

Project 08A210 (COPMC-T-9801-WL, COPMC-T-9802-WL, COPMC-T-9803-WL)
Maybell Bitterbrush
December – 2006
By: Dr. Gary L. Noller

Maybell Bitterbrush Project with Colorado Division of Wildlife

INTRODUCTION

The project contains three studies: COPMC-T-9801 bitterbrush re-establishment by drilling; COPMC-T-9802 bitterbrush re-establishment, caching vs. live transplants; and COPMC-T-9803 bitterbrush re-establishment with transplants in rows. On November 1, 2006, two of the three bitterbrush studies were evaluated. The evaluation involved examining tubling plants of antelope bitterbrush *Purshia tridentata* in rows and plots. The one caching plot with seedlings (Replication 1, plot 7) has been found each year from 1999 to 2006. Drilled rows (COPMC-T-9801) were **not examined** in 2006, since live plants have not been found. Additional information on methods of planting can be found in progress reports for 1998 and 1999.

In general, the conditions and plant growth within the enclosure appeared to be good. However, grasses, especially needle-and-thread did not have as much growth as was present in 2005. As a result, bitterbrush plants were easier to find in 2006. Small bitterbrush plants were flagged to help locate them for future evaluations. The enclosure fence is still in need of repair and does not prevent animals from entering the enclosure. Some rodent activity was noted in 2006. Two white-tailed jack rabbits were observed inside the enclosure.

RESULTS

Tubling plants in rows and plots were examined on November 1, 2006. In addition, the one cache (Replication 1, plot 7) that was found each year from 1999 to 2006 was also evaluated. Soil inside the enclosure was moist to a depth of 22 inches, and was not examined to a greater depth. The average height and width for plants in **rows** was determined by measuring all plants in the first four rows. The average height for plants in **plots** was determined by measuring all plants where herbicide or no herbicide was used. Many bitterbrush plants inside the enclosure had been browsed, but the use did not appear to be very recent.

COPMC-T-9801-WL

Drilled plots – (4.5 and 9.0 ft. row spacing):

This study was **not evaluated** in 2006.

COPMC-T-9802-WL

Caching:

Plots for caching and tubling (plug) plants had 36 planting sites per plot. Only one cache (Replication 1, plot 7) had plants on November 1, 2006. The one cache results in 0.3% re-establishment for caching. Since the one cache was in the herbicide (glyphosate to reduce competition) plot, this averages 0.7% re-establishment when herbicide is used to reduce competition. The plant in this cache measured only 10.0 cm tall and 25.0 cm wide. Based on

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this project, caching is **not** a **successful** method for re-establishing antelope bitterbrush on this site. Caching plots where plants had not been found in the past were not examined.

Tubling plants in plots:

Height and width measurements from all plots where **herbicide** was used averaged 31.1 cm by 53.5 cm, respectively. The one plant in the plots where **no herbicide** was used measured 22.0 cm in height and 55.0 cm in width. Survival in plots where **herbicide** was used was 34.7% in 1999, 30.6% in 2000, 25.7% in 2001, 25.0% in 2002, 24.3% in 2003 and 2004, and 23.6% in 2005 and 2006 (Table 1). Survival in plots where **no herbicide** was used was 13.9% in 1999, 9.0% in 2000, 4.9% in 2001, 1.4% in 2002, and 0.7% in 2003, 2004, 2005 and 2006. Survival for bitterbrush plants in plots did not change in 2006 for the **herbicide** or **no herbicide** treatments. Planting tubling bitterbrush plants in plots when **herbicide** is used is a **successful** method of re-establishing antelope bitterbrush. In 2006, 50.0% of the plants were found, that were present in 1999. **Herbicide** is important in the initial **establishment** of bitterbrush tublings (50 plants with herbicide and 20 plants with no herbicide in 1999, Table 1), but also in the **persistence** of tublings (34 of 50 plants, 68.0%, were still alive in 2006 when herbicide was used vs. only 1 of the 20 plants, 5.0% was still alive in 2006 when no herbicide was applied). Survival of bitterbrush tublings in plots appears to be relatively stable three years (2002) after planting (Figure 1). This study indicates that if a bitterbrush tubling can survive for three years, its chances of long term survival are good. It would also suggest, methods that improve the chances of survival for the first three years will be important for long term survival.

COPMC-T-9803-WL

Tubling plants in rows:

Eighteen rows of tubling antelope bitterbrush plants (716 planting sites) were examined for survival on November 1, 2006. Plants in rows averaged a height of 29.6 cm and a width of 51.5 cm. It should be noted that rows were treated with **herbicide** to reduce competition before planting. Survival in rows was 21.1% (151 plants) in 1999, 18.2% (130 plants) in 2000, 17.0% (122 plants) in 2001, 16.5% (118 plants) in 2002, 15.8% (113 plants) in 2003, 16.1% (115 plants) in 2004, and 15.9% (114 plants) in 2005 and 2006 (Table 2). Survival for tubling plants in rows did not change in 2006 from 2005. In 2006, 75.5% of the plants were found, that were present in 1999. This is a **successful** method of re-establishing antelope bitterbrush on this site. Survival of bitterbrush tublings in rows also appears to be relatively stable three years (2002) after planting (Figures 2 and 3). This study indicates that if a bitterbrush tubling can survive for the first three years, its chances of long term survival are good. It also suggests that methods that improve the chances for survival for the first three years will be important for long term survival.

OBSERVATIONS AND CONCLUSIONS

1. The project was evaluated on November 1, 2006, for antelope bitterbrush re-establishment.
2. Seeding (both drilling and caching) was done on October 21, 1998.

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3. Antelope bitterbrush tublings were planted in plots and rows on May 6, 1999.
4. Seeding (both drilling and caching) were **not successful** methods for re-establishing antelope bitterbrush on this site at this time. Drilled plots were **not examined** in 2005.
5. Survival of antelope bitterbrush tublings on November 1, 2006, in **plots** averaged 12.2% on this site. (23.6% when herbicide was used and 0.7% with no herbicide.) This is a **successful** method for re-establishing antelope bitterbrush on this site at this time.
6. In **plots**, 50.0% of the plants that were observed in 1999 were found again in 2006.
7. Planting antelope bitterbrush tublings in **rows** was a **successful** method of re-establishing bitterbrush and resulted in a 15.9% survival recorded on November 1, 2006.
8. In **rows**, 75.4% of the plants that were observed in 1999 were found again in 2006.
9. **Herbicide** was important for the **establishment** of bitterbrush tubling (See Table 1, 1999), and for the **persistence** of the tublings over time (See Table 1, 1999 to 2006).
10. Width measurements of bitterbrush plants were included in the report for 2006.
11. Survival of tubling plants in plots and rows did not change for 2005 to 2006.
12. Survival of bitterbrush tublings in plots and rows did not change substantially after the first three years (2002) of the study.
13. Methods that will improve survival for the first three years will be important for the long term survival of bitterbrush tublings.

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Table 1. A listing of the number of plants found in plots treated with herbicide, no herbicide, and the total of both, from 1999 through 2006. Percent survival is also listed.

TUBLING PLANTS IN PLOTS

Date		Number of Plants	% Survival
May 9, 1999	(Planted)	288	-
November 10, 1999	(all plants)	70	24.3
	Herbicide	50	34.7
	No herbicide	20	13.9
September 26, 2000	(all plants)	57	19.8
	Herbicide	44	30.6
	No herbicide	13	9.0
November 7, 2001	(all plants)	44	15.3
	Herbicide	37	25.7
	No herbicide	7	4.9
October 4, 2002	(all plants)	38	13.2
	Herbicide	36	25.0
	No herbicide	2	1.4
October 9, 2003	(all plants)	36	12.5
	Herbicide	35	24.3
	No herbicide	1	0.7
October 13, 2004	(all plants)	36	12.5
	Herbicide	35	24.3
	No herbicide	1	0.7
November 2, 2005	(all plants)	35	12.2
	Herbicide	34	23.6
	No Herbicide	1	0.7
November 1, 2006	(all plants)	35	12.2
	Herbicide	34	23.6
	No Herbicide	1	0.7

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Table 2. A listing of the number of plants found in rows from 1999 to 2006. Percent survival is also listed.

TUBLING PLANTS IN ROWS

Date	Number of Plants	% Survival
May 6, 1999 (Planted)	716	-
November 10, 1999	151	21.1
September 26, 2000	130	18.2
November 7, 2001	122	17.0
October 4, 2002	118	16.5
October 9, 2003	113	15.8
October 13, 2004	115	16.1
November 2, 2005	114	15.9
November 1, 2006	114	15.9

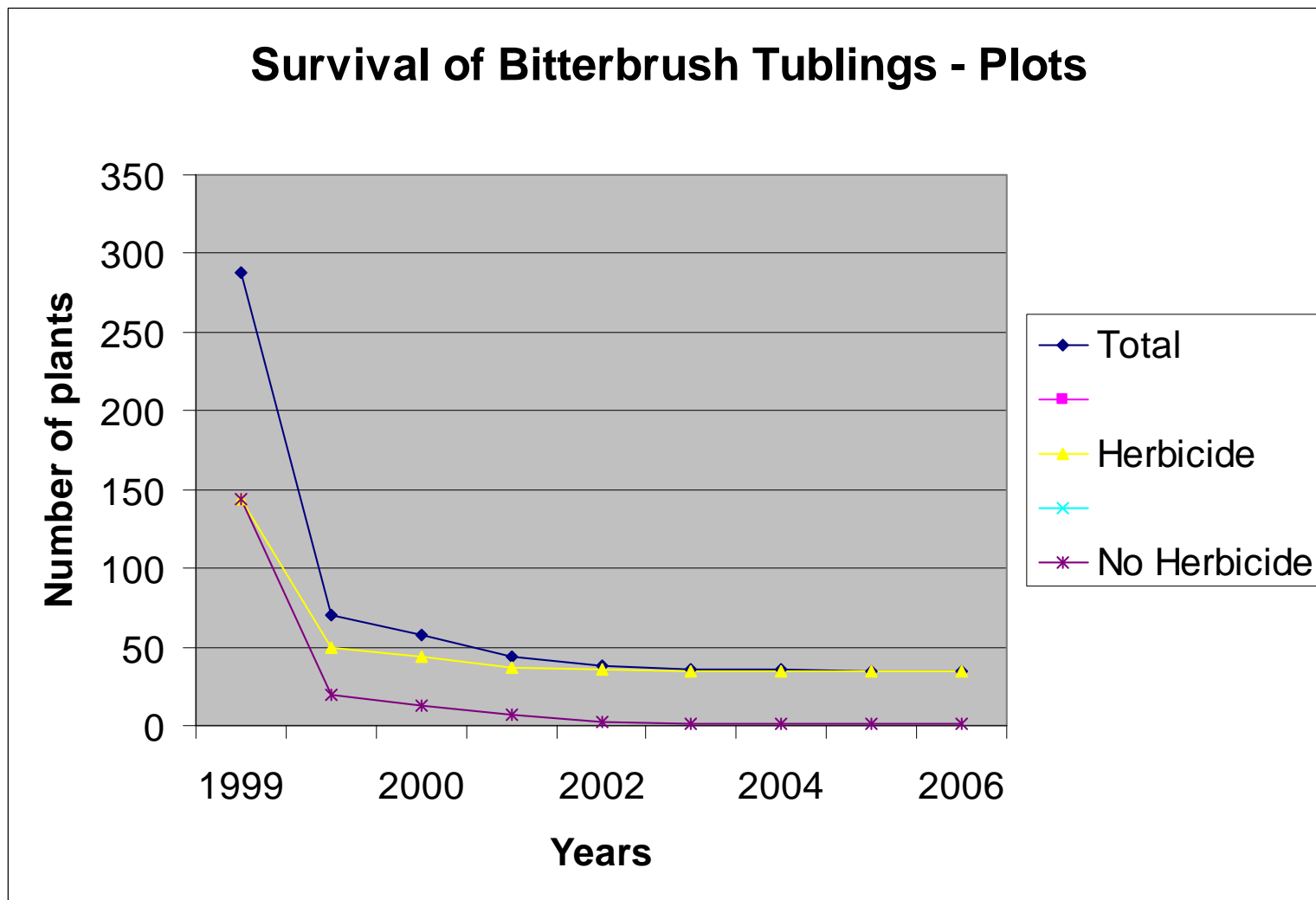


Fig. 1.

Survival of bitterbrush tubplings in plots is shown. Bitterbrush tubplings are shown as total plants (with and without herbicide), tubplings with no herbicide, and tubplings that had herbicide (Roundup Ultra at 2 quarts/Ac in a four foot strip prior to planting) to reduce competition. The figure shows that survival, three years after planting (2002), is relatively stable to 2006.

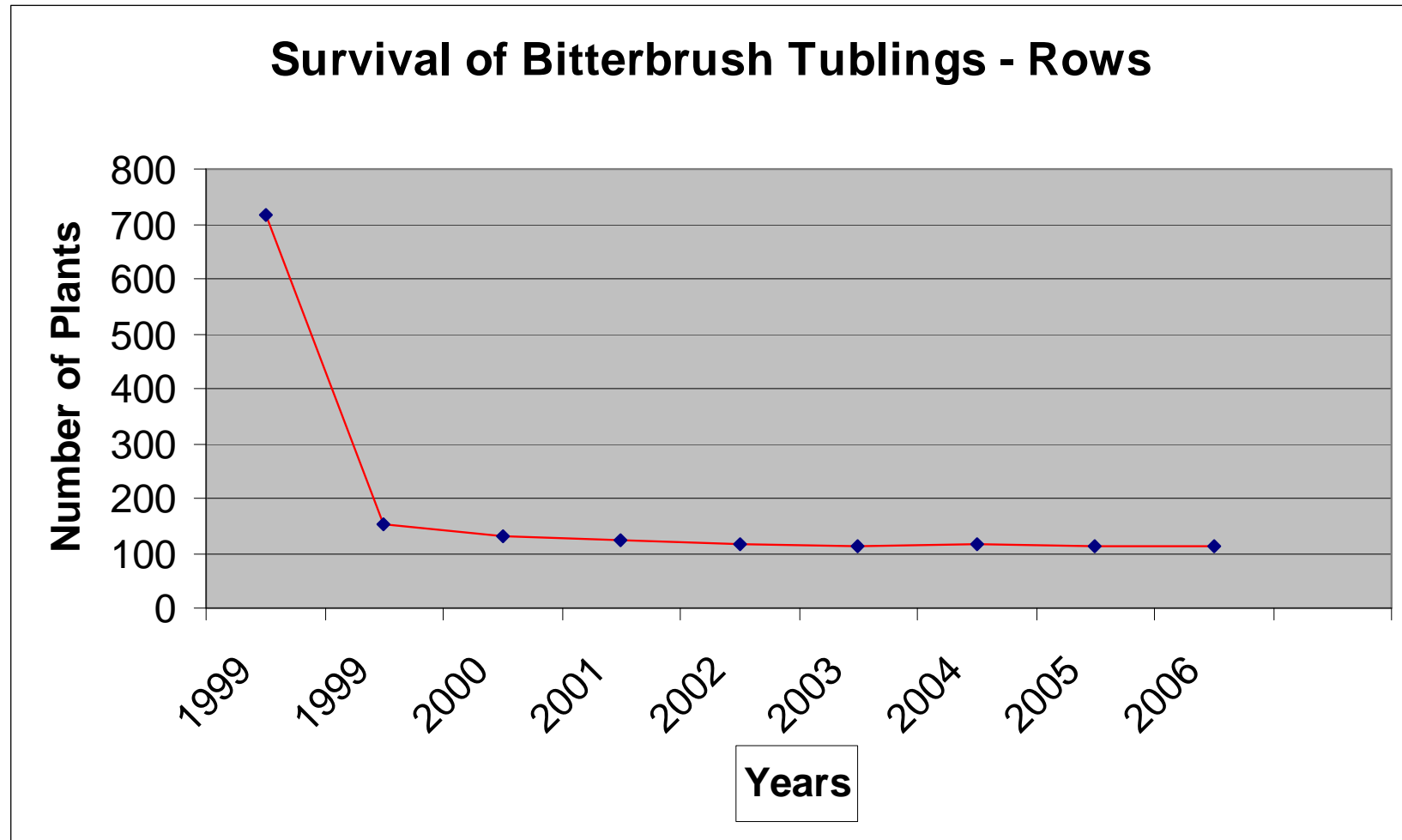


Fig. 2.

Survival of bitterbrush tubplings in rows. Herbicide was applied to all rows to reduce competition. Survival three years after planting (2002), has remained relatively stable to present.

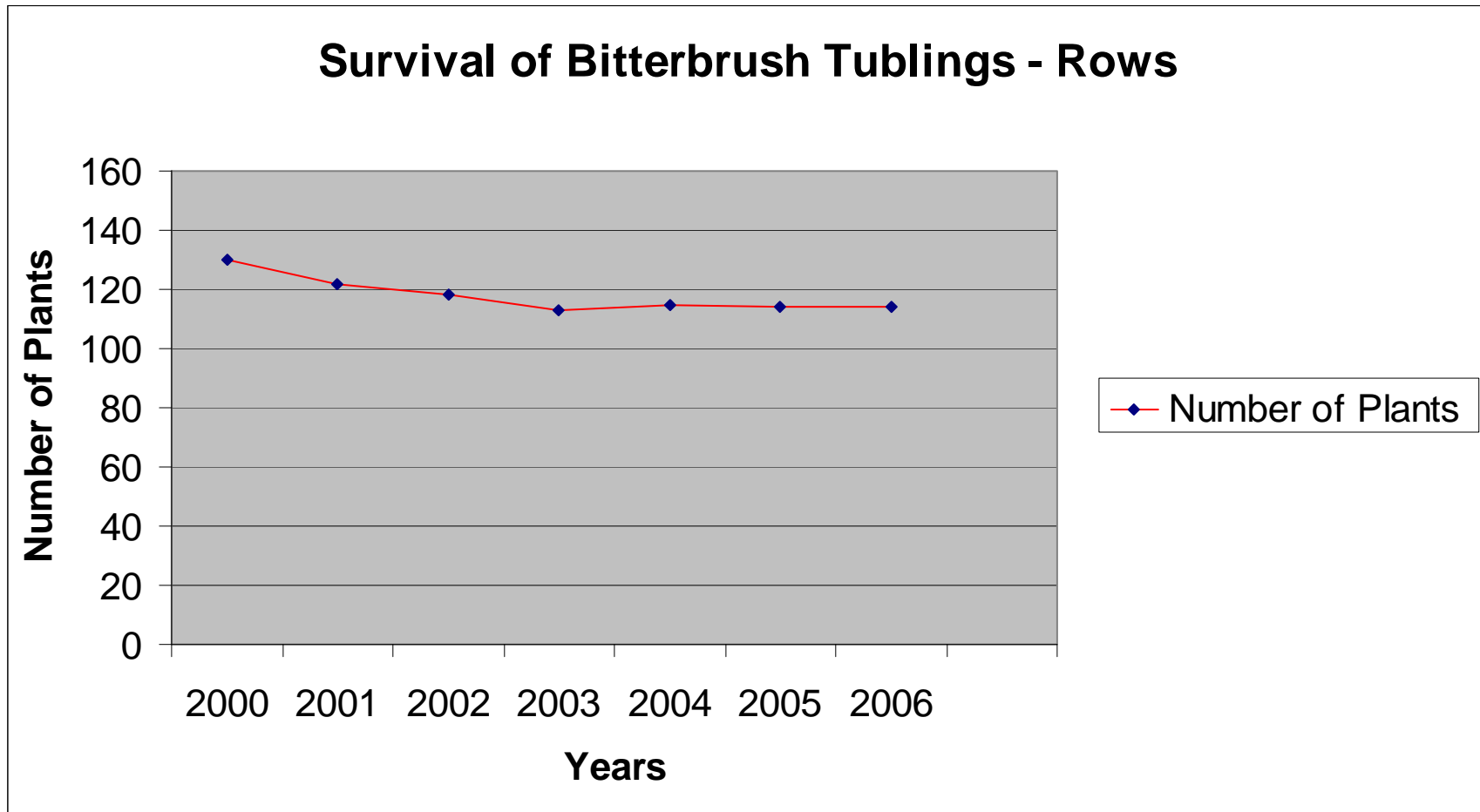


Fig. 3.

This figure is an attempt to emphasize the changes in survival from the fall of 1999 to 2002. And to show that survival was relatively stable from 2002 to 2006.