

# **Hardware Ranch Student Biocontrol Program Cache County**



**2020**







Canada thistle weevil   Canada thistle gall fly   Knapweed seed head weevil   Knapweed root weevil

**Biocontrol Student Monitoring and Releases**  
***Larinus minutus*, Knapweed seed head weevil**  
***Cyphocleonus achates*, Knapweed root weevil**  
***Hadroplontus litura*, Canada thistle stem weevil**  
***Urophora cardui*, Canada thistle gall fly**  
**Hardware Ranch WMA**

**Overview:**

Our program this year expanded to include five field days, two noxious weeds and four biocontrol agents. We were unable to host as many different groups of students due to COVID-19 risk. However, we were still able to bring several small groups of students to Hardware Ranch Wildlife Management Area (HRWMA) in cooperation with local school districts. All education groups were able to follow state and local COVID-19 guidelines including groups of under 20 wearing masks and socially distanced outdoors.



Students were educated on the use of biocontrol and its effect on noxious weeds. We discussed the impact of noxious weeds on the Wildlife Management Area. Students were encouraged to discuss ideas to control invasive weeds. Following our discussion, students helped to monitor ongoing biocontrol sites to look for evidence of biocontrol insects. We also took data on vegetation cover to determine the impact of biocontrol agents.





Canada thistle gall fly release

The Cache County Weed Department helped to conduct biocontrol releases and monitoring when we were unable to bring student groups. Cache County was especially helpful in stepping up to assist this program on several days throughout the year.

### Biocontrol Releases:

Biocontrol releases were placed on Canada thistle and spotted knapweed. We placed **1000 *Urophora cardui*, the Canada thistle gall fly** in two locations and **1000 *Hadroplontus litura*, the Canada thistle stem mining weevil** in one additional location. We then placed **1000 *Larinus minutus*, the spotted knapweed seed head weevil** in one location above Curtis Creek. We placed **1000 *Cyphocleonus achates*, the knapweed root weevil** in the Upper Meadow.

Weed Species	Insect Species	Number	Source	Location
Canada Thistle	Urophora Cardui	500	Purchased by Grant	Back Meadow
	Urophora Cardui	500	Purchased by Grant	Curtis Creek
	Hadroplontus Litura	1000	Purchased by Grant	Curtis Creek Bridge
Spotted Knapweed	Cyphocleonus Achates	1000	Purchased by Grant	Upper Meadow
	Larinus Minutus	1000	Collected in Utah	Curtis Creek

### Biocontrol Monitoring:

Four sites were monitored for biocontrol efficacy. Monitoring is conducted using the US Forest Service SIMP protocol. When conducting SIMP monitoring with student groups, we modify the protocol to allow for random sampling. Plots are often trampled and students seem to lose focus by the time we reach the end of the transect. We have adapted the SIMP protocol by having students break off into several groups over a one acre area. Students stand with their back to an infestation of noxious weeds and gently toss monitoring frames over their head. This allows us to select noxious weed patches, but still take a random sample.



Random sampling using Daubenmire frames





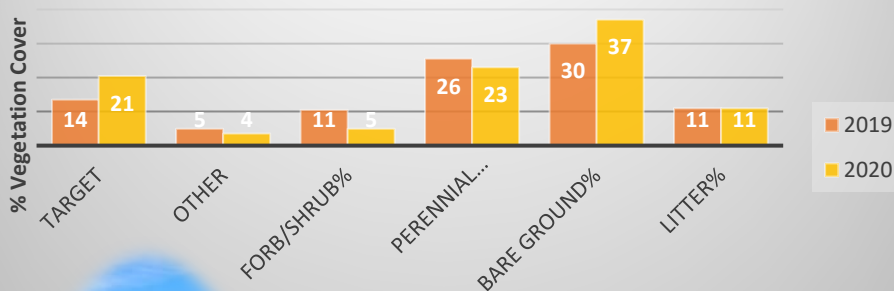
We continued monitoring on the Upper Meadow Knapweed site from 2019. Curtis Creek Bridge site was also continued from 2019. The Canada Thistle Upper Meadow site has been monitored continuously since 2017. We selected one new site for Canada thistle monitoring in 2020. Technicians at HRWMA found a new patch of noxious weeds near the bunkhouse. We plan to release biocontrol agents at the bunkhouse in 2021.

## Monitoring Results

### Spotted Knapweed Monitoring Upper Meadow

The Cache County Weed Department met with cooperators from Coldwater Ranch, (a neighboring property,) to release and monitor biocontrol agents. We conducted SIMP monitoring on the Upper Meadow on June 30th. The cover of spotted knapweed increased over one year. It takes more than one year for biocontrol agents to impact a noxious weed population. We will continue monitoring this site for several more years. We did not recover any biocontrol agents at this site. This may be because of timing. Spotted knapweed plants were very small at HRWMA. It may also indicate that weevils are not yet established. We recommend seed head sampling to determine establishment rates of the knapweed seed head weevil.

#### Spotted Knapweed Vegetation Monitoring Upper Meadow 2019



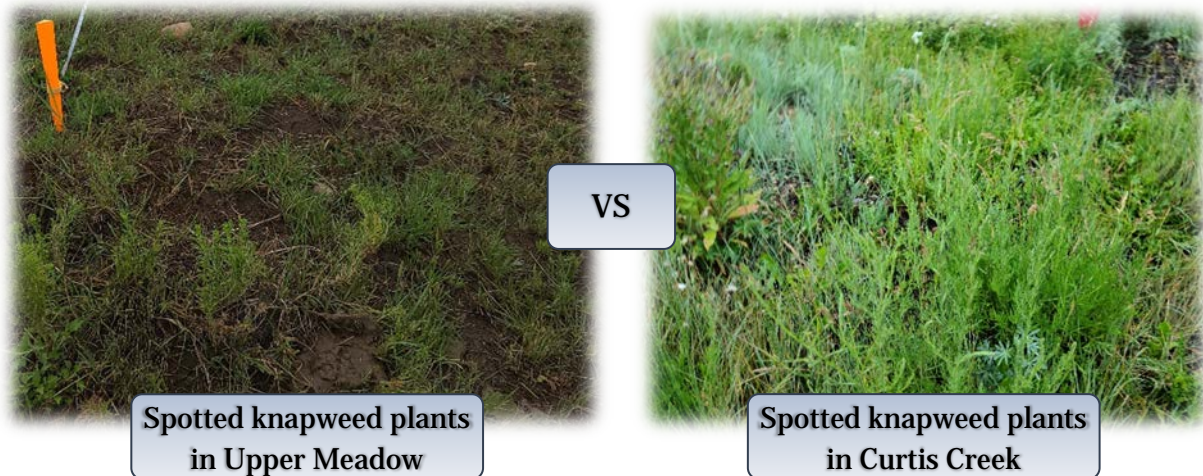
We released 1000 knapweed seed head weevils at the Upper Meadow. We also released 1000 spotted knapweed root weevils in the Upper Meadow site in July.

Amber Mendenhall  
"Utah's Bug Girl"



## Additional Knapweed Monitoring

We monitored spotted knapweed on the hill above Curtis Creek and along Curtis Creek. Spotted knapweed plants were not dense, but they were much taller than knapweed at the Upper Meadow. The Upper Meadow may have increased grazing pressure causing more dense, shorter plants.



We found several biocontrol agents on the Curtis Creek Hill. We recovered *Larinus minutus*, the knapweed seed head weevil and *Urophora affinis*, the knapweed seed head gall fly. We have released the seed head weevil for many years and were pleased to find establishment. The gall fly was even more surprising as there is no record of biocontrol releases at HRWMA. The gall fly is known to travel for several miles to find spotted knapweed. We still have not found any sign of *Cyphocleonus achates*, the knapweed root weevil. We will continue monitoring for biocontrol agents each year at HRWMA.

- Released since 2017
- 2020- Established
- Timed Count: 6 weevils per 3 minute timed counts

Knapweed seed head weevil



- Natural introduction
- 2020- First known establishment
- Two flies recovered during monitoring

Knapweed seed gall fly



- 2017 - First release
- 2020- Not Established
- Recommendations: root sampling in 2021 with continued biocontrol release

Knapweed root weevil



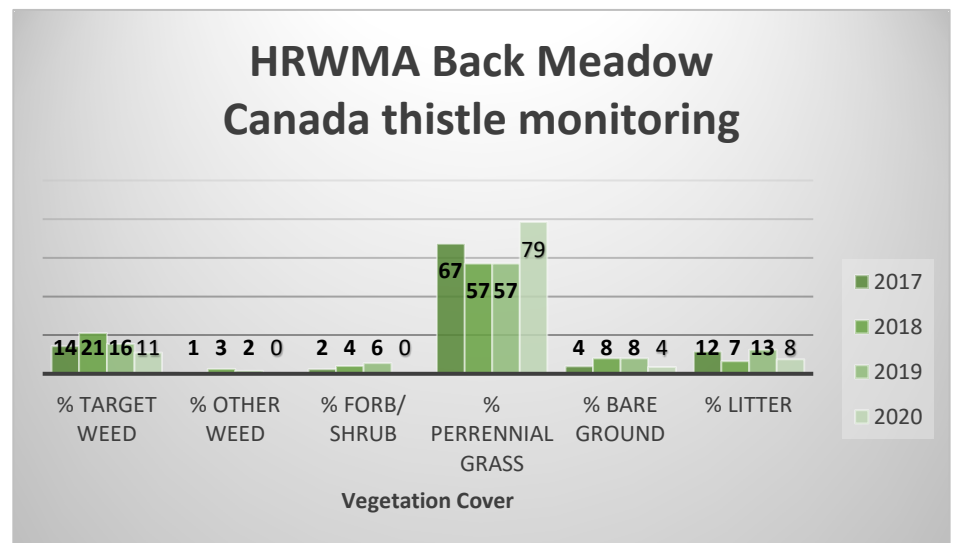
## Canada Thistle Monitoring Back Meadow

Monitoring results have varied in the back meadow over the past four years. However plant cover of Canada thistle is trending downward over the past three years. Perennial grasses are increasing on this site. There was already a large population of perennial grass so this is no surprise. As with all SIMP monitoring sites, we should continue monitoring this site for several years.



We found an establishment of *U. cardui*, the Canada thistle gall fly for the first time in 2020. Galls were not common yet, but we found **1 gall per 1 minute timed count**. We found **stem mining weevils established in 25%** of stems of Canada thistle.

We released 500 additional gall flies at the Back Meadow in 2020.



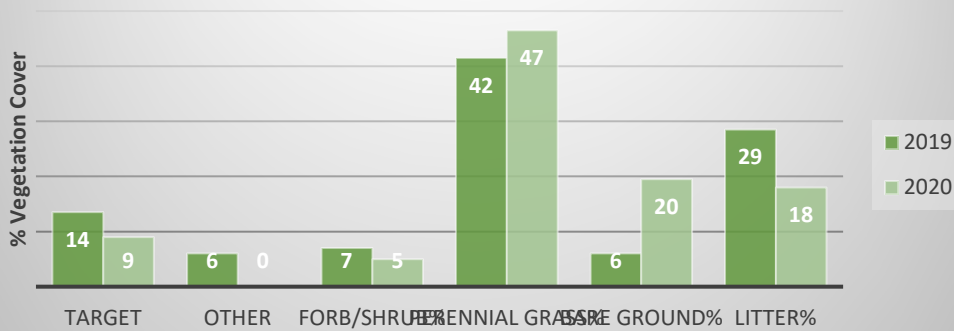
## Curtis Creek Bridge

The Curtis Creek site is a continuing SIMP site from 2019. We will build on this data to compile additional data. Most of the Canada thistle at the Curtis Creek Bridge was treated with herbicide in 2020. This is great for control of Canada thistle. Unfortunately, most of the Canada thistle insectary site has been killed. Monitoring shows a reduction in Canada thistle likely due to herbicide treatment. We will continue to monitor this site to study how biocontrol agents interact with herbicide treatment. However, it is also recommended to find a new site to establish biocontrol agents in case this site collapses.





## Canada Thistle Monitoring Curtis Creek Bridge



We did find **stem mining weevils** established in **25%** of stems of Canada thistle. It appears that herbicide treatment has not negatively affected the percentage of establishment. But we will have less Canada thistle which will lead to less stem mining weevils overall.

We released 500 gall flies and 1000 stem mining weevils at the Curtis Creek Bridge. This will probably be the last time we need to release biocontrol agents if Canada thistle continues to decrease.

It typically takes up to three years to establish biocontrol agents and up to five years to see impact to vegetation. Biocontrol is a long term treatment with two goals. 1. Reducing noxious weeds below an economic threshold and 2. Stop the spread of noxious weeds by reducing plant cover and seed production.



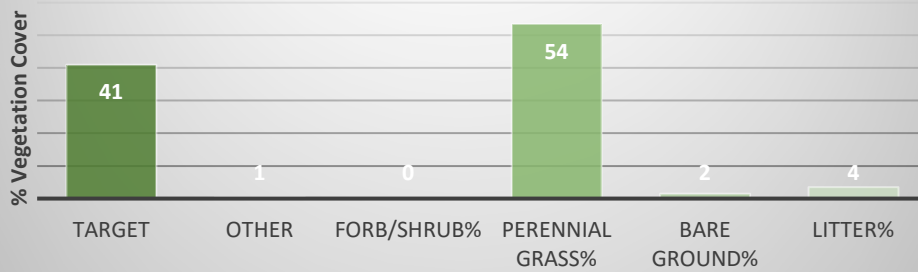
Stem mining weevil recovered  
from Curtis Creek

## Bunkhouse

We identified the need for a new biocontrol release site during our September visit with Cache County. In October, HRWMA technicians helped to identify a new problem site. Canada thistle is becoming a larger problem at the Bunk House Site. In October, we were able to bring a small group of fourth grade students to assist with biocontrol monitoring. Students from the Edith Bowen Lab School travelled to HRWMA in groups of 12 over four days. Cooperators from HRWMA helped to train students to monitor the Bunkhouse biocontrol site for release of Canada thistle biocontrol agents in 2021.



## Canada Thistle Vegetation Monitoring Bunk House 2020



### Results

The student biocontrol program is a great way to combine treatment, monitoring and education. In spite of the unusual circumstances, we were able to reach 48 students over four days in 2020. We were also able to facilitate three additional biocontrol release and monitoring field days with Cache County Weed Department. This year we also contacted the neighboring 36,000 acre property to help monitor and conduct biocontrol release. This was a great opportunity to increase noxious weed awareness among neighboring landowners.

We released 4000 biocontrol agents over five sites. We have also placed monitoring plots in four locations. As this program continues, we will add monitoring plots and increase the quality of our ongoing data.

Some of our successes in 2019 include the discovery of two newly established biocontrol agents on spotted knapweed. This is the first year that we have recovered galls from the fly for the first time at the Back Meadow.





## Future Plans

We hope to reach more students in 2021. Hopefully things will be more normal for field days and education by 2021. We will continue to release biocontrol agents and establish some of our most reliable monitoring plot data in northern Utah. We spent some time plotting new biocontrol locations for 2021 including the Bunk House in addition to new sites along Rock Creek.



# Standardized Impact Monitoring Protocol (SIMP) Biological Control Monitoring Form

Observer(s): Cache Classroom		Date: 06/30/2020		Landowner: HRWMA	
Permanent site? Y N		Site name: HRWMA Upper Meadow		Weed: Spotted Knapweed	
Biological control agent: CA/LM			Insect Stage: Adult		
Lat/Long: N 41.36.413		W 111.33.222		UTM Datum:	
				UTM E:	
				UTM Year :	
				UTM N:	
Size in acres: 20		Picture taken?		Yes No If Y, picture direction: E	

Vegetation cover (all in %, rows add to 100%):

Frame	Target weed%	Other weed%	Forb/shrub%	Perennial Grass%	Bare ground%	Litter%	Moss%	Total%
1	10	5	5	30	40	10	0	100
2	20	0	0	15	40	25	0	100
3	30	0	5	10	45	10	0	100
4	25	0	5	20	40	10	0	100
5	20	10	5	35	20	10	0	100
6	20	5	5	35	30	5	0	100
7	10	10	10	30	35	5	0	100
8	30	0	10	25	30	5	0	100
9	25	5	0	20	45	5	0	100
10	15	0	5	10	45	25	0	100

Target weed size/density:

Biological control agent:

Frame	Number of Stems	Height of tallest stem (cm)
1	3	3
2	17	3
3	23	3
4	10	3
5	7	3
6	7	3
7	3	3
8	18	3
9	14	3
10	11	3

10 sweeps repeated 6 times (for AP, GA, LA, CYAC & OBER) <b>OR</b> a 3 minute timed count repeated 6 times (for MEJA, ACMA galls & URCA galls)	
Count site	Insect (or gall) count
1	0
2	0
3	0
4	0
5	0
6	0

Notes: No insects recovered. Seed sampling recommended



# Standardized Impact Monitoring Protocol (SIMP) Biological Control Monitoring Form

Observer(s): Cache Classroom		Date: 9/3/2020		Landowner: HRWMA	
Permanent site? Y N		Site name: HRWMA Upper Meadow		Weed: Canada thistle	
Biological control agent: UC/HL			Insect Stage: Adult		
Lat/Long: N 41.36.413		W 111.33.222		UTM Datum:	
				UTM E:	
				UTM Year :	
				UTM N:	
Size in acres: 20		Picture taken?		Yes No If Y, picture direction: E	

Vegetation cover (all in %, rows add to 100%):

Frame	Target weed%	Other weed%	Forb/shrub%	Perennial Grass%	Bare ground%	Litter%	Moss%	Total%
1	10	0	0	80	10	0	0	100
2	25	0	0	55	5	20	0	100
3	0	0	0	80	0	20	0	100
4	30	0	0	65	0	5	0	100
5	20	0	0	80	0	0	0	100
6	10	0	0	85	0	5	0	100
7	0	0	0	90	5	5	0	100
8	0	0	0	90	5	5	0	100
9	10	0	0	80	5	5	0	100
10	5	0	0	80	5	10	0	100

Target weed size/density:

Biological control agent:

Frame	Number of Stems	Height of tallest stem (cm)
1	0	0
2	2	30
3	0	0
4	2	40
5	1	35
6	1	20
7	0	0
8	0	0
9	2	20
10	1	20

10 sweeps repeated 6 times (for AP, GA, LA, CYAC & OBER) <b>OR</b> a 3 minute timed count repeated 6 times (for MEJA, ACMA galls & URCA galls)	
Count site	Insect (or gall) count
1	2
2	5
3	1
4	0
5	0
6	1

Notes: No SK found. No insects recovered. Stem sampling – 25%

# Standardized Impact Monitoring Protocol (SIMP) Biological Control Monitoring Form

Observer(s): Cache Classroom		Date: 10/1/2020		Landowner: HRWMA	
Permanent site? Y N		Site name: HRWMA Bunk House		Weed: Canada thistle	
Biological control agent: UC/HL			Insect Stage: Adult		
Lat/Long: N 41.60482		W 111.59056		UTM Datum:	
				UTM E:	
				UTM Year :	
				UTM N:	
Size in acres: 20		Picture taken?		Yes No If Y, picture direction: E	

Vegetation cover (all in %, rows add to 100%):

Frame	Target weed%	Other weed%	Forb/shrub%	Perennial Grass%	Bare ground%	Litter%	Moss%	Total%
1	65	0	0	35	0	0	0	100
2	25	0	0	65	10	0	0	100
3	15	0	0	85	0	0	0	100
4	30	5	0	60	5	0	0	100
5	25	0	0	55	0	20	0	100
6	50	0	0	50	0	0	0	100
7	30	0	0	55	0	15	0	100
8	10	0	0	90	0	0	0	100
9	80	0	0	20	0	0	0	100
10	80	0	0	20	0	0	0	100

Target weed size/density:

Frame	Number of Stems	Height of tallest stem (cm)
1	11	10
2	7	4
3	3	13
4	4	5
5	5	7
6	5	13
7	3	27
8	1	32
9	4	46
10	6	35

Biological control agent:

10 sweeps repeated 6 times (for AP, GA, LA, CYAC & OBER) <b>OR</b> a 3 minute timed count repeated 6 times (for MEJA, ACMA galls & URCA galls)	
Count site	Insect (or gall) count
1	1/2
2	2/2
3	4/4
4	3/5
5	3/5
6	2/3

Notes: No SK found. Looked for sk and found about 10 plants.

Found PP on site and recovered galls of UC,



# Standardized Impact Monitoring Protocol (SIMP) Biological Control Monitoring Form

Observer(s): Cache Classroom		Date: 10/1/2020		Landowner: HRWMA	
Permanent site? Y N		Site name: HRWMA		Curtis Creek	
				Weed: Canada Thistle	
Biological control agent: UC/HL			Insect Stage: Adult		
Lat/Long: N		W		UTM Datum:	
				UTM E:	
				UTM Year :	
				UTM N:	
Size in acres: 20		Picture taken?		Yes No	
				If Y, picture direction: E	

Vegetation cover (all in %, rows add to 100%):

Frame	Target weed%	Other weed%	Forb/shrub%	Perennial Grass%	Bare ground%	Litter%	Moss%	Total%
1	0	0	0	65	15	20	0	100
2	0	0	10	10	0	80	0	100
3	35	0	0	20	45	0	0	100
4	0	0	0	40	55	5	0	100
5	40	0	0	30	30	0	0	100
6	5	0	5	85	5	0	0	100
7	5	0	0	95	0	0	0	100
8	5	0	5	85	0	5	0	100
9	0	0	0	20	20	60	0	100
10	0	0	30	15	25	10	0	100

Target weed size/density:

Frame	Number of Stems	Height of tallest stem (cm)
1	0	0
2	0	0
3	1	45
4		
5	1	30
6	8	20
7	1	6
8	2	18
9		
10	0	0

Biological control agent:

10 sweeps repeated 6 times (for AP, GA, LA, CYAC & OBER) <b>OR</b> a 3 minute timed count repeated 6 times (for MEJA, ACMA galls & URCA galls)	
Count site	Insect (or gall) count
1	0/4
2	04/4
3	01/3
4	02/2
5	0/3
6	01/2

Notes: No SK found. No insects recovered. Stem sampling – 30%

## A step-by-step guide for completing the SIMP biological control monitoring form:

### General Information:

- Observer(s) – Who are you?
- Date – Today's date.
- Landowner – Who is the landowner/land manager?
- Permanent? – Is this a permanent monitoring site?
- Site name – Which site are you monitoring? This could have a specific name if it is a permanent site.
- Weed – Which target weed are you are monitoring?
- Biological control agent – Which biological control agent you are monitoring?
- Insect Stage – What is the developmental stage of the agent are you monitoring (egg, larva, nymph, pupa adult)?
- Lat/Long OR UTM – What are the GPS coordinates of the site you are monitoring? If UTM (preferred), what datum and year is your coordinate system?



Annual grass – note stems which are typically solitary or in a few stemmed tufts.

Vegetation Cover (all in %, rows add up to 100%) – All percentages are to be estimated to the nearest 5%. If there is a trace of any of the vegetation you monitoring in the frame, round up to 5%.

- Frame – Which frame number are you working on (1= 2m, 2= 4m, ..., 10 = 20m)?
- Target weed % – What is % cover of the target weed to the nearest 5%? Other weeds %
- – What is the % cover of any other weeds in the frame to the nearest 5%? Count undesirable annual grasses as weeds.
- Forb/Shrub % – What is the % cover of native forbs/shrubs in the frame to the nearest 5%?
- Grass % – What is the % cover of perennial grass to the nearest 5%?
- Bare Ground/Litter % – What is the % cover of bare ground/litter to the nearest 5%?



Perennial grass – note the multiple stem base with multiple year's growth.

stem of the target

### Target Weed Size/Density

- Frame – Which frame number are you working on (1=2m, 2=4m,...,10=20m)?
- Number of stems – How many stems of the target weed are in the frame?
- Height of tallest stems (cm) – How tall is the tallest weed in the frame (in cm)?

### Biological Control Agent

- Count location – Identify 6 sites at least 5 paces away from the vegetation transect but within the same weed infestation.
- # of insects per 10 sweeps – How many insects are in your net after 10 sweeps of the surrounding vegetation? Take one step between each sweep. Repeat 5 more times (for a total of 6 sweep sites, 60 sweeps) moving at least 2 steps away from the last sweep location **(for AP, CYAC, GA, LA, & OBER).**
- # of biological control insects or galls per 3 min. count – How many biological control agents or galls do you see in a 3 minute period? Carefully approach the plants and be sure to count insects one time only. Please repeat 5 times (for a total of 6) moving at least 4 paces away from the first count location **(for, MEJA, ACMA galls & URCA galls).**



Inkind Total for Cache HRWMA Bio Grants					2020												
Bugs Released		0			Man Hours			Equipment Hours									
		Supervisor	Full Time Sprayer	Seasonal/Volunteer	Sedan	Truck 2X4	Truck 4X4	Truck 4X4 w/Sprayer	ATV 4X4	ATV 4X4 w Spray	UTV w/Sprayer	Trailer 1 Axle	Trailer 2 Axle	Backpack Sprayer			
Name	Entity																
TOTAL	FOR 2020	40	72	725	20	0	120	0	0	0	2	0	0	0			
	</																

Rates	
Supervisor	\$36.00
Full Time Sprayer	\$26.00
Seasonal/Volunteer	\$16.00
Sedan	\$12.00
Truck 2X4	\$15.00
Truck 4X4	\$18.00
Truck 4x4 w/sprayer	\$25.00
ATV4x4	\$15.00
ATV 4x4 w/sprayer	\$18.00
UTV 4X4 w/sprayer	\$20.00
Trailer 1 Axle	\$12.00
Trailer 2 Axle	\$15.00
Backpack Sprayer	\$5.00

Totals	
Bugs Collected	0
Acres Treated	0
Total Man Hours	837
Supervisor Labor	\$1,440.00
Full Time Sprayer Labor	\$1,872.00
Seasonal/Volunteer Labor	\$11,600.00
Sedan	\$240.00
Truck 2X4	\$0.00
Truck 4X4	\$2,160.00
Truck 4X4 w/Sprayer	\$0.00
ATV 4X4	\$0.00
ATV 4X4 w/Sprayer	\$0.00
UTV w/Sprayer	\$40.00
Trailer 1 Axle	\$0.00
Trailer 2 Axle	\$0.00
<b>Total Match</b>	<b>\$17,312.00</b>

Project Name: Bio Release U. cardui and L. minutus					6/30/2020											
Bugs Released				Man Hours			Equipment Hours									
		Supervisor	Full Time Sprayer	Seasonal/Volunteer	Sedan	Truck 2x4	Truck 4x4	Truck 4x4 w/Sprayer	ATV 4x4	ATV 4x4 w Spray	UTV w/Sprayer	Trailer 1 Axle	Trailer 2 Axle	Backpack Sprayer		
Name	Entity															
Justin Stubbs	Coldwater Ranch		10				10									
Anthony Manzionni	Coldwater Ranch			10			10									
Arial	Coldwater Ranch			10												
Bethany	Coldwater Ranch			10												
Steve	Cache County		10				10									
Quinn	Cache County		10													
Alex	Cache County		10													
					</											

Rates	
Supervisor	\$36.00
Full Time Sprayer	\$26.00
Seasonal/Volunteer	\$16.00
Sedan	\$12.00
Truck 2X4	\$15.00
Truck 4X4	\$18.00
Truck 4x4 w/sprayer	\$25.00
ATV4x4	\$15.00
ATV 4x4 w/sprayer	\$18.00
UTV 4X4 w/sprayer	\$20.00
Trailer 1 Axle	\$12.00
Trailer 2 Axle	\$15.00
Backpack Sprayer	\$5.00

Totals	
Bugs Collected	0
Acres Treated	0
Total Man Hours	70
Supervisor Labor	\$0.00
Full Time Sprayer Labor	\$1,040.00
Seasonal/Volunteer Labor	\$480.00
Sedan	\$0.00
Truck 2X4	\$0.00
Truck 4X4	\$540.00
Truck 4X4 w/Sprayer	\$0.00
ATV 4X4	\$0.00
ATV 4X4 w/Sprayer	\$0.00
UTV w/Sprayer	\$0.00
Trailer 1 Axle	\$0.00
Trailer 2 Axle	\$0.00
<b>Total Match</b>	<b>\$2,060.00</b>



Totals	
Bugs Collected	0
Acres Treated	0
Total Man Hours	32
Supervisor Labor	\$0.00
Full Time Sprayer Labor	\$832.00
Seasonal/Volunteer Labor	\$0.00
Sedan	\$0.00
Truck 2X4	\$0.00
Truck 4X4	\$180.00
Truck 4X4 w/Sprayer	\$0.00
ATV 4X4	\$0.00
ATV 4X4 w/Sprayer	\$0.00
UTV w/Sprayer	\$40.00
Trailer 1 Axle	\$0.00
Trailer 2 Axle	\$0.00
<b>Total Match</b>	<b>\$1,012.00</b>

Project Name: Bio Education/Monitoring Field Days					9/28/20-10/1/20											
Bugs Released				Man Hours			Equipment Hours									
		Supervisor	Full Time Sprayer	Seasonal/Volunteer	Sedan	Truck 2x4	Truck 4x4	Truck 4x4 w/Sprayer	ATV 4x4	ATV 4x4 w Spray	UTV w/Sprayer	Trailer 1 Axle	Trailer 2 Axle	Backpack Sprayer		
Name	Entity															
Marni Lee	Hardware Ranch	40														
Jennifer Lonero	Hardware Ranch			30												
Mari Carroll	Hardware Ranch			40												
Nicaela Haig	Hardware Ranch			20	20											
Eric Newell	Edith Bowen School			40			40									
Nate Justis	Edith Bowen School			5			40									
Shannon Rhodes	Edith Bowen School			40												
Amanda Seifert	Edith Bowen School			40												
48 4th grade students	Edith Bowen School			480												

Rates	
Supervisor	\$36.00
Full Time Sprayer	\$26.00
Seasonal/Volunteer	\$16.00
Sedan	\$12.00
Truck 2X4	\$15.00
Truck 4X4	\$18.00
Truck 4x4 w/sprayer	\$25.00
ATV4x4	\$15.00
ATV 4x4 w/sprayer	\$18.00
UTV 4X4 w/sprayer	\$20.00
Trailer 1 Axle	\$12.00
Trailer 2 Axle	\$15.00
Backpack Sprayer	\$5.00

Totals	
Bugs Collected	0
Acres Treated	0
Total Man Hours	735
Supervisor Labor	\$1,440.00
Full Time Sprayer Labor	\$0.00
Seasonal/Volunteer Labor	\$11,120.00
Sedan	\$240.00
Truck 2X4	\$0.00
Truck 4X4	\$1,440.00
Truck 4X4 w/Sprayer	\$0.00
ATV 4X4	\$0.00
ATV 4X4 w/Sprayer	\$0.00
UTV w/Sprayer	\$0.00
Trailer 1 Axle	\$0.00
Trailer 2 Axle	\$0.00
<b>Total Match</b>	<b>\$14,240.00</b>

<b>Biocontrol Totals for Cache Bio 2020</b>	
# Insects Released	4,000
Acres Treated**	200
Acres Monitored	40
# Field Days	7
# Cooperators	67
SIMP Transects Monitored	4
* All biocontrol releases: 1 release = 100 insects	
**Acres treated calculated at 5 acres per	

<b>In-kind</b>		
Total In-kind labor	837 hours	<b>\$14,912</b>
Total In-kind insects	0	\$ -
Total In-kind equipment		\$ 349
	<b>Total Value</b>	<b>\$15,261</b>

<b>Contractor Costs</b>		
Hours	270	\$ 5,400.00
Miles	348	\$ 200.10
	<b>Total</b>	<b>\$5,600.10</b>