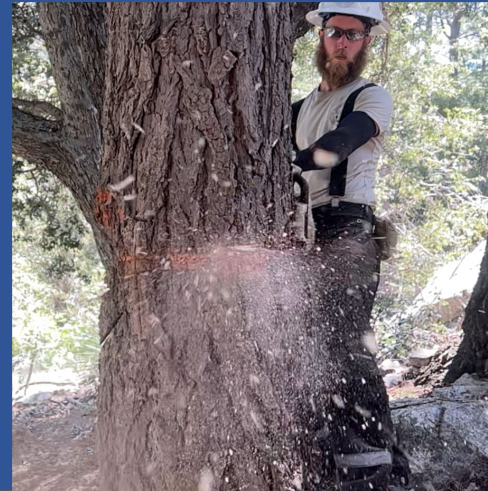
- Providing high quality and specialized work and technical support for public land management agencies.
- Hire, train and mobilize young adults to execute challenging projects in challenging environments.

## Programs:

- Individual placement / Internship
- Hand crews

# Project Specialties

- Fuels reduction
- Trained saw crews
- Wetland and riparian restoration
- Low Tech, Process Based Restoration
  - BDAs
  - PALS & brush weirs
  - Log jams
  - Zeedyk structures
- High volume planting or transplanting
- Trail layout & design
- Fencing
- Mechanized equipment
- Invasive plant management



## Invasives Poly Layer

Table Edit Get directions ...

Agency Location:	Tissaw Road Trails
Acres:	22.3600
Treatment Method:	Foliar Spot
Common & Scientific Name:	Yellow Bluestem Grass (Bothriochloa ischaemum (L.) Keng)
Phenology:	Vegetative
Percent Density:	<1% Scarce
Common & Scientific Name 2:	
Phenology 2:	
Percent Density 2:	
Pesticide Brand Name:	Roundup Pro and Polaris
Mix Rate:	2% Roundup, 1% Polaris, .5% Activator 90 Surfactant
Amount of Mix Applied:	2 Gallons of mix applied
Crew Leader Name:	Margaret Judge
Notes:	Preemergent activity should keep yellow bluestem back for at least 6 months. Recommend follow up treatments in early July.
Polygon ID:	PG.12.17.25.MJ.1

# Data Management Tools for Integrated Vegetation Management

- Pesticide Use Logs
- GIS tools
- Navigating pesticide labels and SDS

# Pesticide Use Logs

## Streamline the workflow

- Paperless/Tablet
- Excel or Google Sheets
  - Duplicate tabs to reduce workload
- GIS Feature ID
  - For cross referencing spatial data with pesticide use data
- Weather Data
- Equipment
- Proximity to water
- Target species information
- Pesticide use data
  - Let the formulas do the work.
  - Reduce math as much as you can.

Pesticide Use Log										Version 2.2 May 2023-DM	
<b>Project Details</b>											
Project Name:	Zion National Park Annual Grass Treatments			Date:	March 2, 2026			Name of Partner:	Barrin Goble		
Division Reporting:	SWA			Start Time:	8:15 AM			Agency & Name of The Public Land:	National Park Service / Zion National Park		
Recorder's Name:	Dan McLendon			End Time:	3:00 PM			Treatment Location Name:	Lee's Canyon		
Crew Leader's Name:	Taylor Suto			Name of License Holder:	Dan McLendon			GIS Feature ID:	PG. 3.1.26.DM.1		
Crew Size:	6 Persons			Pesticide Applicator License Number:	Utah- 4001-28374						
<b>Weather Data</b>											
Weather Sample Time:	12:06 PM			Relative Humidity (RH):	85%			Wind Speed (MPH):	Low:	Average: <i>Autofilled</i>	High:
Precipitation:	Light Rain			Cloud Cover:	76%-100%			Wind Direction:	Southwest		
Precipitation Timeline:	9:45am through 10:20am very light rain.			Temperature:	58°			Weather Data Notes:			
<b>Equipment</b>											
Sprayer Type #1:	Backpack Sprayer			Hand & Powertool Type #1:	N/A			Equipment Notes (optional):	Sprayer #13 has a leak at the hose clamp next to trigger mechanism. Contents of sprayer was added into Sprayer #11 and triple rinsed. Reminder to repair on Friday.		
Sprayer Type #2:				Hand & Powertool Type #2:							
<b>Plant Species &amp; Treatment Data</b>											
Common & Latin Name #1:	Cheatgrass (Bromus tectorum)		Plant Phenology:	Seed-Set		Target Species Cover Class:	26%-75% Abundant		Treatment Type:	Broadcast	
Common & Latin Name #2:										Was a Body of Water Within 10 ft of Treatment Areas?:	
Common & Latin Name #3:										No	
Common & Latin Name #4:											
<b>Pesticide Application Data -(REQUIRED)- Treatment Type 1</b>											
Pesticide Brand Name, Active Ingredient & EPA #:				Mix Rate in %:	Total Mix Applied:	Max. Concentrate Application Rate Per Acre:	Total Acres of all treatments recorded on this PUL:	Total Concentrate Applied: <i>Autofilled Cells</i> :	Total Concentrate Applied Per Acre: <i>Autofilled Cells</i> :		
Plateau, Inazapic, EPA# 241-365				0.50%	Gallons	Gallons/Acre	2	Gallons	Gallons/Acre		
					25	0.094		0.125	0.0625		
Surfactant Name:	Surfactant Mix Rate:	Dye Color:	Dye Mix Rate:	Herbicide & Treatment Data Notes:		There's a considerable amount of cheatgrass along the roadside					
Cidekick	0.25%	Blue	1 oz/gallon								

Project Details						
Project Name:	Zion National Park Annual Grass Treatments	Date:	March 2, 2026	Name of Partner:	Darrin Gobble	
Division Reporting:	SWA	Start Time:	8:15 AM	Agency & Name of The Public Land:	National Park Service / Zion National Park	
Recorder's Name:	Dan McLendon	End Time:	3:00 PM	Treatment Location Name:	Lee's Canyon	
Crew Leader's Name:	Taylor Suto	Name of License Holder:	Dan McLendon	GIS Feature ID:	PG. 3.1.26.DM.1	
Crew Size:	6 Persons	Pesticide Applicator License Number:	Utah- 4001-28374			

Weather Data							
Weather Sample Time:	12:06 PM	Relative Humidity (RH):	85%	Wind Speed (MPH):	Low: 4	Average: <i>-Autofilled-</i> 7	High: 10
Precipitation:	Light Rain	Cloud Cover:	76%-100%	Wind Direction:	Southwest		
Precipitation Timeline:	9:45am through 10:20am very light rain.		Temperature:	58°	Weather Data Notes:		

Equipment						
Sprayer Type #1:	Backpack Sprayer	Hand & Powertool Type #1:	N/A	Equipment Notes (optional):	Sprayer #13 has a leak at the hose clamp next to trigger mechanism. Contents of sprayer was added into sprayer #11 and triple rinsed. Reminder to repair on Friday.	
Sprayer Type #2:		Hand & Powertool Type #2:				

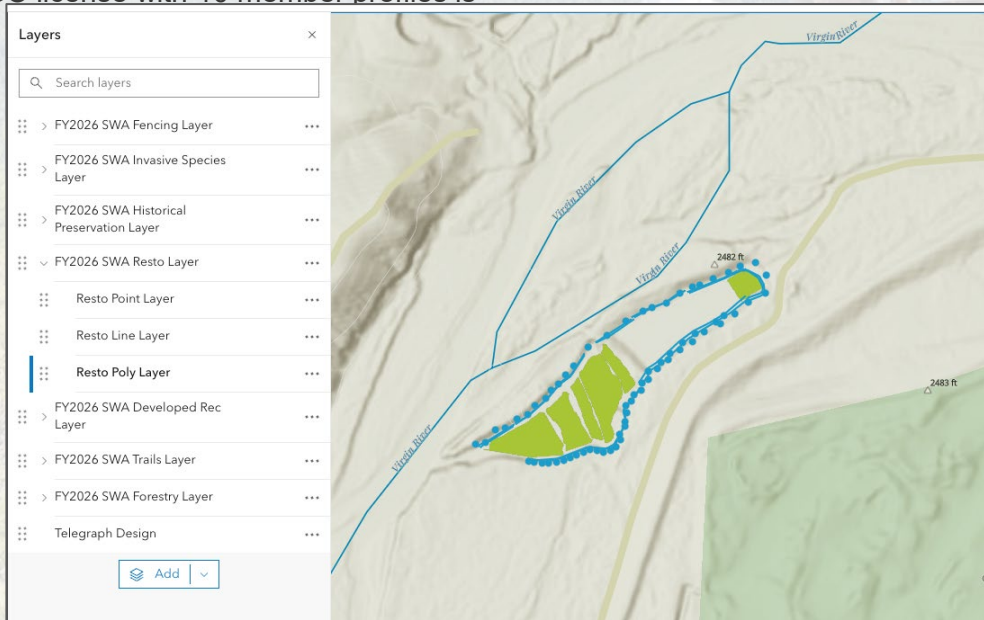
Plant Species & Treatment Data		Plant Phenology:	Target Species Cover Class:	Treatment Type:	Was a Body of Water Within 10 ft of Treatment Areas?:
Common & Latin Name #1:	Cheatgrass (Bromus tectorum)	Seed-Set	26%-75% Abundant	Broadcast	No
Common & Latin Name #2:					
Common & Latin Name #3:					
Common & Latin Name #4:					

Pesticide Application Data -(REQUIRED)- Treatment Type 1							
Pesticide Brand Name, Active Ingredient & EPA #:		Mix Rate in %:	Total Mix Applied:	Max. Concentrate Application Rate Per Acre:	Total Acres of all treatments recorded on this PUL:	Total Concentrate Applied: <i>-Autofilled Cells-</i>	Total Concentrate Applied Per Acre: <i>-Autofilled Cells-</i>
			Gallons	Gallons/Acre		Gallons	Gallons/Acre
Plateau. Imazapic. EPA# 241-365		0.25%	100	0.094	1.5	0.25	0.1667
Rejuvera. Indaziflam. EPA# 432-1609		0.15%		0.08		0.15	0.1
Ranger Pro. Glyphosate. EPA# 524-517		3.00%		2.5		3	2
Surfactant Name:	Surfactant Mix Rate:	Dye Color:	Dye Mix Rate:	There's a considerable amount of cheatgrass along the roadside			
Cidekick	0.25%	Blue	1 oz/gallon				

# ArcGIS Online

## Managing spatial data CAN be simple

- One stop shop for most spatial data
- Basic spatial data collection and data management can be all be done without ArcGIS Pro
- An agency or NGO license with 10 member profiles is \$1,000/year



## Feature layers on ArcGIS Online

- Example: Invasive Plant Management Layer
  - Point, line, polygon
  - Create a GIS Feature ID Field
    - Polygon ID Example: *PG.3.3.26.DM.1*
    - Line ID Example: *LN.3.3.26.DM.2*
    - Point ID Example: *PT.3.4.26.DM.1*

# Building Layers

Fairly user friendly "build your own layer" interface

Web Maps

Does not have to be built with ArcGIS Pro

Monitor, manage and edit data

FY2026 SWA Invasive Species Layer

Overview Data Visualization

Table Layer: Inv. Species Poly Layer Search Schema updated: F

Fields	Display name	Field name	Type	Value type
<input type="checkbox"/>	Agency:	Agency	abc	String
<input type="checkbox"/>	Agency Location:	Agency_Location	abc	String
<input type="checkbox"/>	Polygon ID:	Polygon_ID	abc	String
<input type="checkbox"/>	Common & Scientific Name:	Common_and_Scientific_Name	abc	String
<input type="checkbox"/>	Phenology:	Phenology	abc	String
<input type="checkbox"/>	Percent Density:	Percent_Density	abc	String
<input type="checkbox"/>	Common & Scientific Name 2:	Common_and_Scientific_Name_2	abc	String
<input type="checkbox"/>	Phenology 2:	Phenology_2	abc	String
<input type="checkbox"/>	Percent Density 2:	Percent_Density_2	abc	String
<input type="checkbox"/>	Pesticide Brand Name:	Pesticide_Brand_Name	abc	String
<input type="checkbox"/>	Mix Rate:	Mix_Rate	abc	String
<input type="checkbox"/>	Amount of Mix Applied:	Amount_of_Mix_Applied	abc	String
<input type="checkbox"/>	Crew Leader Name:	Crew_Leader_Name	abc	String
<input type="checkbox"/>	Notes:	Notes	abc	String
<input type="checkbox"/>	Acres:	Acres	129	Double

Learn << Collapse

Invasives Poly Layer

Table Edit Get directions

Fossil Creek - Cut Stump & Basal

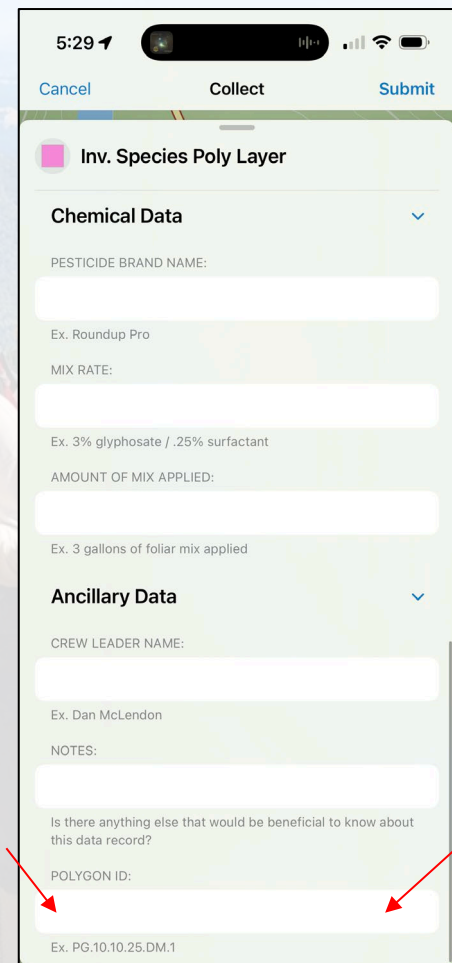
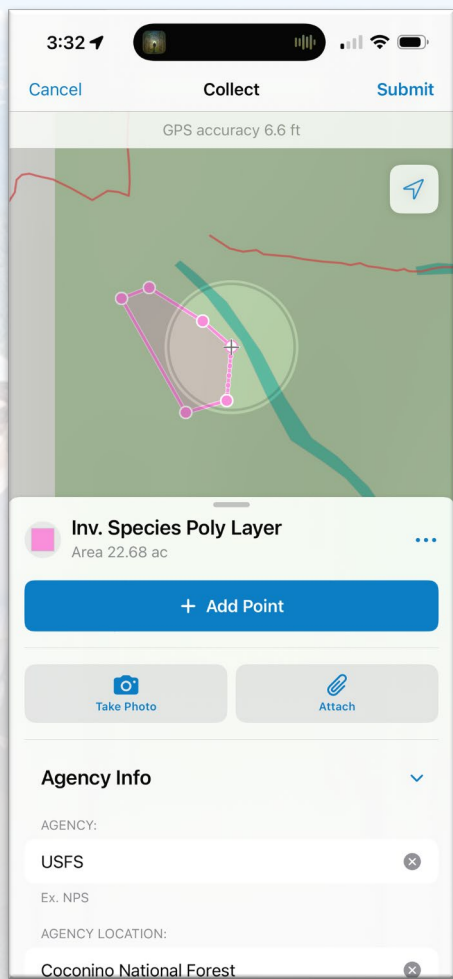
Treatment Method:	Cut Stump & Basal
Agency:	NFWF
Agency Location:	Fossil Creek
Acres:	0.0200
Amount of Mix Applied:	1oz
Common & Scientific Name:	Himalayan Blackberry
Phenology:	Vegetative
Percent Density:	26%-75% Abundant
Common & Scientific Name 2:	
Phenology 2:	
Percent Density 2:	
Pesticide Brand Name:	Roundup Custom
Mix Rate:	75% glyphosate/2% MSO
Crew Leader Name:	Guillermo Rivera
Notes:	Dauber Bottles/Hand Pruners/Loppers
Polygon ID:	PG.12.5.25.GR.1

Last edited by SWA1CL on 12/9/2025, 2:14 PM.

# Field Maps

## Field data collection

- Can be used with or without cellular data
- Fairly straight forward workflow
- Streamlined data collection process
- Syncs to the cloud via wifi or cellular data
- GIS Feature ID
  - Points: PT.3.3.26.DM.1
  - Lines: LN.3.3.26.DM.1
  - Polygons: PG.3.3.26.DM.1



# Filtering Out Data With GIS Feature IDs

**Restoration Point Layer**

Table Edit Get directions ...

Oak Creek Canyon - Low Tech Process Based Rock or Post Assisted Feature

Agency:	USFS
Agency Location:	Oak Creek Canyon
Action:	Low Tech Process Based Rock or Post Assisted Feature

**Open tabs: 1**

Resto Point Layer

201 records, 1 selected

	...	Crew Leader:	Notes:	Point ID:	Attachments
<input type="checkbox"/>		Lorraine Garcia	One rock dam extension	PT.12.15.25.LG.4	(0)
<input type="checkbox"/>		Lorraine Garcia	One-rock dam	PT.12.15.25.LG.5	(0)
<input type="checkbox"/>		Lorraine Garcia	One-rock dam	PT.12.15.25.LG.6	(0)
<input type="checkbox"/>		Lorraine Garcia	One-rock dam extension	PT.12.15.25.LG.7	(0)
<input checked="" type="checkbox"/>		Lorraine Garcia	One-rock dam	PT.12.15.25.LG.8	(0)
<input type="checkbox"/>		Lorraine Garcia	One-rock dam	PT.12.15.25.LG.9	(0)
<input type="checkbox"/>		Lorraine Garcia	One-rock dam	PT.12.15.25.LG.10	(0)
<input type="checkbox"/>		Lorraine Garcia	One-rock dam	PT.12.15.25.LG.11	(0)
<input type="checkbox"/>		Lorraine Garcia	Rock rundown	PT.12.15.25.LG.12	(0)

**Resto Point Layer**

Filter

Show features where [Clear all](#)

Condition ...

Point ID:

# Pesticide Label Library

- Mix rate conversions
- Most updated label
- Most updated SDS
- Label Review Document!!

## Label Review

From label law to field clarity

- Communicate relevant information from the label and SDS. Weed out irrelevant language.
- Keep it simple. 4 pages or less.
- This does not replace the label and SDS.



Nufarm  
**Polaris AC Complete**  
Herbicide

ACE- Pesticide Label Review  
(June, 2022- DM)

[Polaris AC Complete Label](#)  
[Polaris AC Complete Safety Data Sheet](#)

Active ingredient

- Imazapyr

EPA registration #

- 228-570

Signal word

- Caution

Restricted or general use

- General Use

Max application rate (concentrate)

- 57 ounces of concentrate/acre

Application methods and general mix rates

	Foliar	Cut Stump	Max Application Rate/Acre/Year
Polaris AC Complete (imazapyr)	.75% Imazapyr / .5% non-ionic surfactant / 97.75% water	5% Imazapyr / 95% water	-57 ounces/Acre- terrestrial/aquatic sites -25 ounces/acre pasture/rangeland sites

Label's description of the herbicide (and paraphrased for your benefit)

- For control of undesirable vegetation [and bareground weed control] within certain aquatic sites, forestry sites, pasture/rangeland, non-ag lands, wildlife openings, and non-crop areas.
- **\*\*Note that Polaris AC Complete is a spitting image of its NuFarm sister herbicide, Polaris. The only difference is the concentration of the active ingredient (imazapyr) in Polaris AC Complete is **twice as strong** than the original Polaris formulation. The "AC" in Polaris AC Complete stands for "applicator concentrate", meaning you get more active ingredient per gallon (or pound) of concentrate. The concentration of this herbicide is very strong compared to previous standards.**
- **\*\*Mix rates for Polaris AC Complete should be ½ the amount generally used for other imazapyr herbicides; such as Habitat or Polaris. Generally speaking, if using Polaris AC Complete, foliar application formulas shouldn't exceed 1.5%. It is not uncommon for ACE partners to mistake "Polaris AC Complete" from the older "Polaris"- consequently resulting in application rates exceeding 2 to 5 times over the legal maximum application rate.**



ACE- Pesticide Label Review  
(March, 2022- DM)

[Garlon 4 Ultra Label](#)  
[Garlon 4 Ultra Safety Data Sheet](#)

**Garlon<sup>®</sup> 4 Ultra**

**HERBICIDE**

Active ingredient

Triclopyr (ester formula)

EPA registration #

62719-527

Signal word

CAUTION!- Causes moderate eye & skin irritation.

Restricted or general use

General Use

Max application rate (concentrate)

2 gallons (8 quarts) concentrate/acre

Application methods and general mix rates

\*\*Please note that the mix rates below may not reflect what the partner agency requests\*\*

	Foliar	Cut Stump	Basal (oil only)	Max Application Rate/Acre
Garlon 4 Ultra (triclopyr ester)	4% triclopyr ester / 4% Oil / 92% water	25% triclopyr ester / 75% Oil	25% triclopyr ester / 75% Oil	2 Gallons/Acre

About Garlon 4 Ultra

Garlon 4 Ultra is one of the most commonly used herbicides in the non-agriculture invasive plant management industry. Garlon 4 Ultra's active ingredient, Triclopyr-Ester, is unique as it is specifically designed for the control of woody plants, forbs and vines- not grasses. Another unique trait of Garlon 4 Ultra is that it's an oil-based herbicide. The ester (oil) feature allows this herbicide to soak through the thick cuticles of leaves, or even the bark of a tree- providing higher rates of control of invasive plants.

We may (or may not) have heard of the herbicide, known as Remedy Ultra. Garlon 4 Ultra's formula is identical to that of Remedy Ultra, and produced by the same manufacturer. This was a marketing strategy by the chemical manufacturing goliath- Corteva. What's important to know is that Remedy Ultra is advertised and approved for application in agricultural settings. Conversely, Garlon 4 Ultra is advertised and approved for application in the non-ag setting; such as public parks, rights-of-ways, natural and restoration sites, and forest sites.

Mode of Action

Triclopyr, mimics a synthetic auxin found in woody stemmed plants and causes uncontrolled cellular division. Disguised as a growth hormone, plants treated with Triclopyrs readily uptake and circulate the chemical. Within 2 days of a lethal application of Triclopyr, normal auxin signaling pathways become disrupted, resulting in abnormal twisting and bending of leaves, shoots and roots. This explosion of cellular growth ultimately kills the plant.

Selective or non-selective? What vegetation does this target?

Garlon 4 Ultra is selective towards woody/broadleaf plant species (dicots.) This herbicide will not control grasses (monocots).

Pre-emergent or post-emergent?

Post-emergent. This means Triclopyr should not be applied on the ground with the intention of controlling newly emerging seedlings or root sprouts.

Soil residuality/biodegradability concerns

No. Photodegradation and microbial factors in the soil deactivates Triclopyr within 1 to 4 days.

Aquatic restrictions

Not aquatically approved. This herbicide cannot be applied in water and is "highly toxic to aquatic organisms." It can, however, be applied up to the water's edge or high water mark.

Grazing restrictions

- There are no grazing restrictions.
- Do not harvest hay for 14 days following application.
- Withdraw livestock from treatment area at least 3 days prior to slaughter

Temperature restrictions

- Be cognizant of temperature inversions, as water droplets may become airborne and cause off target damage.

Volatility restrictions

- Garlon 4 Ultra can become volatile at temperatures above 90°F, and will convert from a liquid to a gas, causing drift and harming non-target plants.
- **Do not not apply this herbicide in temperatures exceeding 90 degrees without consulting with the agency and/or ACE's National Restoration Specialist- Dan McLendon- 704-661-1243 or dmclendon@usaconservation.org.**

Wind Restrictions

Do not apply in winds exceeding 10 mph.



# Thanks!

Reach out if interested in obtaining information or copies of:

- ArcGIS Online Feature Layer Templates
- Pesticide Use Log Templates
- Pesticide Label Reviews

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