



# Yosemite's response to disjunct populations - an EDRR story

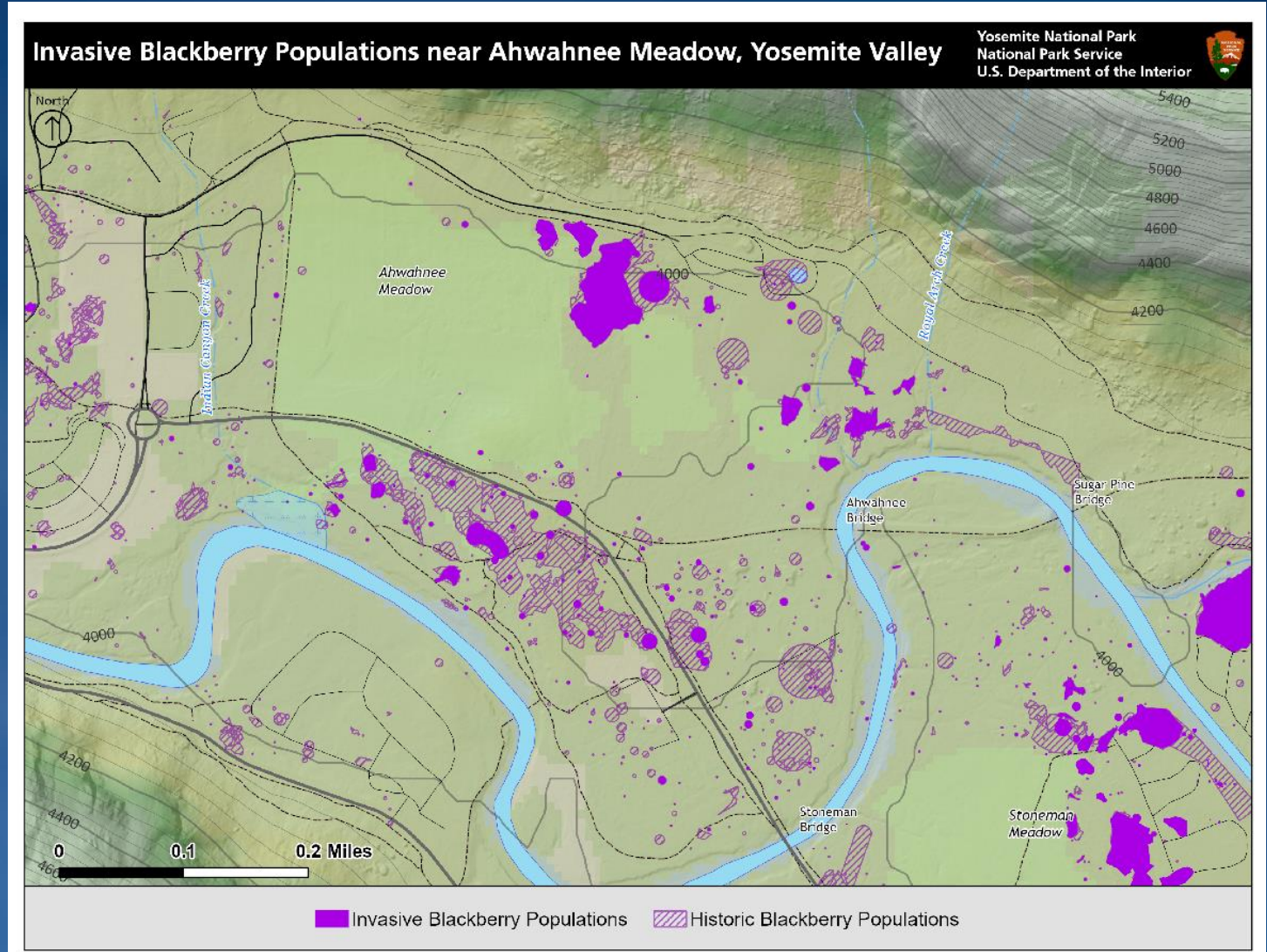
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*October 25<sup>th</sup>, 2024*

# Overview

- History of Invasive Data Collection
- Disjunct Population and Modeling
- Data Driven Workplan and Treatment Strategies
- Data Analysis
- Questions

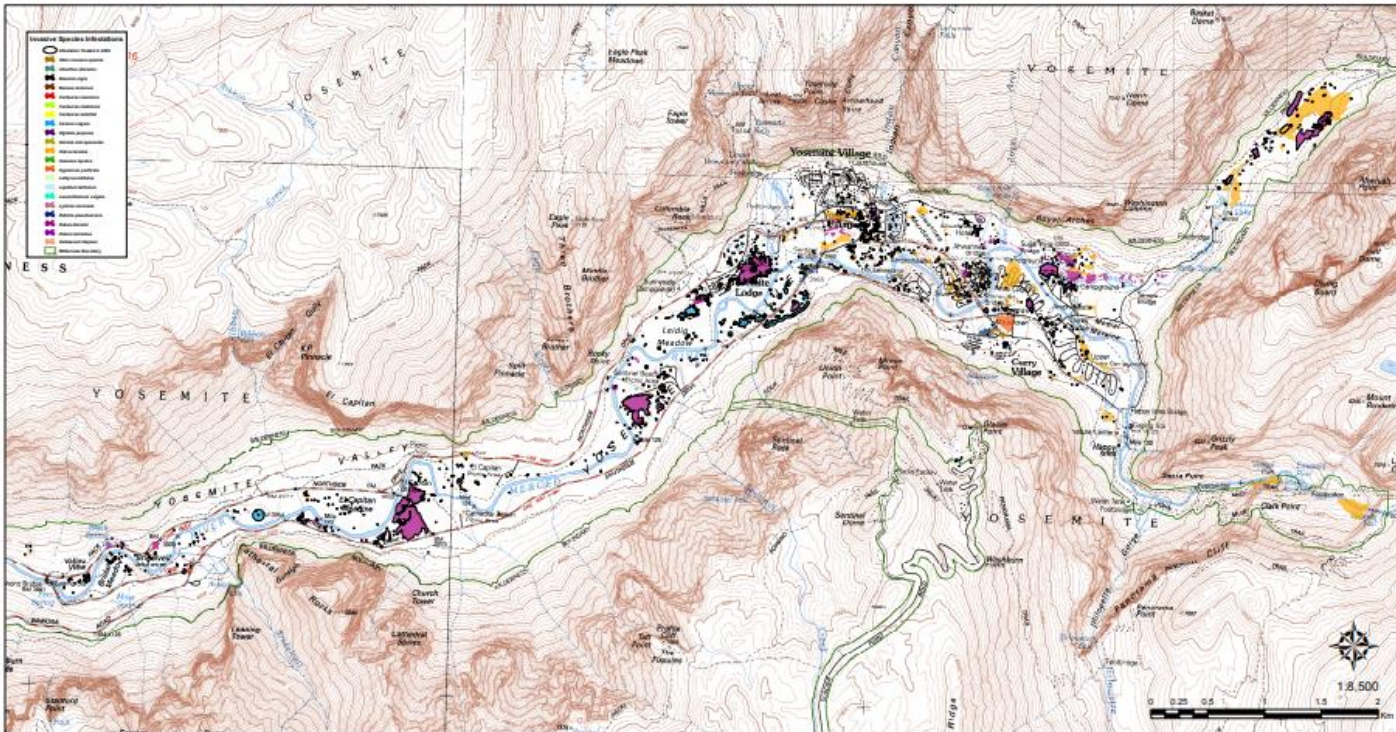




# History of Invasive Data Collection in Yosemite

Current high-priority invasive plant infestations and 2009 treatments

National Park Service  
U.S. Department of Interior



- Compiling Historical Data in 2008 and Standardization
- Remapping effort of 2013
- Species Group and Species Prioritization
- Current Assessment and Automation
- Disjunct and Monitor for Eradication



# Disjunct Population and Modeling

- **Disjunct Population**
  - What is it?
- **Yosemite's Approach to Disjunct Populations**
  - Use comprehensive data
  - Consult species list for high priority, medium priority, and EDRR species
  - Identify isolated populations
  - Identify groups of isolated populations

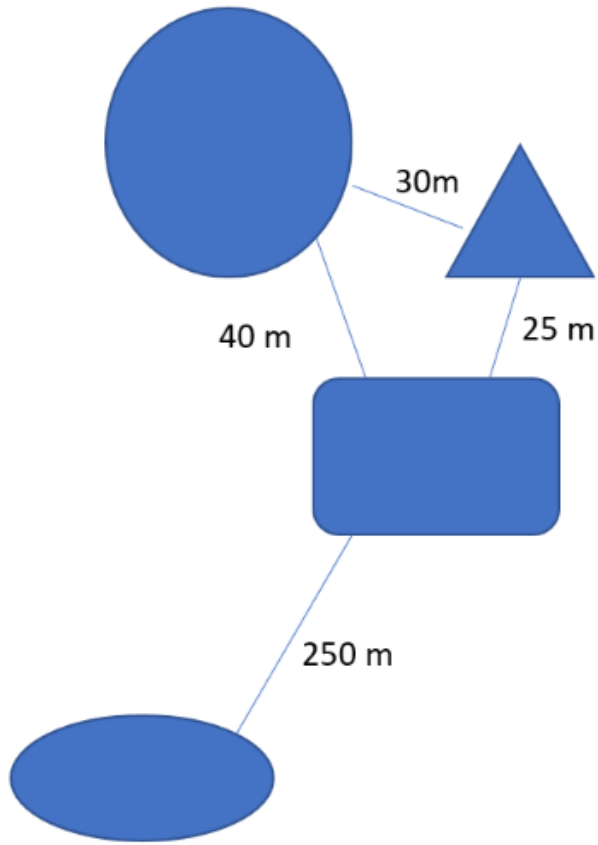


# Disjunct Populations and Modeling

"Raw" populations

200 meters = 515 populations

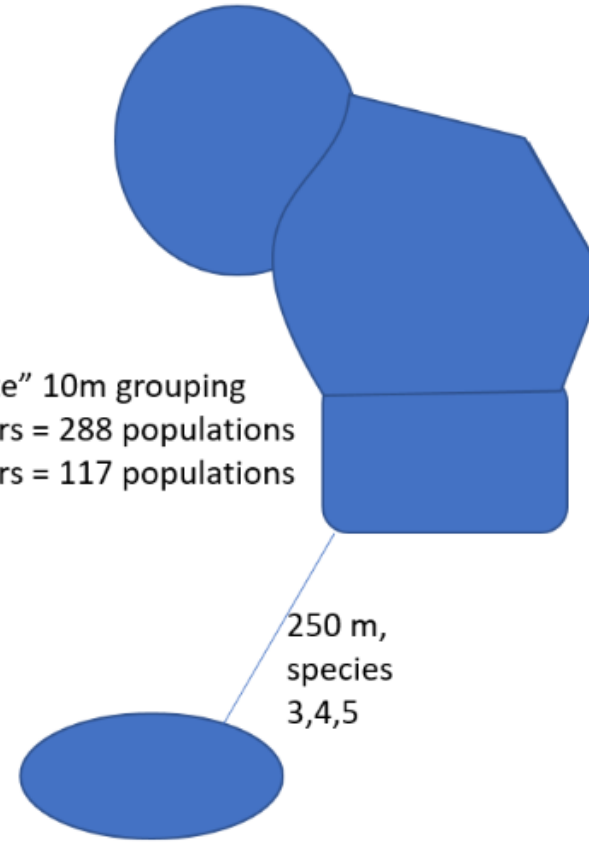
400 meters = 368 populations



"Aggregate" 40m groupings

200 meters = 689 populations

400 meters = 257 populations



"Aggregate" 10m grouping

200 meters = 288 populations

400 meters = 117 populations

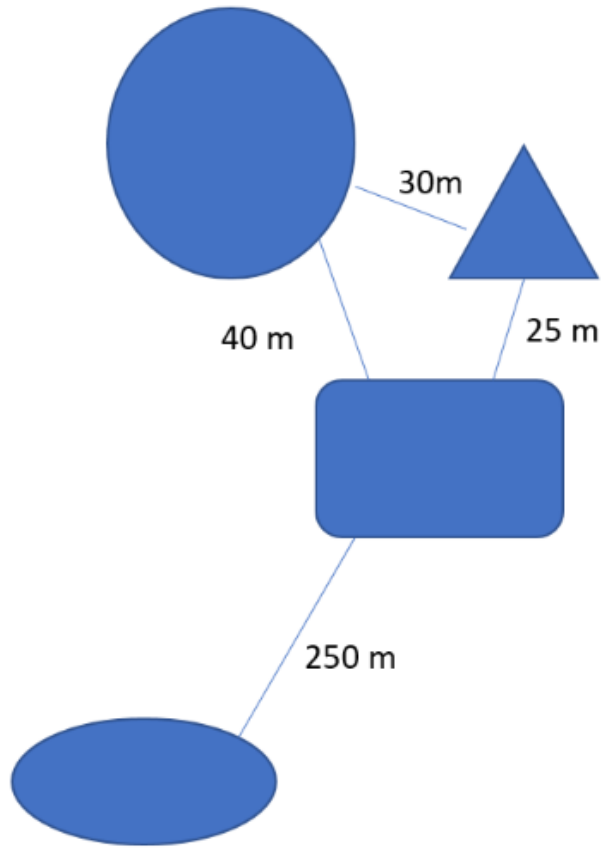
250 m,  
species  
3,4,5



# Disjunct Populations and Modeling

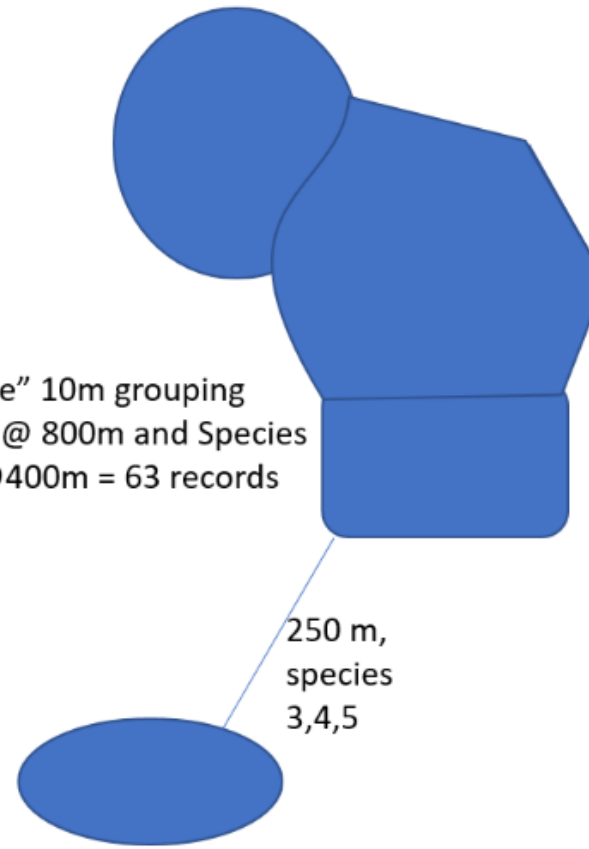
"Raw" populations

Species 3 @ 800m and Species  
4 and 5 @400m = 332 records



"Aggregate" 40m groupings

Species 3 @ 800m and Species  
4 and 5 @400m = 151 records

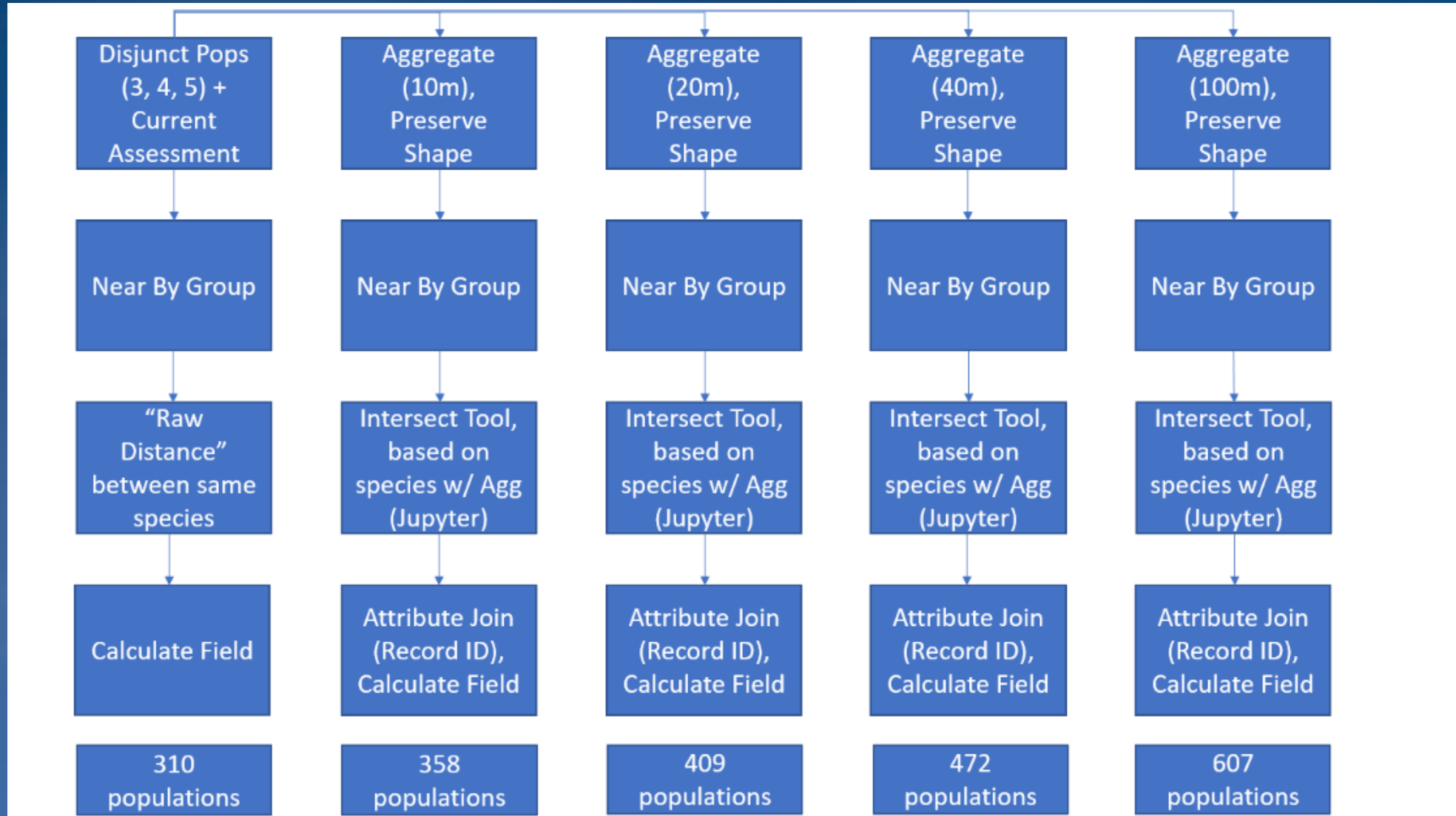


"Aggregate" 10m grouping  
Species 3 @ 800m and Species  
4 and 5 @400m = 63 records





# Disjunct Populations and Modeling



# Disjunct Population and Modeling

- **Disjunct Population in Yosemite**
  - High priority species at 400m
  - Medium priority species at 1600m
  - If treated or observed last, it means “likely needs treatment”

<b>Population Condition</b>	<b>Total</b>
Disjunct	156
Disjunct EDRR	51
EDRR	1225
Medium Priority Disjunct	75
Woody	241
Woody Disjunct	9
<b>Sum</b>	<b>1757</b>





# Data Driven Workplan and Treatment Strategies

```
In [1]: import arcpy
apr_x_path = r'U:\Old EP Resources Data\gisdata\Invasive_Plants\Projects\Early_Detection\EDRR_WorkPlan_2024.aprx'
apr_x = arcpy.mp.ArcGISProject(apr_x_path)
m = apr_x.listMaps('EDRR_Calculations')[0]
print(m.name)
```

EDRR Calculations

```
In [2]: in_layer = m.listLayers("InvCA_20231227_10mAgg")[0]
intersect_layer = m.listLayers("InvCA_20231227")[0]
#in_layer = r'U:\Old EP Resources Data\gisdata\Invasive_Plants\Projects\Early_Detection\EDRR_Calculations.gdb\Invasive_HighPriority_Agg_40m'
#intersect_layer = r'U:\Old EP Resources Data\gisdata\Invasive_Plants\PRO_YOSE_InvasivePlants_GDB\VEG_InvasivePlants.gdb\DisjunctPop_noBuf'
print(in_layer)
print(intersect_layer)
```

InvCA\_20231227\_10mAgg  
InvCA\_20231227

```
In [3]: spec_list = []
arcpy.management.SelectLayerByAttribute(in_layer, "CLEAR_SELECTION")
with arcpy.da.SearchCursor(in_layer, "Species") as cursor1:
    for row in cursor1:
        spec_list.append(row[0])
```

```
In [5]: species_list = set(spec_list)

print(species_list)
```

```
In [6]: fc_list = []

for spec in species_list:
    query = f"Species = '{spec}'"
    arcpy.management.SelectLayerByAttribute(in_layer, "NEW_SELECTION", query)
    arcpy.management.SelectLayerByAttribute(intersect_layer, "NEW_SELECTION", query)

    out_fc = r'U:\Old EP Resources Data\gisdata\Invasive_Plants\Projects\Early_Detection\EDRR_Calculations.gdb\{}'.format(spec.replace(" ", "_"))
    if arcpy.Exists(out_fc):
        arcpy.management.Delete(out_fc)
    arcpy.analysis.Intersect([in_layer, intersect_layer], out_fc)
    fc_list.append(out_fc)

print(spec)
```

Anthriscus caucalis  
Holcus lanatus  
Lepidium virginicum  
Rumex acetosella  
Linaria vulgaris  
Bromus hordeaceus  
Festuca myuros  
Digitaria sanguinalis  
Helianthus annuus  
Chenopodium pratericola  
Brassica rapa  
Robinia pseudoacacia  
Chenopodium missouriense  
Veronica arvensis  
Solanum triflorum  
Mellilotus indicus  
Vicia sp.  
Agrostis capillaris  
Hieracium murorum

```
In [7]: fc = r'U:\Old EP Resources Data\gisdata\Invasive_Plants\Projects\Early_Detection\EDRR_Calculations.gdb\HighPriority_Agg10m'
if arcpy.Exists(fc): arcpy.management.Delete(fc)
arcpy.management.Merge(fc_list, fc)
```



Species	Month	EI Portal	Foresta	Yosemite Valley	John Muir Trail - Mist Trail to Merced Lake	Wawona and Mariposa Grove	Northern Yosemite	Eastern Yosemite	Glacier Point Road	Crane Flat and Merced	Frequency YOSE	Treatment	Herbicide Used	Herbicide Rate	Herbicide 2	Herbicide Rate 2
Aegilops cylindrica	June	4									4	No Plants	N/A	N/A	N/A	N/A
	November	1									1	Handpull	N/A	N/A	N/A	N/A
	November	8									8	Pre-Emergent	Matrix SG	4.0 oz/ac	N/A	N/A
Aegilops triuncialis	May		4								4	Foliar Spray	Milestone	14 oz/ac	N/A	N/A
	May		3								3	No Plants	N/A	N/A	N/A	N/A
	November		2								2	Pre-Emergent	Matrix SG	4.0 oz/ac	N/A	N/A
Amaranthus retroflexus	June		1								1	Foliar Spray	Roundup Custom	3.0 qt/ac	Polaris	1.5 qt/ac
	July			1							1	No Plants	N/A	N/A	N/A	N/A
	August									4	4	No Plants	N/A	N/A	N/A	N/A
	August					1					1	No Plants	N/A	N/A	N/A	N/A
	September								1		1	Foliar Spray	Polaris SP	1.5 qt/ac	N/A	N/A
	November									1	1	Foliar Spray	Polaris	3.0 pt/ac	N/A	N/A
Ambrosia acanthicarpa	June			1							1	Observed/Monitored	N/A	N/A	N/A	N/A
	June			1							1	No Plants	N/A	N/A	N/A	N/A
	July			3							3	Foliar Spray	Roundup Custom	3.0 qt/ac	Milestone VM	7.0 oz/ac
	July			1							1	No Plants	N/A	N/A	N/A	N/A
	August	1									1	No Plants	N/A	N/A	N/A	N/A
	September					1					1	Handpull	N/A	N/A	N/A	N/A
	September					2					2	Observed/Monitored	N/A	N/A	N/A	N/A
Ambrosia sp.	July			1							1	Foliar Spray	Roundup Custom	3.0 qt/ac	Milestone VM	7.0 oz/ac
Arundo donax	June	2									2	No Plants	N/A	N/A	N/A	N/A
Bellis perennis	July									1	1	No Plants	N/A	N/A	N/A	N/A
	August					1					1	Observed/Monitored	N/A	N/A	N/A	N/A
Carduus pycnocephalus	March	2									2	Shovel Shear	N/A	N/A	N/A	N/A
	April	16									16	No Plants	N/A	N/A	N/A	N/A
	April	4									4	Handpull	N/A	N/A	N/A	N/A
	April	24									24	Foliar Spray	Milestone	7.0 oz/ac	N/A	N/A
	April	10									10	Foliar Spray	Milestone VM	7.0 oz/ac	N/A	N/A
	April	3									3	Foliar Spray	Rodeo	3.0 qt/ac	N/A	N/A
	April	3									3	Foliar Spray	Rodeo	7.5 pt/ac	N/A	N/A
	April	3									3	Foliar Spray	Roundup Custom	3.0 qt/ac	N/A	N/A
	April	1									1	Foliar Spray	Roundup Pro Max	3.0 qt/ac	N/A	N/A
	May	1									1	Observed/Monitored	N/A	N/A	N/A	N/A
	May	10					1				11	Handpull	N/A	N/A	N/A	N/A
	May	2									2	Foliar Spray	Milestone	7.0 oz/ac	N/A	N/A
	May	8									8	Foliar Spray	Rodeo	3.0 qt/ac	N/A	N/A
	May	51									51	Foliar Spray	Roundup Custom	3.0 qt/ac	N/A	N/A
	May	36									36	No Plants	N/A	N/A	N/A	N/A
	June	6	4								10	Handpull	N/A	N/A	N/A	N/A
	June	1									1	Foliar Spray	Rodeo	3.0 qt/ac	N/A	N/A
	June	61	1								62	No Plants	N/A	N/A	N/A	N/A
	July	1		1		1	1				4	No Plants	N/A	N/A	N/A	N/A
	October					1					1	Handpull	N/A	N/A	N/A	N/A

# 2024 EDRR, Disjunct, and Woody Invasive Species Workplan

## 2.0 Foresta

Yosemite National Park  
Resources Management and Science  
U.S. Department of the Interior



### Map Features

- Park Boundary
- Buildings
- Wilderness
- Wet Meadows
- Sequoia Grove
- Rivers
- Roads
- Trails
- Lakes
- Fire Footprint

### Sensitive Resources

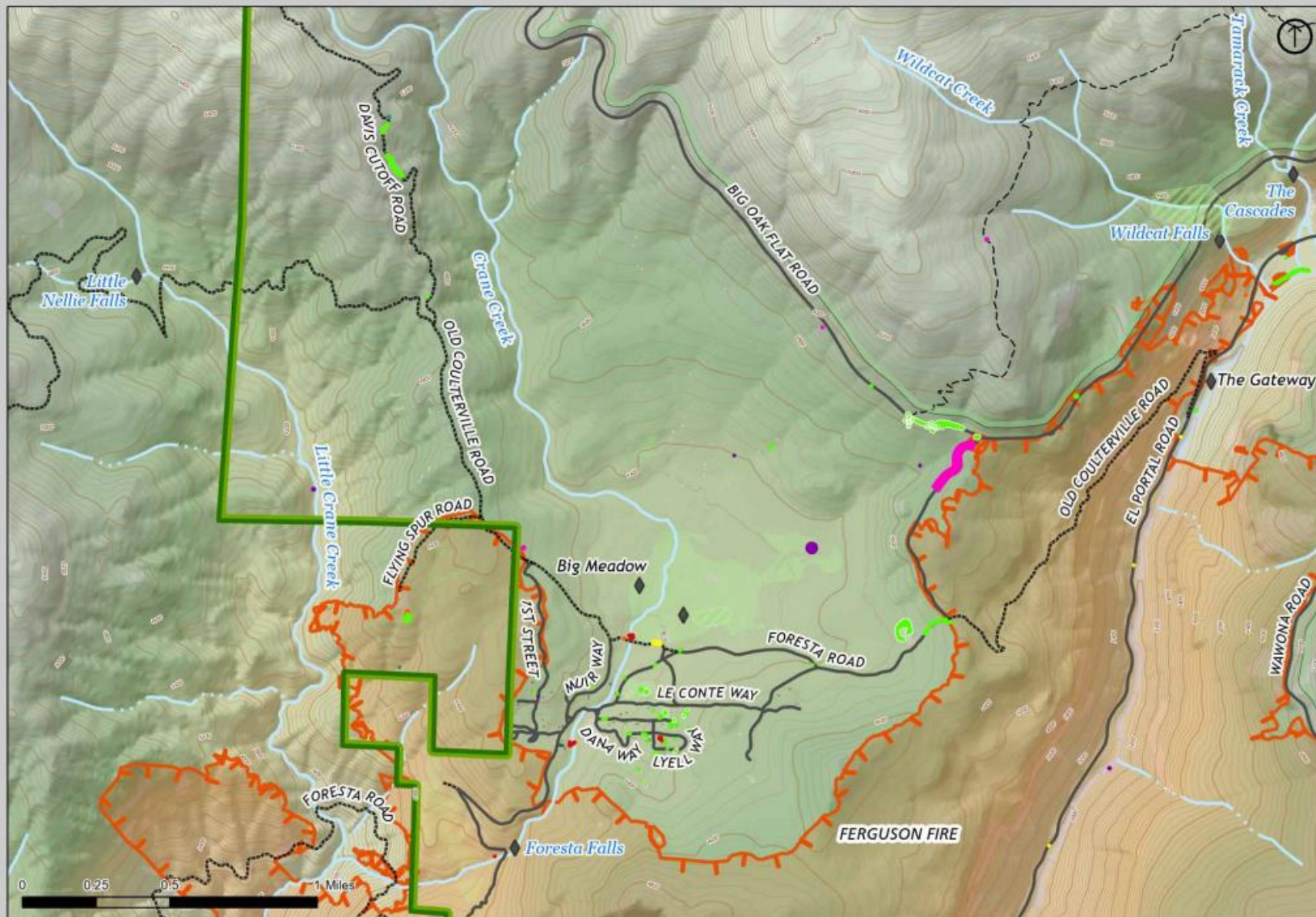
- Rare Plants

### Treated in 2023

- Treated Early Detection (21)

### EDRR, Woody, and Disjunct Species

- Early Detection Species (106)
- Perennial Woody Species (8)
- Yellow star-thistle (4)
- Velvet grass (2)
- Blackberry (6)
- Medium Priority Species (5)
- Dandelion and Oxeye daisy (4)





# EDRR, Woody Species, and Disjunct Stats

- 817 out of the 1757 EDRR, Woody, and Disjunct populations were visited at least once in 2023/2024

Action	Number of Populations
Observed/Monitored	75
Treated-Manual	67
Treated-Herbicide	296
No Plants	379
<b>Sum</b>	<b>817</b>

Population Condition	Number of Populations
Disjunct	33
Disjunct EDRR	23
Medium Priority Disjunct	21
Woody Disjunct	1
EDRR	708
Woody	31
<b>Sum</b>	<b>817</b>



# Disjunct Populations Stats

- The crew visited 37 disjunct populations in 2023 and 78 disjunct populations in 2024

Action	2023 Visits	2024 Visits
Observed/Monitored	2	6
Treated-Manual	3	2
Treated-Herbicide	7	3
No Plants	25	67
<b>Sum</b>	<b>37</b>	<b>78</b>



# Disjunct Populations Stats

Species	Gross Infested Acres Treated	Gross Infested Acres Total	Canopy Acres Treated	Canopy Acres Total
Arundo donax	0	0.002	0	0
Brassica nigra	<.001	0.002	<.001	<.001
Brassica rapa	0	0.105	0	0
Bromus inermis	0	0.032	0	0.002
Carduus pycnocephalus	0	0.002	0	0
Centaurea solstitialis	0	0.036	0	0
Centaurea stoebe	0	0.003	0	0
Chondrilla juncea	0	0.063	0	0
Conium maculatum	0	0.044	0	0
Cytisus striatus	0	0.003	0	0
Digitalis purpurea	0	0.002	0	0
Elymus caput-medusae	0.004	0.176	<.001	<.001
Elymus hispidus	0	<.001	0	0
Elymus repens	0	0.109	0	0
Euphorbia lathyris	<.001	<.001	<.001	<.001
Festuca arundinacea	0	0.002	0	0
Foeniculum vulgare	0	0.006	0	0
Genista monspessulana	0	0.006	0	0
Hedera helix	0	0.002	0	0
Holcus lanatus	0	0.196	0	<.001
Hypericum perforatum	0	0.003	0	<.001
Lepidium perfoliatum	0	0.014	0	0
Leucanthemum vulgare	0.003	0.008	<.001	<.001
Linaria vulgaris	<.001	0.002	<.001	<.001
Melilotus albus	0	0.004	0	0
Phalaris arundinacea	0	0.003	0	<.001
Rubus armeniacus	0.119	0.203	0.006	0.021
Rubus laciniatus	0	0.097	0	0
Salsola tragus	0.016	0.051	<.001	<.001
Sorghum halepense	0	0.012	0	0
Taraxacum officinale	0.017	0.056	<.001	<.001
Verbena litoralis	0	<.001	0	0
Vicia benghalensis	0	0.002	0	0
<b>Sum</b>	<b>0.159</b>	<b>1.246</b>	<b>0.006</b>	<b>0.023</b>





# Summary

- Yosemite has a robust invasive data collection system with data going back to 1991.
- Yosemite's disjunct population strategy is part of a greater EDRR, Woody Species, and Disjunct Population work plan.
- 115 out of the 291 disjunct populations visited in 2023 and 2024.
- 1.2 gross infested acres of disjunct populations were treated or monitored in 2023 and 2024.



# Questions?

