
Therriault Creek Riparian Revegetation 2014 Monitoring and Maintenance Report

Contract #150017



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Contents

Introduction.....	1
2014 Effectiveness Monitoring.....	3
Residual Shrub Protection.....	11
Containerized Planting.....	12
Planted Solarization	16
Temporary Solarization Plots	18
Vegetated Soil Lifts	22
Willow Fascines.....	24
Large Woody Debris Structures.....	24
Coir Logs	26
Weed Control.....	26
Completed 2014 Maintenance	29
Adaptive Management: Next Steps	30
References.....	34
Appendix A: Phase I Select Planting Unit Photographs 2008 through 2014	35
Appendix B: Phase I Select Vegetated Soil Lift Photographs 2008 through 2014	41
Appendix C: Phase I Select Coir Log Photographs 2008 through 2014.....	45
Appendix D: Phase III Planting Units Photographs Fall 2010 through 2014.....	51
Appendix E: Weed Control Maps and Spray Records.....	61

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Introduction

This report describes work completed in 2014 at the Therriault Creek restoration project site under Montana Fish, Wildlife and Parks (FWP) Contract #150017. A total of four tasks were included in contract #150017:

- Monitoring
- Maintenance
- Revegetation Treatments
- Reporting

Work completed in 2014 represents the continued commitment of project stakeholders to the long-term success of the Therriault Creek Riparian Revegetation Project. As described in previous reports, successfully converting the riparian vegetation along Therriault Creek at the site to a mosaic of native riparian shrubs and trees requires a multi-year, phased approach that includes maintenance and monitoring during the establishment period while vegetation becomes adapted to site conditions. The intention of the initial phase, completed in fall 2007, was to implement a range of treatments based on a detailed evaluation of existing site conditions and ecological processes driving vegetation succession at the site. Effectiveness monitoring of the treatments installed in 2007 was completed in 2008 and 2009. The results were used to determine maintenance needs for 2007 treatments and identify additional revegetation treatments based on how effective the 2007 treatments were at achieving project goals and objectives. A small number of additional revegetation treatments were implemented in September and October 2009 (Phase II). Monitoring continued in 2010 and the results of this and previous monitoring were used to determine treatments for the downstream portion of the project (Phase III). Phase III treatments were implemented during October 2010 and are reported in *Therriault Creek Riparian Revegetation 2010 Implementation and Monitoring Report* (Geum Environmental Consulting, Inc. 2010). All treatments were monitored in 2011 and maintenance was completed in 2011 based on the results of 2011 monitoring. Monitoring in 2012 included a 5 year summary assessing the progress of meeting goals and objectives. This summary indicates that the site is trending toward meeting the goals and objectives established for the project and that reduced monitoring could be done in subsequent years.

The purpose of this report is to describe the results of 2014 effectiveness monitoring, describe maintenance activities completed in 2014 based on the results of 2014 monitoring, and provide recommendations for continued monitoring and maintenance at the site. Table 1 describes the tasks completed under Contract #150017.

Table 1. Tasks completed at Therriault Creek restoration site under Contract #150017 in 2014.

Task	Description and Quantity
Monitoring	
Phase I and II	
Photo documentation	Photos were taken of all treatments. Treatments include: 16 containerized planting units, 2 long term planted solarization units, 3 temporary solarization units, 2 vegetated soil lifts, 800 feet of willow fascine, 400 feet of coir log fascines, and 5 woody debris structures.
Record qualitative observations	Observations were recorded for all revegetation treatments, plant community development, channel conditions, and other ecological processes influencing plant community succession and site conditions.
Document maintenance needs	Maintenance needs were recorded for all treatments.
Phase III	
Survival monitoring	Survival monitoring was completed for four of the nine planting units.
Photo documentation	Photos were taken of all treatments. Treatments include: 21 planting units and 1 planted solarization unit.
Document maintenance needs	Maintenance needs were recorded for all treatments.
Maintenance	
Fence repair	The 10 foot tall riparian protection fence, which surrounds all of the planting units in Phase I and most of the planting units in Phase III, was re-built using 10 foot tall t-posts to replace the failed angle iron extensions installed in 2013.
Browse protector removal	All of the remaining browse protectors and many vole protectors were removed from within the riparian protection fence in Phase I.
Revegetation Treatments	
Herbicide application	Herbicide was applied in early August and targeted all noxious weed species within and adjacent to the project area.
Reporting	
Reporting	This report was prepared to summarize the results of monitoring, maintenance and revegetation activities, progress towards meeting project goals, and provide adaptive management recommendations for future years.

2014 Effectiveness Monitoring

This section describes the results of effectiveness monitoring completed in August 2014. In 2014, effectiveness monitoring included collecting survival data in four planting units in Phase III (2010) and making general observations were made of all other treatments.

Details on the Therriault Creek riparian revegetation project including as-built documentation; effectiveness monitoring methods and results; and the adaptive management framework for the project can be found in eight separate documents:

- *Therriault Creek Riparian Revegetation Plan* (Revegetation Plan) prepared for Kootenai River Network (Geum Environmental Consulting, Inc. 2007a);
- *Therriault Creek Riparian Revegetation Plan Implementation Report* (2007 Implementation Report) prepared for Montana Fish, Wildlife and Parks (Geum Environmental Consulting Inc. 2007b);
- *Therriault Creek Riparian Revegetation 2008 Monitoring Report* prepared for Kootenai River Network (2008 Monitoring Report) (Geum Environmental Consulting, Inc. 2008);
- *Therriault Creek Riparian Revegetation Maintenance and Monitoring 2009 Report* (2009 Monitoring Report) prepared for the Kootenai River Network (Geum Environmental Consulting, Inc. 2009);
- *Therriault Creek Riparian Revegetation 2010 Implementation and Monitoring Report* (2010 Monitoring Report) prepared for Montana Fish, Wildlife and Parks (Geum Environmental Consulting, Inc. 2010) and
- *Therriault Creek Riparian Revegetation 2011 Implementation and Monitoring Report* (2011 Monitoring Report) prepared for Montana Fish, Wildlife and Parks (Geum Environmental Consulting, Inc. 2011).
- *Therriault Creek Riparian Revegetation 2012 Monitoring and Maintenance Report* (2012 Monitoring Report) prepared for Montana Fish, Wildlife and Parks (Geum Environmental Consulting, Inc. 2012).
- *Therriault Creek Riparian Revegetation 2013 Monitoring and Maintenance Report* (2013 Monitoring Report) prepared for Montana Fish, Wildlife and Parks (Geum Environmental Consulting, Inc. 2013).

As described in previous monitoring reports, three types of monitoring are necessary components of the integrated monitoring and adaptive management program. These include: baseline, as-built, and effectiveness monitoring. **Baseline monitoring** documents the pre-restoration condition and is described in the Revegetation Plan prepared for the project (Geum 2007a). **As-built monitoring** documents completed treatments and for the treatments implemented in fall 2007, is described in the 2007 Implementation Report (Geum 2007b). **Effectiveness monitoring** addresses whether project objectives are being met, determines maintenance needs, and provides inputs into decision pathways for adaptive management. The results of 2008 effectiveness monitoring are provided in the 2008 Monitoring Report (Geum 2008). The 2009 report provides the results of 2009 effectiveness monitoring for treatments implemented in 2007, compares those results with 2008 effectiveness monitoring results, and describes results of as-built monitoring for revegetation treatments implemented in September and October 2009 (Geum 2009). The results of 2010 effectiveness monitoring, compared with the results of previous years' monitoring and the determination of 2010 maintenance needs and Phase III revegetation treatments, are provided in the 2010 Monitoring Report (Geum 2010). The 2011 Monitoring

Report (Geum 2011) provides the results of 2011 monitoring, compares these results with previous year's results, and describes the maintenance activities completed in 2011. The 2012 report (Geum 2012) provides the results of 2012 monitoring, describes the maintenance and revegetation treatments implemented as a result of the 2012 monitoring, and describes how the site is progressing towards meeting project goals and objectives. The 2013 report (Geum 2013) provides results of 2013 monitoring and outlines maintenance needs.

The focus of 2014 effectiveness monitoring was to continue to evaluate treatment effectiveness observed since 2008, determine maintenance needs, and evaluate effectiveness of 2013 maintenance recommendations. Figure 1 shows an overview of revegetation treatments installed at the project site. Figure 2 shows the locations of Phase III treatments monitored in 2014.

Effectiveness monitoring completed in 2014 included:

- General observations of all revegetation treatments in Phase I, II and III;
- Photographs of all revegetation treatments;
- Repeat survival monitoring of four containerized planting units in Phase III; and
- Documentation of maintenance needs for all revegetation treatments.

Table 2 provides a summary of the results and observations of 2014 effectiveness monitoring. Table 2 also includes the decision making pathway for making adaptive management recommendations based on results of monitoring and a summary of the recommendations, such as maintenance needs or continued monitoring, based on monitoring results. The following sections discuss the results of 2014 monitoring and compare those results with previous years' effectiveness monitoring results where possible.

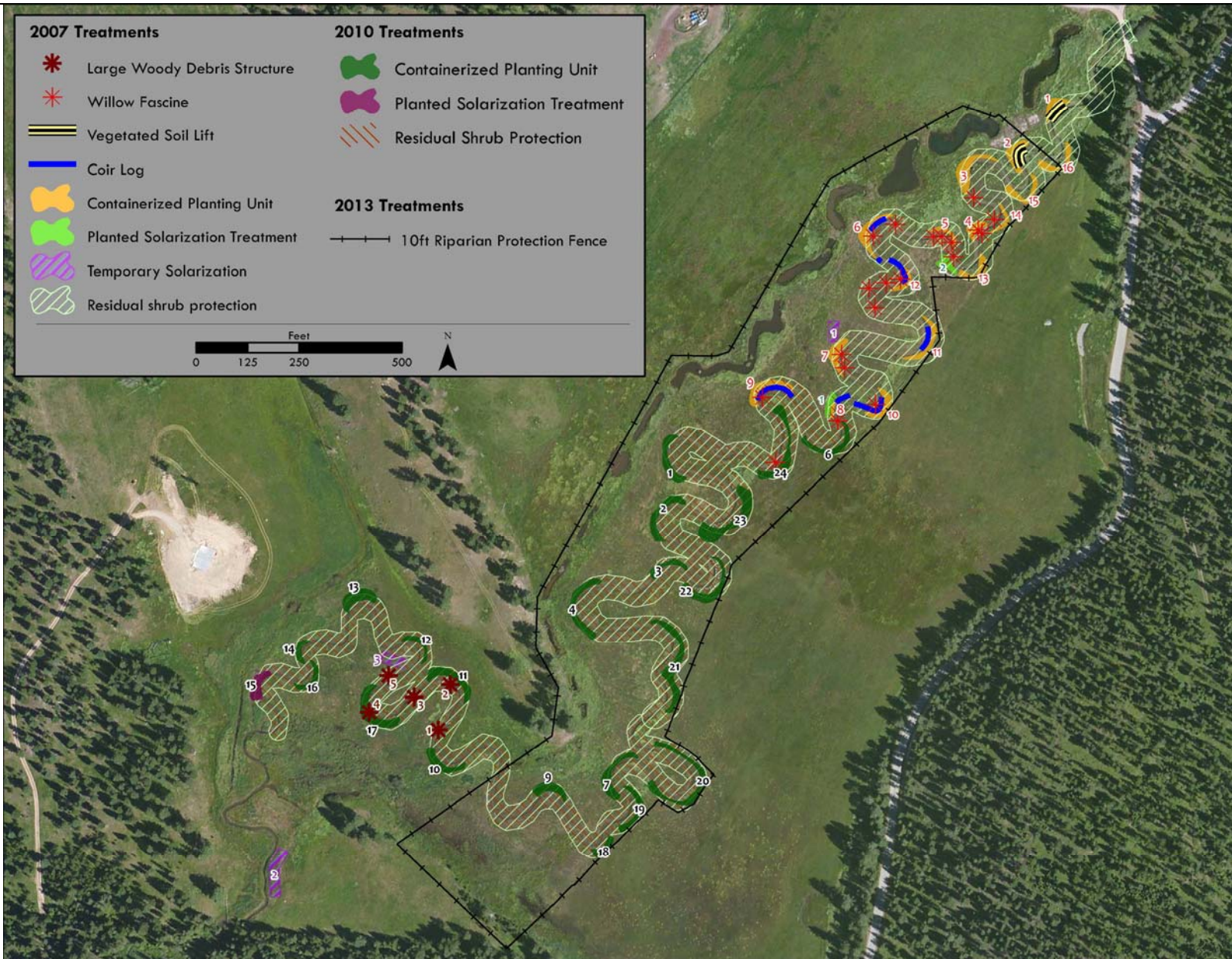


Figure 1. Overview figure showing riparian revegetation treatments installed in 2007 and 2010 at the Therriault Creek Riparian Revegetation project site.

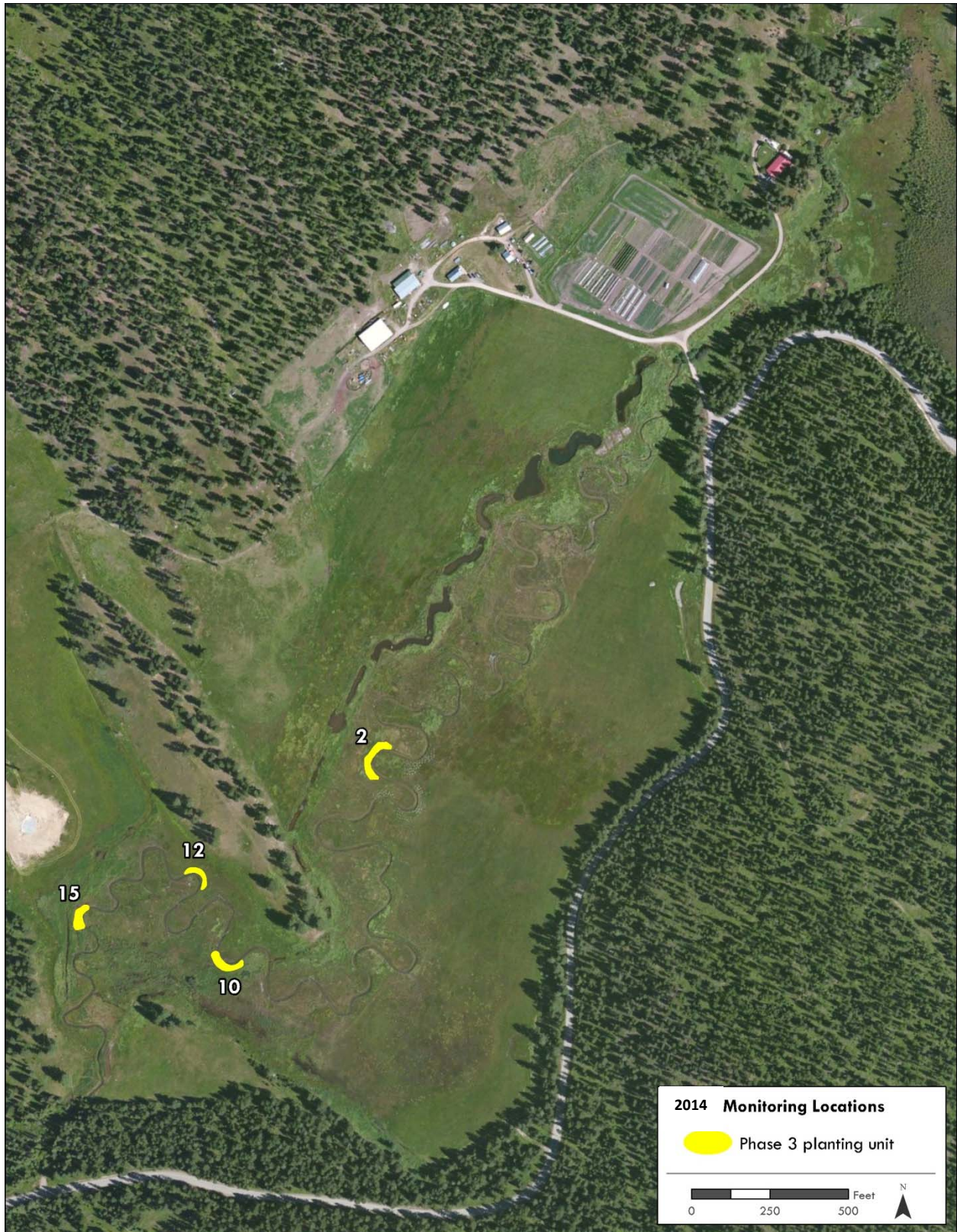


Figure 2. Effectiveness monitoring overview figure showing the locations of planting units monitored in 2014 at the Therriault Creek Riparian Revegetation project site.

Table 2. Summary results of 2014 effectiveness monitoring, decision pathway for making adaptive management decisions based on the results of monitoring, and recommended actions for each type of treatment.

Treatment¹	Decision Pathway for Maintenance and Adaptive Management²	2014 Effectiveness Monitoring Results	Adaptive Management, Completed Actions and Future Recommendations Based on Monitoring
<i>Residual Shrub Protection</i>	(1) If protected shrubs are greater than 3 feet above the height of the browse protector, browse protectors should be removed. If plants are less than 3 feet above the height of the browse protector, leave the protector in place. (2) If protected shrubs have filled greater than 80% of the capacity of the browse protectors, expand protector to accommodate growth. (3) If hedging of protected shrubs is occurring at the height of the browse protector, evaluate the effects on the health of the plant. If the plant appears healthy, no action is needed. If the plant appears stunted or otherwise unhealthy, additional measures for protection may need to be evaluated.	General observations of protected residual shrubs show that the shrubs continue to thrive, outgrowing the individual browse protectors and small exclosures. Browse continues on exposed parts of plants. The small exclosures built around groups of residual shrubs were effective in allowing room for natural growth and expansion however browse was observed along the perimeters of the small exclosures and many had collapsed making them less effective.	In 2014, all of the remaining browse protectors and small exclosures were removed from Phase I within the riparian protection fence. The riparian protection fence was repaired and re-built. In 2015, no additional monitoring is required. Focus should be on maintaining the riparian protection fence; continuing to remove individual protectors and small exclosures from within the fenced area and to repair, remove, install or expand browse protectors on residual shrubs as needed outside of the riparian protection fence.
<i>Containerized Planting</i>	(1) If survival of containerized shrubs in Phase III is greater than 80%, reduce the frequency of monitoring at the site. Continue to conduct annual maintenance site visits and implement necessary maintenance. (2) If survival is less than 80%, determine if additional irrigation or weed suppression measures are needed or if other site conditions are precluding growth (e.g. soils). If limitations to survival are identified, consider re-planting poor survival areas.	General observations of planting units in Phase I indicate that survival is similar to the previous two years. Overall survival in Phase I is less than 80%; however many surviving shrubs are very large and providing a range of desired ecological functions. Browse and ungulate damage remain a limiting factor. In Phase III, survival continued to decrease. Exact causes of decreased survival are unclear and may relate to soil and hydrology conditions. Plants are adequately protected from competition.	In 2014, all of the remaining browse protectors and small exclosures were removed from Phase I within the riparian protection fence. In 2015, no additional monitoring is required. Although survival in Phase III is less than 80%, the causes are not clear and additional planting should not occur. Focus should be on maintaining the riparian protection fence; continuing to remove protectors from within the fenced area and to repair, remove, install or expand protectors on residual shrubs as needed outside of the riparian protection fence.

Treatment ¹	Decision Pathway for Maintenance and Adaptive Management ²	2014 Effectiveness Monitoring Results	Adaptive Management, Completed Actions and Future Recommendations Based on Monitoring
<i>Solarization: Planted</i>	(1) If survival remains above 80%, reduce the frequency of monitoring at the site. Continue to conduct annual maintenance site visits and implement necessary maintenance. (2) If survival remains above 80% begin fabric removal around select shrubs in Phase I sites. Leave fabric installed in Phase III in place. (3) If survival drops below 80%, try to determine causes. Consider removing fabric and re-planting once causes are determined.	Survival in Phase III plot 15 was 87%. Grass has been effectively killed in Plot 15, but sediment deposition on the fabric has allowed colonization by reed canarygrass. Fabric seems to be promoting survival and growth of planted shrubs. Survival was not measured in Phase I in 2014, but general observations indicate survival is approximately the same as previous years in Plot 2 and to have declined further in Plot 1. The exposed soil surfaces have been colonized by a mix of seeded and naturally colonizing species.	In 2014, no maintenance actions were completed. In 2015, no additional monitoring or maintenance is required. Future actions could include: spraying undesirable grasses that colonize the plots (this has not been done to this point for fear of off target damage and the dominance of these species in areas next to the plots) and re-planting Phase 1 Plot 1 with containerized plants or willow cuttings.
<i>Solarization: Temporary</i>	(1) If percent cover of seeded or other desirable species is greater than 70%, expand plots to treat additional area and continue to evaluate sites each year for maintenance needs. (2) If percent cover of seeded or other desirable species is less than 70% and undesirable species are not present or less than 10% total cover, re-seed with native species. Consider adding soil amendments such as compost or mulch if appropriate. (3) If percent cover of seeded or other desirable species is less than 70% and undesirable species are present and greater than 10% total cover, try to determine causes and consider re-treatment with solarization fabric or chemical control once causes have been identified.	Based on general observations made in 2014, both undesirable and desired species are present in all temporary solarization plots. Bluejoint reedgrass ³ is the dominant species in all plots. Willows that naturally colonized plot 1 have grown 1 to 3 feet. Willow cuttings planted in plots 2 and 3 have high survival but are heavily browsed. The small enclosure fences placed around these plots have collapsed and are not effectively protecting the willows. Cover of seeded or desirable species remains greater than 70% in Plots 1 and 2. Plot 1 has not been expanded because the vegetation surrounding the plot is dominated by desired species, primarily sedges. Plot 2 has not been expanded because killing the reed canarygrass along the channel will result in bank instability. Plot 3 has been expanded twice. Cover of	In 2014, no additional actions were taken at these sites. In 2015, no additional monitoring or maintenance is required. Future actions could include: spraying undesirable grasses that colonize these areas (this has not been done to this point for fear of off target damage and the dominance of these species in areas next to the plots); installing additional willow cuttings or containerized plants; and installing 8 or 10-foot enclosures around each plot.

Treatment ¹	Decision Pathway for Maintenance and Adaptive Management ²	2014 Effectiveness Monitoring Results	Adaptive Management, Completed Actions and Future Recommendations Based on Monitoring
		seeded and desirable species in Plot 3 is near 70% and undesirable species in this plot should be removed.	
<i>Vegetated Soil Lift</i>	(1) If willow shoot height remains below 3 feet and overall percent cover is not increasing, apply chemical barriers to browse. (2) If willow shoot height is greater than 3 feet or density appears the same or increasing take no further action.	Based on general observations made in 2014, willow cover is near 100 percent on both soil lifts. Willows continue to be browsed but cover remains high and willow cuttings appear robust. Willows are providing bank stability and in-stream shade and cover. Although the riparian protection fence was down in many areas, there was less browse observed on soil lift 2 located within the fenced area.	In 2014, no additional actions were taken at these sites. In 2015, no monitoring or maintenance is required. No future actions are needed.
<i>Willow Fascines</i>	Take no further action.	Based on general observations made in 2014, intact willow fascines have trapped sediment and debris and are functioning to build depositional features within the channel margins and provide substrate for colonizing vegetation. Most fascines are buried with gravels and fine sediment. Some fascines have grown into small, dense willow clumps within the channel margins and are providing shade and cover.	In 2014, no additional actions were taken at these sites. In 2015, no monitoring or maintenance is required. Future actions could include installation or more fascines or willow stakes along the channel.
<i>Large Woody Debris Structures</i>	(1) If species composition adjacent to structures appears to have shifted, repeat transect monitoring to evaluate trend. (2) If species composition adjacent to structures appears not to have changed, continue to make annual visual observations of treatment effectiveness.	Based on general observations made in 2014, wood structures are promoting prolonged floodplain inundation during high flow events and elevating the water surface during base flows. Species composition adjacent to structures has shifted to an overall wetter species composition based on re-monitoring of vegetation transects that occurred in 2012. Wood structures are creating variable channel depths and increasing substrate	In 2014, no additional actions were taken at these sites. In 2015, no monitoring or maintenance is required. Future actions could include installing willow cuttings in the banks and sediment deposition in and around these structures.

Treatment ¹	Decision Pathway for Maintenance and Adaptive Management ²	2014 Effectiveness Monitoring Results	Adaptive Management, Completed Actions and Future Recommendations Based on Monitoring
		diversity in the channel. Some willows have colonized deposition along channel margins.	
<i>Coir Logs</i>	(1) If willow shoot height remains below 3 feet and overall percent cover is not increasing, apply chemical barriers to browse to allow willows to grow and become more resistant to browse. (2) If willow shoot height is greater than 3 feet or density appears the same or increasing take no further action.	Based on general observations made in 2014, willow cover continues to be variable overall, but has increased at most sites. Some sites have formed continuous dense bands of willows along the channel margin. Coir logs remain structurally intact and the channel is deepening below the logs at most sites.	In 2014, no additional actions were taken at these sites. In 2015, no monitoring or maintenance is anticipated. Repair and maintenance of the riparian protection fence should promote willow growth at these sites. Future actions could include installing supplemental willow cuttings behind the coir logs where cover is low.
<i>Herbicide Application</i>	(1) If noxious weed infestations are documented, continue to treat infestations. (2) Continue to monitor for new infestations of Canada thistle, reed canarygrass, yellow toadflax, houndstongue, sulfur cinquefoil and any new weed species.	Herbicide applications have been effective at controlling most target species. The primary species that remain a concern are Canada thistle and reed canarygrass. Small infestations of houndstongue near the lower end of the project are also a concern. Within the project area Canada thistle is still present but density has been greatly reduced. Significant effort has been made to control the Canada thistle in the hayfield east of the project but there are still dense patches along the road ditch and within the pasture that remain a threat of re-infestation in the project area.	In 2014, treated Canada thistle, houndstongue, yellow toadflax, isolated patches of reed canarygrass at the site. In 2015 continue to treat Canada thistle including areas outside of the project limits, isolated patches of reed canarygrass and all other occurrences of noxious weeds. Observe streambanks where reed canarygrass was treated to evaluate the need for revegetation or other stabilization measures. Specific objectives related to weed control should be developed.

¹ See Figure 1 for treatment locations, and see previous reports for descriptions of treatments.

² From 2010 Report Adaptive Management Recommendations section.

³ Note that previous reports indicated that redtop (*Agrostis stolonifera*) was the dominant species in temporary solarization plots but it was later confirmed to be bluejoint reedgrass (*Calamagrostis canadensis*).

Residual Shrub Protection

General observations of shrubs that were planted in 2003 during channel restoration and fitted with browse protectors in subsequent years were made in August 2014. Browse protectors were added to residual shrubs in 2008, 2009, 2010, 2011, and 2012. Many of the residual shrubs fitted with browse protectors outgrew the protectors, resulting in removal or expansion of many of the protectors in 2010, 2011 and 2012. This on-going maintenance of browse protectors was costly so in 2013, a 10 foot tall riparian protection fence was installed around the perimeter of Phase I and a portion of Phase III to protect the project area from browse and allow removal of the browse protectors from within the fenced area. In 2014, residual shrubs continued to expand both in size and area occupied. Many of the residual shrubs are now providing shade for the stream and habitat for birds and wildlife. Figure 3, Figure 4 and Figure 5 show how residual shrubs have increased in size and the area they occupy. Figure 5 shows an area in Phase I where residual sandbar willow have suckered and young willow are now present throughout a large area of an inside meander bend. Despite the natural expansion of these plants, many continued to be suppressed by browse protection measures. In September 2014, using volunteer labor, all of the browse protectors were removed from Phase I within the fenced area.

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for residual shrub protection include:

- In 2014, repair riparian protection fence to ensure it adequately protects establishing woody vegetation.
- In 2014, remove as many of the browse protectors and small exclosures from within the fenced area as possible.
- In 2015, remove all remaining browse protectors from within the fenced area to allow shrubs to expand naturally and repair, expand or replace browse protection outside of the fenced area as needed.
- In 2015, repair riparian protection fence as needed.



Figure 3. Residual shrubs, seen in the background, that have formed dense clumps.



Figure 4. Since being protected from browse, residual shrubs have grown significantly and now provide shade and overhanging vegetation in some stretches of the project area.



Figure 5. Inside meander across from Phase I planting unit 3 where residual sandbar willow have suckered and expanded significantly.

Containerized Planting

In 2014, survival monitoring of containerized plants was conducted in four planting units in Phase III. Repeat photos and general observations were made for all planting units in Phase I and Phase III. Planting units monitored in Phase III included three plots that have been monitored since 2010 and the one planted solarization plot that was monitored in 2013. The Phase III plots were selected to include the range of survival observed in previous years (i.e. plots with high and low survival were selected to re-monitor).

Table 3 shows the results of Phase III 2014 survival monitoring by planting unit. Within the four plots monitored, total survival ranged from 82 percent to 27 percent. Survival did not change much between 2013 and 2014. Unit 10 remained the same at 73%. Survival in Unit 12, which consistently had the lowest survival, decreased from 35% to 27%. Unit 2 and Unit 15 both decreased 5%. Table 4 provides a breakdown of all the species in each of the monitored plots. Appendix D provides photos of Phase III planting units from 2010 to 2014.

The causes for the lower survival in Phase III still remain uncertain. Survival decreased the most between August 2011 and August 2012. The initial growing season (2011) was very wet with standing water late into the growing season in many of the Phase III planting units. This may have had an effect on root development of newly planted shrubs that affected growth and survival in 2012. Vole damage was also observed in 2012 and 2013, but did not appear to be an issue in 2014. General observations of other planting units indicate that survival remained relatively similar between 2013 and 2014 as it did in the monitored plots.

At this point in the project life, it has been determined that survival is no longer a useful metric for Phase I. Surviving trees and shrubs in Phase I continue to grow and create the riparian habitat desired along the channel. As stated in the 2012 and 2013 Monitoring Reports, the project is trending toward meeting the goals and objectives and therefore the level of effort for monitoring was decreased. Appendix A provides photos of select Phase I planting units from 2008 through 2014.

The herbaceous vegetation in both Phases I and III remains a mix of pasture grasses, sedges, rushes, native grasses, and native forbs. In general, the cover of native, wetter species continues to increase in both Phases I and III (Figure 6). The lower end of Phase I and upstream portion of Phase III support large areas dominated by sedges. One major difference observed in herbaceous cover was in Unit 6 which in the past has been saturated or inundated and had dense cover of native sedges, however, in 2014 this area was dry and much of the sedge cover had turned brown and appeared dead. Small patches of reed canarygrass were found in this area for the first time (Figure 7). Unit 6 is located just upstream of the hayfield drainage ditch that was dug by the landowner in 2012. This observation indicates that the drainage ditch is likely having at least localized effects on the hydrology within the project area.

Table 3. Phase III survival by planting unit. Percent survival for each year is based on the original number of plants installed in each unit.

Phase III Planting Unit	2011 Survival	2012 Survival	2013 Survival	2014 Survival
Planting Unit 2	100%	58%	56%	51%
Planting Unit 10	100%	93%	73%	73%
Planting Unit 12	92%	51%	35%	27%
Solarization Unit 15	N/A	N/A	87%	82%

Table 4. Actual numbers of surviving plants for Phase III Planting Units 2, 10 and 12 from 2011 through 2014 and the percent survival in 2014 based on 2010 as-built data.

Scientific Name	Common Name	2010 As-built	2011	2012	2013	2014	2014 % Survival by Species
Unit 10		30	30	28	22	22	
<i>Betula occidentalis</i>	water birch	3	3	2	0	0	0%
<i>Cornus sericea</i>	red osier dogwood	5	6	6	6	6	120%*
<i>Populus tremuloides</i>	quaking aspen	3	2	2	1	1	33%
<i>Salix bebbiana</i>	Bebb willow	2	2	2	2	2	100%
<i>Salix boothii</i>	Booth's willow	4	4	3	2	2	50%
<i>Salix drummondiana</i>	Drummond's willow	8	8	9	8	8	100%
<i>Salix exigua</i>	sandbar willow	5	5	4	3	3	60%
Unit 12		37	34	19	13	10	
<i>Betula occidentalis</i>	water birch	4	4	1	1	1	25%
<i>Cornus sericea</i>	red osier dogwood	8	7	2	1	1	13%
<i>Populus tremuloides</i>	quaking aspen	4	3	2	0	0	0%
<i>Salix bebbiana</i>	Bebb willow	2	4	1	0	0	0%
<i>Salix boothii</i>	Booth's willow	4	3	1	1	1	25%
<i>Salix drummondiana</i>	Drummond's willow	9	7	6	5	4	44%
<i>Salix exigua</i>	sandbar willow	6	6	6	5	3	50%
Unit 2		45	45	26	25	23	
<i>Alnus incana</i>	mountain alder	3	3	3	3	3	100%
<i>Amelanchier alnifolia</i>	Western serviceberry	3	3	0	0	0	0%
<i>Cornus sericea</i>	red osier dogwood	5	5	2	1	1	20%
<i>Salix bebbiana</i>	Bebb willow	15	16	7	7	7	47%
<i>Salix boothii</i>	Booth's willow	4	4	1	1	1	25%
<i>Salix drummondiana</i>	Drummond's willow	12	11	11	11	9	75%
<i>Symphoricarpos occidentalis</i>	snowberry	3	3	2	2	2	67%

*Number recorded have been consistent since 2011, however original baseline data collected did not account for 1 individual.



Figure 6. Herbaceous vegetation within some planting units is now dominated by native sedges, such as Phase I planting unit 4 (left photo) and Phase III planting unit 2 (right photo). Others are still dominated by dense pasture grasses.



Figure 7. Photographs of herbaceous vegetation in Phase III planting unit 6 in 2013 (top photo) and 2014 (bottom photo).

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for containerized plantings include:

- In 2014, repair riparian protection fence so that it provides adequate protection for plants.
- In 2014, remove as many of the browse protectors and small exclosures from within the fenced area as possible.
- In 2014, remove vole protectors from all plants in Phase I.
- In 2015, remove all remaining browse protectors from within the fenced area to allow shrubs to expand naturally and repair, expand or replace browse protection outside of the fenced area as needed.
- In 2015, repair riparian protection fence as needed.
- In 2015, continue to encourage the landowner to either fill or place a water control structure on the hayfield ditch to ensure that a high water table is maintained in the adjacent project area.

Planted Solarization

General observations of planted solarization plots were made in August 2014. Herbaceous cover of both seeded and naturally colonizing species in Planted Solarization Plot 1 remains high (Figure 8). Plot 1 is dominated by bluejoint reedgrass (*Calamagrostis canadensis*) and seeded species are also present including tufted hairgrass (*Deschampsia cespitosa*), sawbeak sedge (*Carex stipata*) and daggerleaf rush (*Juncus ensifolius*). Reed canarygrass (*Phalaris arundinacea*) is also present inside the plot, but cover is low. The young willows that colonized the exposed mineral soils in 2012 are still present but are heavily browsed. An overall decline in survival occurred after removal of fabric in 2011, but general observations of survival in 2014 suggest that plant survival remains similar to levels observed in 2013.

In 2014, conditions in Planted Solarization Plot 2 were similar to 2013 (Figure 9). Survival of planted shrubs did not appear to have changed. Sediments deposited on the floodplain in 2012 were being colonized by a mix of grasses, shrubs and weedy species such as mullein. Planted shrubs continue to grow and expand in this plot.

The planted solarization plot in Phase III (unit 15) was installed in fall 2010 and has been in place for four growing seasons. The reed canarygrass under the fabric has been effectively killed. The fine sediments that deposited on top of the fabric during the large spring flow in 2012 continue to support herbaceous vegetation including a mix of native forbs and graminoids and reed canarygrass. The fabric has been effective at limiting competition while the containerized plants became established; however, because this portion of the project area is dominated by reed canarygrass the fabric should stay in place or the bare ground underneath will quickly become colonized by reed canarygrass again. Also, removal of the fabric in other planted solarization plots resulted in collapse and loss of some of the planted shrubs. The plants installed within this unit are thriving despite the patchy recolonization of reed canarygrass and are taller than most of the Phase III plants (Table 3, Figure 10).

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for planted solarization plots include:

- In 2014, no maintenance actions are required. The solarization fabric in Phase III Planting Unit 15 should be left in place permanently to limit the spread of reed canarygrass and encourage
- In 2015, consider removing reed canarygrass through use of herbicide or hand pulling from Planted Solarization Plot 1.
- In 2015, consider installing willow cuttings in Planted Solarization Plot 1 to increase woody vegetation cover.

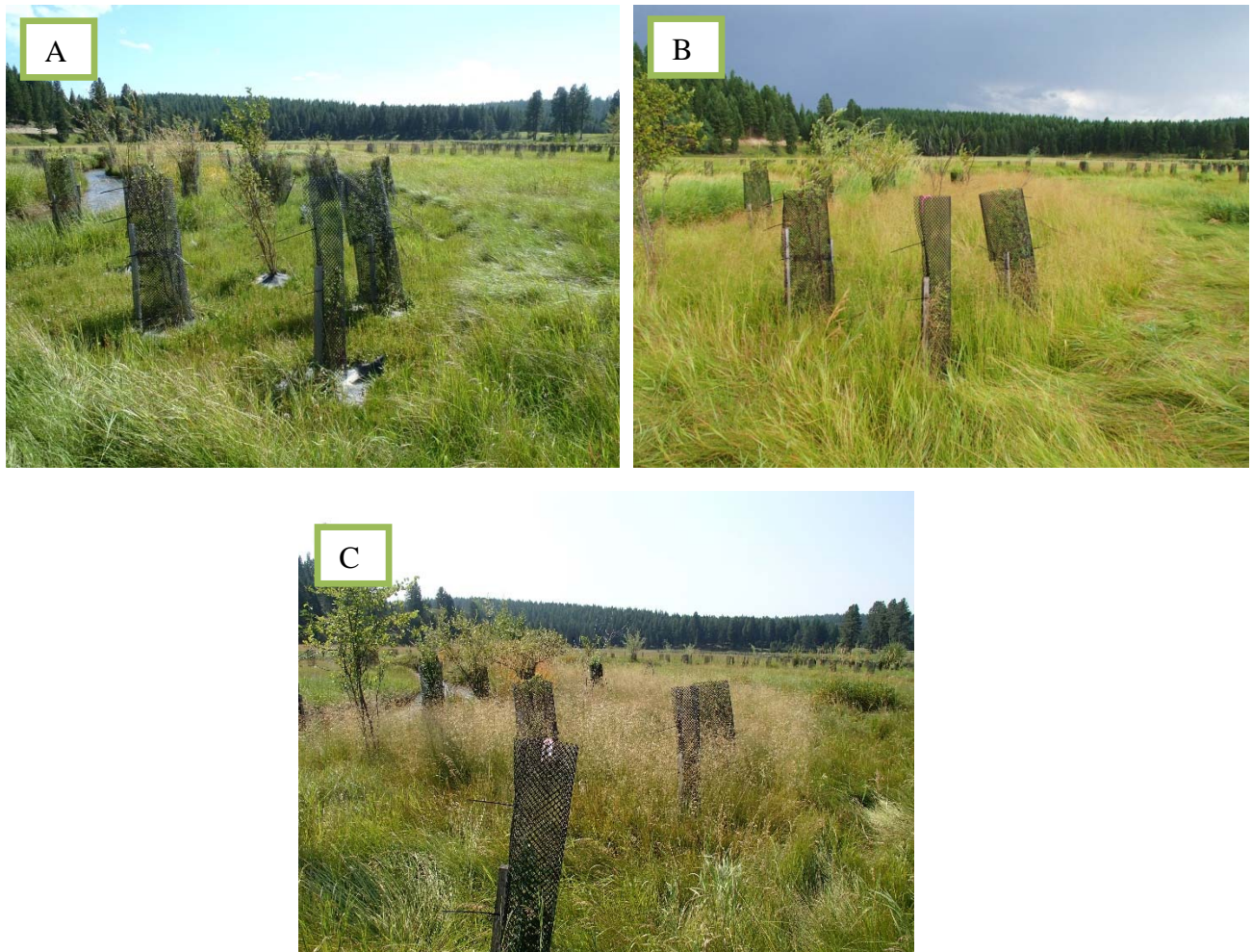


Figure 8. Planted Solarization Plot 1 in August 2012 (A), August 2013 (B) and August 2014 (C). Herbaceous species cover continues to increase and is dominated by seeded species and bluejoint reedgrass.



Figure 9. Overview of Planted solarization Plot 2 in August 2013 (left photo) and August 2014 (right photo). Shrubs, grasses and forbs have begun to colonize the gravel surface.



Figure 10. Phase III planted solarization plot showing the growth of shrubs between 2013 (left photo) and 2014 (right photo). The fabric has provided an advantage for shrub growth by limiting the amount of competition from reed canarygrass even though reed canarygrass dominates the surrounding area.

Temporary Solarization Plots

In 2014, general observations were made of the three temporary solarization plots. In Temporary Solarization Plot 1, conditions observed in 2014 were similar to 2013. This plot is dominated by bluejoint reedgrass and sawbeak sedge. Young willows have colonized this site naturally but are suppressed by browse. The plot is generally surrounded by dense stands of sedges. Figure 11 shows the transition of this plot through the years.

In Temporary Solarization Plot 3, a variety of desirable seeded grasses as well as some recolonization of non-native pasture grass species was observed in 2014. Seeded species observed in 2014 include American mannagrass (*Glyceria grandis*), sawbeak sedge, and daggerleaf rush. Other desirable species that have colonized on their own include Northwest Territory sedge (*Carex utriculata*), field mint (*Mentha arvensis*), and other sedge species. Reed canarygrass is starting to recolonize this plot. Willow cuttings installed in 2012 continue to grow but are suppressed by browse and grasses. The browse protector enclosure installed around this

plot in 2013 has slumped and is doing little to protect the willow cuttings from browse. Figure 12 shows the transition of this plot through the years.

In Temporary Solarization Plot 2, reed canarygrass has started to re-colonize the streamside edge of the plot where there is an existing dense stand of reed canarygrass. Willow cuttings installed in the plot in 2012 are surviving but are heavily browsed. The browse protector enclosure installed around this plot in 2013 has slumped and is doing little to protect the willow cuttings from browse. Desirable species observed in 2014 include bluejoint reedgrass, American mannagrass and field mint. Figure 13 shows the transition of this plot through the years.

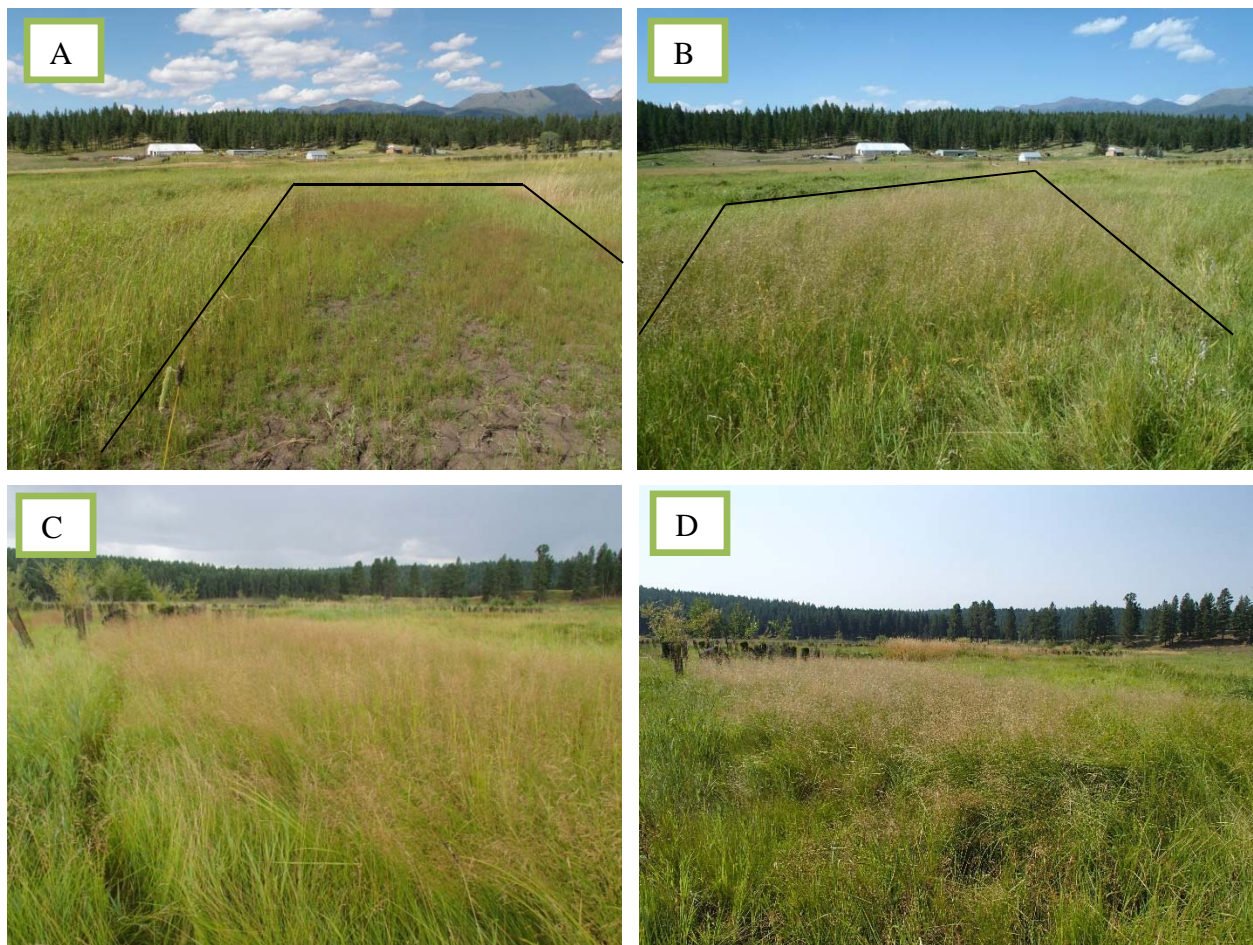


Figure 11. Photograph of Temporary Solarization Plot 1 in July 2011 (A) and in August 2012 (B). Black lines in the figure represent the approximate extents of where the solarization fabric covered the plot. Photo C taken in 2013 (from the opposite direction) shows the dense cover of grasses dominating the plot. Photo D taken in 2014 shows similar conditions in the plot as 2013.

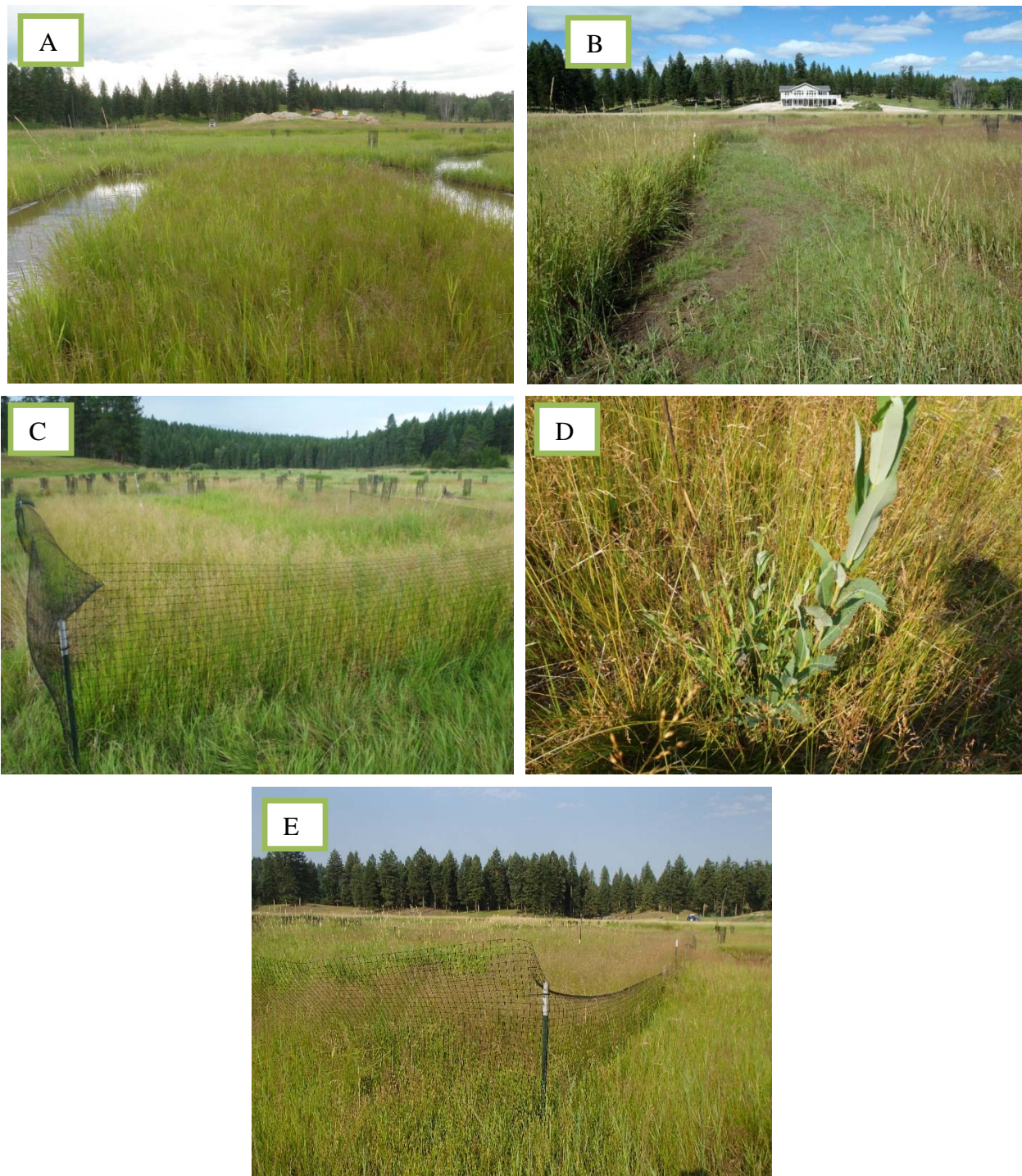


Figure 12. Photograph of Temporary Solarization Plot 3 in 2011 (A) and in 2012 (B). In photo A the area between the standing water is the original plot location that was exposed and seeded in fall 2009. The areas of standing water have fabric under the water that was placed around the original plot. This fabric was removed in fall 2011 and the exposed soil area is shown in photo B. Photo C taken in 2013 (from the opposite direction) shows the browse enclosure and the fully vegetated plot. Photo D was also taken in 2013 shows the growth of willow cuttings that were planted in fall 2012. Photo E shows the plot in 2014.

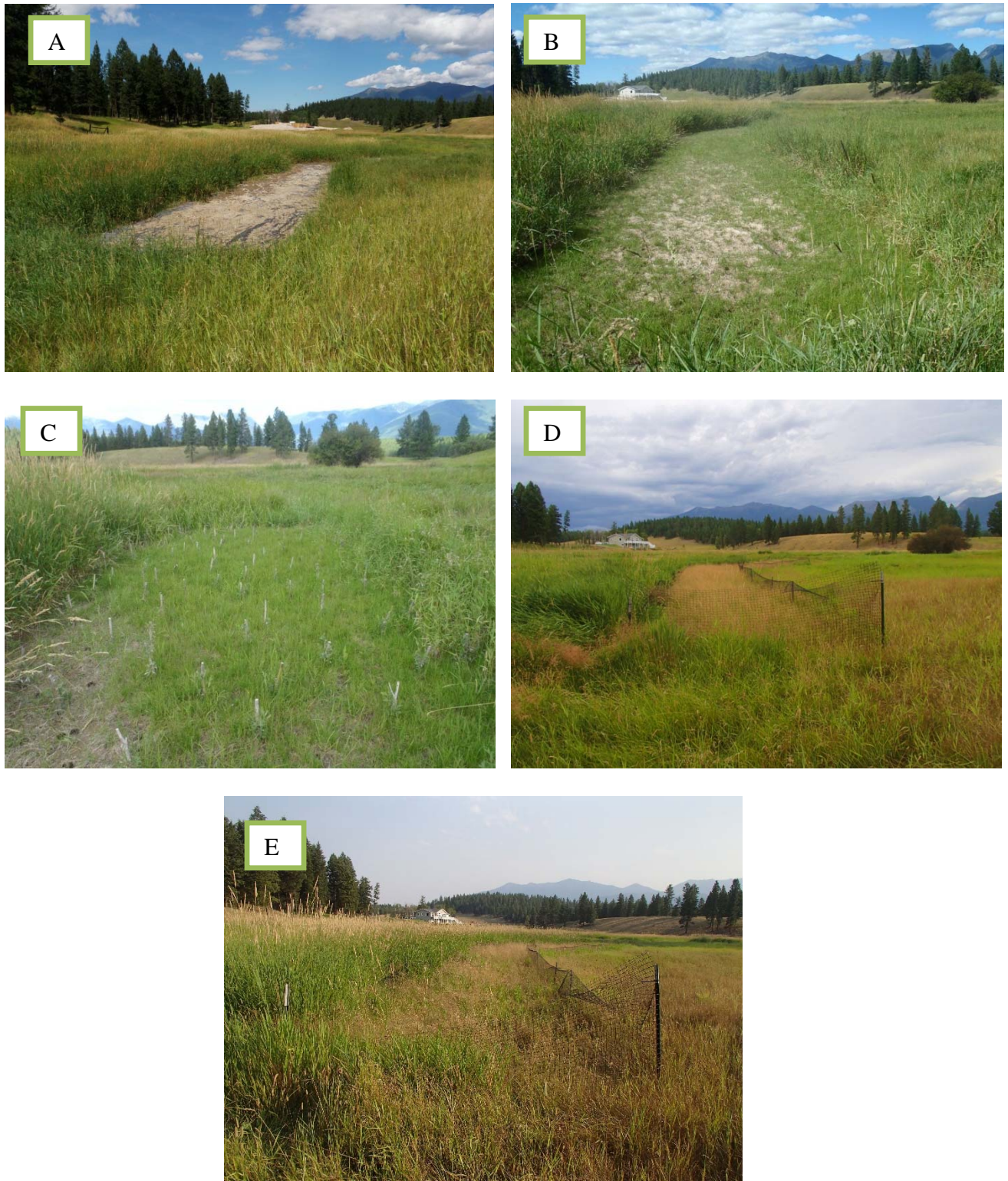


Figure 13. Photograph of temporary solarization plot 2 prior to fabric removal and seeding in fall 2011 (A), in August 2012 one year after fabric removal (B), after willow cuttings were planted in fall 2011(C), in 2013 showing grass cover (D) and in 2014 (E).

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for temporary solarization plots include:

- In 2014, no maintenance actions are required.
- In 2015, consider removing reed canarygrass through the use of herbicide or hand pulling from all temporary solarization plots.
- In 2015, consider installing more effective temporary exclosures around plots 2 and 3 where willow cuttings were installed. These plots are located outside of the riparian protection fence installed in November 2013.

Vegetated Soil Lifts

In 2014, general observations were made of both vegetated soil lifts. Willow cover appears to continue to increase resulting in a dense band of woody vegetation immediately along the channel at both sites (Figure 14 and Figure 15). Willows on Vegetated Soil Lift 1 continue to be stunted by browse. Willows on Vegetated Soil Lift 2 still show signs of browse but much less compared with site 1. The riparian protection fence installed in fall 2013 includes Vegetated Soil Lift 2 and therefore this site was partially protected during the 2014 growing season. Appendix B provides a photo series for each site from 2008 through 2014.

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for vegetated soil lifts include:

- In 2014, repair riparian protection fence to reduce browse on vegetated soil lift 2.
- In 2015, repair riparian protection fence as needed.
- No additional maintenance or monitoring of these structures is anticipated.



Figure 14. Photographs of vegetated soil lifts in 2013 and 2014. The top photos are of Vegetated Soil Lift 1 and the bottom photos are of Vegetated Soil Lift 2. The riparian protection fence that was installed in fall 2013 includes Vegetated Soil Lift 2.



Figure 15. Dense willow growth overhanging channel at Vegetated Soil Lift 2.

Willow Fascines

In 2014, general observations were made of all willow fascines that could be relocated. Observations in 2014 were similar to previous years. The only noticeable difference in willow fascines in 2014 was the increased height of the willows located within the riparian protection fence (Figure 16). The riparian protection fence was installed in fall 2013 and although much of it was down during the 2014 growing season it appears to have provided some reduction in browse pressure within the fenced area.

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for willow fascines include:

- In 2015, repair riparian protection fence as needed.
- No additional maintenance or monitoring of these structures is anticipated.



Figure 16. Willow fascine located within the riparian protection fence in 2013 prior to protection and 2014 after protection. Although the fence was down in many places in 2014, willows were partially protected from browse and showed increases in height.

Large Woody Debris Structures

In 2014, general observations were made of all large woody debris structures. These structures continue to function as they have in previous years providing increased floodplain connectivity; creating diverse in-stream habitat for fish and other aquatic species; and creating bare surfaces for new vegetation to colonize. The few willow seedlings observed along the margins of these structures are still present and continue to grow. Figure 17 shows the condition of the structures and surrounding area in 2014.

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for large woody debris structures include:

- No additional maintenance or monitoring of these structures is anticipated.

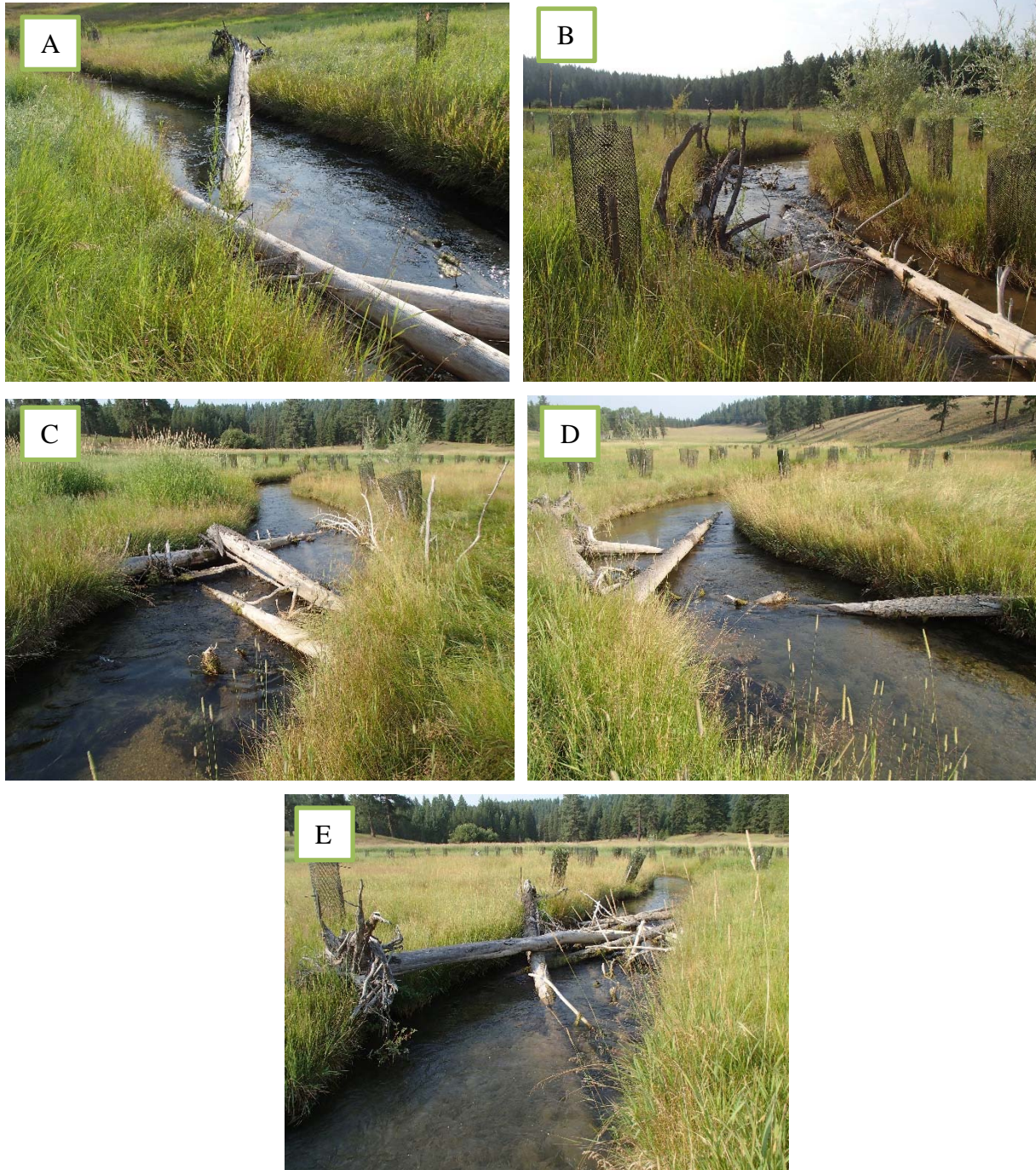


Figure 17. Large woody debris jams 1 through 5 (A through E). The various sediment, gravel and organic debris deposition patterns, both within the channel and along channel margins, can be seen in some of the photos. Smaller debris continues to accumulate on top of the structures.

Coir Logs

In 2014, general observations were made of all coir log sites. Observations in 2014 were similar to previous years. The only noticeable difference in coir logs in 2014 was the increased height of the willows on some structures (Figure 18). All of the coir log structures are located inside of the riparian protection fence. The fence was installed in fall 2013 and although much of it was down during the 2014 growing season it appears to have at least reduced the browse pressure within the fenced area.

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for coir logs include:

- In 2015, repair riparian protection fence as needed.
- No additional maintenance or monitoring of these structures is anticipated.



Figure 18. Coir Log 3 and willow fascine on inside bend (across from planting unit 11) showing increased height of willow cuttings.

Weed Control

In August 2014, general observations of remaining weed infestations in the project area were made. Noxious weed densities in the project area are significantly reduced since 2008 when weed control efforts began. Canada thistle (*Cirsium arvense*) is still present but is sparse. A large infestation of Canada thistle is still present in the hayfield to the east of the project area and remains a threat to re-infestation of the project area. Other noxious weeds identified in the project area include yellow toadflax (*Linaria vulgaris*) and houndstongue (*Cynoglossum officinale*). Yellow toadflax is found sporadically below the access road (Figure 19).

Houndstongue is present primarily above the access road and in the lower portion of the project area. The only other invasive species identified in the project area that is targeted for control is common mullein (*Verbascum thapsus*), which is also found sporadically below the access road. This species is not a high priority but is selectively treated as it occurs with noxious weeds. Perennial pepperweed (*Lepidium latifolium*), a noxious weed, was identified in the Phase III area in 2013 and treated. It was not found in 2014. Reed canarygrass, an invasive species, also remains widespread and continues to spread throughout the project area. Herbicide treatment of

small clumps of reed canarygrass has been somewhat effective for limiting spread of reed canarygrass in the floodplain at the upstream end of the project area; however, small clumps still occur throughout the project area and the density of the plant is increasing along streambanks. Large infestations remain in the lower portion of the project area along the current Therriault Creek channel, the old channel, and irrigation ditch features. Due to the extent of these infestations and the location immediately along the channel, the infestations in the lower end of the project have not been treated.

Weed control has been completed annually at the site since 2008. Weed management has consisted of primarily herbicide application due to the extent of infestations and the presence of multiple target species. In 2014, weed control continued to target all occurrences of noxious weeds in the project area along with discrete patches of reed canarygrass. Forestoration, Inc. completed the weed control in August, 2014. Transline® was applied at a rate of ½ ounce/gal with backpack sprayers and an ATV to treat Canada thistle. Approximately 30 acres of thistle were treated including all of the project area and as much of the adjacent hayfield as budget would allow. Houndstongue, yellow toadflax and common mullein were treated using Brash® at a rate of 1 oz/gal over 1 acre using backpack sprayers. In addition, many of the houndstongue and mullein seed heads were cut, placed in garbage bags and transported off site. Many of these plants were mature at the time of spraying and this was done to reduce additional seed input to the project area. Roundup® was used at a rate of 2 ½ oz/gallon to treat 3 acres of reed canarygrass using a backpack sprayer (Figure 20). Appendix E provides the spray records and maps showing locations of weed treatment completed in August 2014.

Based on these general observations, previous year's monitoring results, and the pathway for maintenance and adaptive management, 2014 actions and future recommendations for weed control include:

- In 2014, complete weed control targeting all noxious weed species and isolated clumps of reed canarygrass.
- In 2015, continue to conduct annual weed control targeting Canada thistle and other noxious weeds. Canada thistle has been effectively controlled within the project area, but large, dense infestations in the adjacent hayfield continue to be a threat to re-infestation of the project area. Project partners should strongly encourage the landowner to implement weed control activities in areas adjacent to the project. Due to the size and density of this infestation it may require an alternative method of application, such as use of a boom sprayer, for effective control.
- In 2015, continue to treat isolated patches of reed canarygrass in the project area. Reed canarygrass cannot be eradicated from the site but selective control has prevented spread in the floodplain at the upstream end of the project area. Despite control efforts, reed canarygrass is increasing in all areas of the project. For areas where reed canarygrass has been killed, supplemental revegetation such as seeding or bank stabilization may be required (Figure 21). Evaluate and implement these treatments as needed in 2015.
- In 2015, develop specific criteria with project partners for when control of noxious weeds and reed canarygrass in the project area is sufficient.



Figure 19. Young yellow toadflax plants in dense grasses and sedges below the access road near the upstream end of the project area (photo left) and mature houndstongue plant at the downstream end of the project (photo right).



Figure 20. Clump of reed canarygrass treated with Roundup® in 2014.



Figure 21. Area of treated reed canarygrass along a streambank. These areas may require additional revegetation.

Completed 2014 Maintenance

During 2014 monitoring, a number of maintenance activities were identified. High priority maintenance needs included: repair and reconstruction of the riparian protection fence; removal of all browse protectors within the riparian protection fence; and removal of all vole protectors from Phase I. As described in the previous sections, other maintenance needs were identified; however, these were a lower priority compared with repair of the riparian protection fence and removal of browse and vole protectors in Phase 1. Therefore, these needs are identified as priorities for 2015 in the previous sections. The riparian protection fence installed in 2013 required repair throughout the entire length of the fence. The exact causes of fence failure are unclear and are probably a combination of snow load and animal pressure that resulted in the angle iron extensions bending causing the netting to sag and collapse (Figure 22). In many areas the netting also broke loose from the cable ties attached to the top of the angle iron extensions.



Figure 22. Photographs of riparian protection fence failure due to bending of the angle iron extensions.

The fence was repaired in October, 2014 by installing ten foot t-posts between existing t-posts. The fence netting was attached to the newly installed ten foot t-posts using a combination of cable ties and 16-gauge tie-wire.

A volunteer effort was organized in September, 2014 to remove individual browse protectors and small enclosures from within the area protected by the riparian protection fence. Geum personnel and FWP completed removal of all of the browse protectors and the highest priority vole protectors from Phase I within the riparian protection fence.

Adaptive Management: Next Steps

This section summarizes recommendations for continued monitoring, maintenance and revegetation activities at the Therriault Creek restoration project site. The Therriault Creek project has been monitored since 2008 and monitoring results and general observations indicate that the project is moving toward meeting goals and objectives (Table 5). The streambanks have woody vegetation that is providing cover for the stream, habitat for birds and small mammals, and promoting the development of a native riparian vegetation community. The site is generally converting to a higher percentage of wetland plants and planted shrubs and trees continue to grow and expand. Observations of wildlife use in the project area continue to increase each year. Figure 23 shows an area at the upstream end of the project in 2006 prior to development of the revegetation plan and implementation of revegetation treatments and the conditions at this same site in 2014. Figure 24 shows examples of the conditions in the middle to lower end of the project site in 2006 and the same area in 2014. Most treatments have been in place for a number of years and no longer require maintenance or annual monitoring. Newer treatments, such as those installed in Phase III still require maintenance but annual monitoring of these treatments is no longer necessary either. Although survival of containerized plants in Phase III has been lower than desired, survival was similar between 2013 and 2014 and it is anticipated that a similar level of survival will continue to occur.



Figure 23. The upstream end of the project reach in 2006 (A) and 2013 (B).



Figure 24. Photos showing the difference in vegetation conditions in the middle to lower end of the project area in 2006 (A and C) and 2014 (B and D).

Table 5. Summary of Therriault Creek Revegetation Project goals and the status of each goal.

Goal	Status
Protect the stability of the restored channel using native woody vegetation	Revegetation treatments including containerized plants, vegetated soil lifts, coir logs, and willow fascines have all increased woody vegetation cover along the streambanks. Woody vegetation is well established along the channel in Phase I and is establishing in much of Phase III. The constructed channel has a high level of stability. Recolonization of the site by dense stands of sedges is also promoting channel stability.
Enhance habitat for native fish populations through use of native woody vegetation	Revegetation treatments including containerized plants, vegetated soil lifts, coir logs, and willow fascines have all increased woody vegetation cover along the streambanks resulting in increased shade, cover, pool depths and increased input of organic material to the channel. Recolonization of the site by dense stands of sedges has also improved aquatic habitat.
Limit invasion and continued spread of Canada thistle and other noxious weeds	Noxious weeds are well controlled within the project area. Infestations of Canada thistle are present outside of the project area.
Protect surviving containerized plantings from initial revegetation efforts	Hundreds of shrubs planted during initial channel restoration activities have been protected and have grown vigorously and are naturally expanding across the floodplain in both Phase I and Phase III.
Create conditions that will promote natural revegetation by native species	Reconnection of the channel with the historic floodplain has been the most effective treatment for creating conditions for natural revegetation of the project. Much of the site is now dominated by desired wetland species that were present in the seed bank within the historic floodplain. Other treatments installed to create conditions for natural revegetation, such as woody debris structures and temporary solarization plots, have generally been effective at creating new, bare surfaces for desired vegetation to establish.

Although effectiveness monitoring is no longer needed, annual site visits should continue to identify maintenance needs and ensure that the project is still trending toward desired conditions. This site visit will determine exact maintenance and revegetation treatment needs, but expected actions are listed below.

The following maintenance is anticipated in 2015:

- Repairs to the riparian protection fence.
- Repair, removal or expansion of browse protectors and small enclosures located outside of the riparian protection fence.
- Removal of remaining browse protectors from within the riparian protection fence.
- Reconstruction of protection fences around temporary solarization plots located outside of the riparian protection fence.

The following revegetation activities are anticipated in 2015:

- Continue to aggressively treat Canada thistle and other noxious weeds in the project area. Specific objectives for weed control should be discussed with project partners.
- Coordinate with the landowner to ensure treatment of dense infestations of Canada thistle in the hayfield to the east of the project area continues.
- Coordinate with the landowner to ensure that the hayfield drainage ditch is filled or fit with an outlet control structure to ensure no further drawdown of the water table in the project area occurs.
- Continue to treat isolated patches of reed canarygrass in the project area. Streambanks where reed canarygrass was treated may show signs of instability if the reed canarygrass that was stabilizing the bank was effectively killed. These areas may require additional revegetation measures such as planting, seeding, or installation of coir logs.
- Install additional willow cuttings or containerized plants in temporary solarization plots; planted solarization plots; around large woody debris structures; and behind coir logs if desired. Additional willow fascines could also be installed.

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Geum Environmental Consulting, Inc. 2013. Therriault Creek Riparian Revegetation 2013 Monitoring and Maintenance Report Contract #140025. Internal Report prepared for Montana Fish, Wildlife and Parks, Libby Montana.

Appendix A: Phase I Select Planting Unit Photographs 2008 through 2014

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Planting Unit 1



2008



2010



2011



2012



2014

Planting Unit 3



2008



2010



2012



2013



2014

Planting Unit 5



2008



2010



2012



2013



2014

Planting Unit 7



2008



2010



2012



2013



2014

Planting Unit 12



2008



2010



2012



2013



2014

Planting Unit 14



2008



2010



2012



2013



2014

Planting Unit 16



2008



2010



2012



2013



2014

Planted Solarization Unit 1



2008



2011



2012



2013



2014

Planted Solarization Unit 2



2008



2011



2012



2013



2014

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**Appendix B: Phase I Select Vegetated Soil Lift
Photographs 2008 through 2014**

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Vegetated Soil Lift 1



2008



2010



2012



2013



2014

Vegetated Soil Lift 2



2008



2010



2012



2013



2014

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**Appendix C: Phase I Select Coir Log Photographs 2008
through 2014**

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Coir Log 1



2008



2010



2012



2013



2014

Coir Log 2



2010



2012



2013



2014

Coir Log 3



2008



2010



2012



2013



2014

Coir Log 4



2008



2011



2012



2013



2014

Coir Log 5



2008



2010



2011



2012



2014

Coir Log 6



2008



2010



2011



2012



2014

Coir Log 7



2008



2011



2012



2013



2014

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Appendix D: Phase III Planting Units Photographs Fall 2010 through 2014

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Planting Unit 1



2010



2011



2012



2013



2014

Planting Unit 2



2010



2011



2012



2013



2014

Planting Unit 3



2010



2011



2012



2013



2014

Planting Unit 4



2010



2011



2012



2013



2014

Planting Unit 6



2010



2011



2012



2013



2014

Planting Unit 7



2010



2011



2012



2013



2014

Planting Unit 9



2010



2011



2012



2013



2014

Planting Unit 10



2010



2011



2012



2013



2014

Planting Unit 11



2010



2011



2012



2013



2014

Planting Unit 12



2010



2011



2012



2013



2014

Planting Unit 13



2010



2011



2012



2013



2014

Planting Unit 14



2010



2011



2012



2013



2014

Planting Unit 15



2010



2011



2012



2013



2014

Planting Unit 16



2010



2011



2012



2013



2014

Planting Unit 17



2010



2011



2012



2013



2014

Planting Unit 18



2010



2011



2012



2013



2014

Planting Unit 19



2010



2011



2012



2013



2014

Planting Unit 20



2010



2011



2012



2013



2014

Planting Unit 21



2010



2011



2012



2013



2014

Planting Unit 22



2010



2011



2012



2013



2014

Planting Unit 23



2010



2011



2012



2013



2014

Planting Unit 24



2010



2011



2012



2013



2014

Appendix E: Weed Control Maps and Spray Records

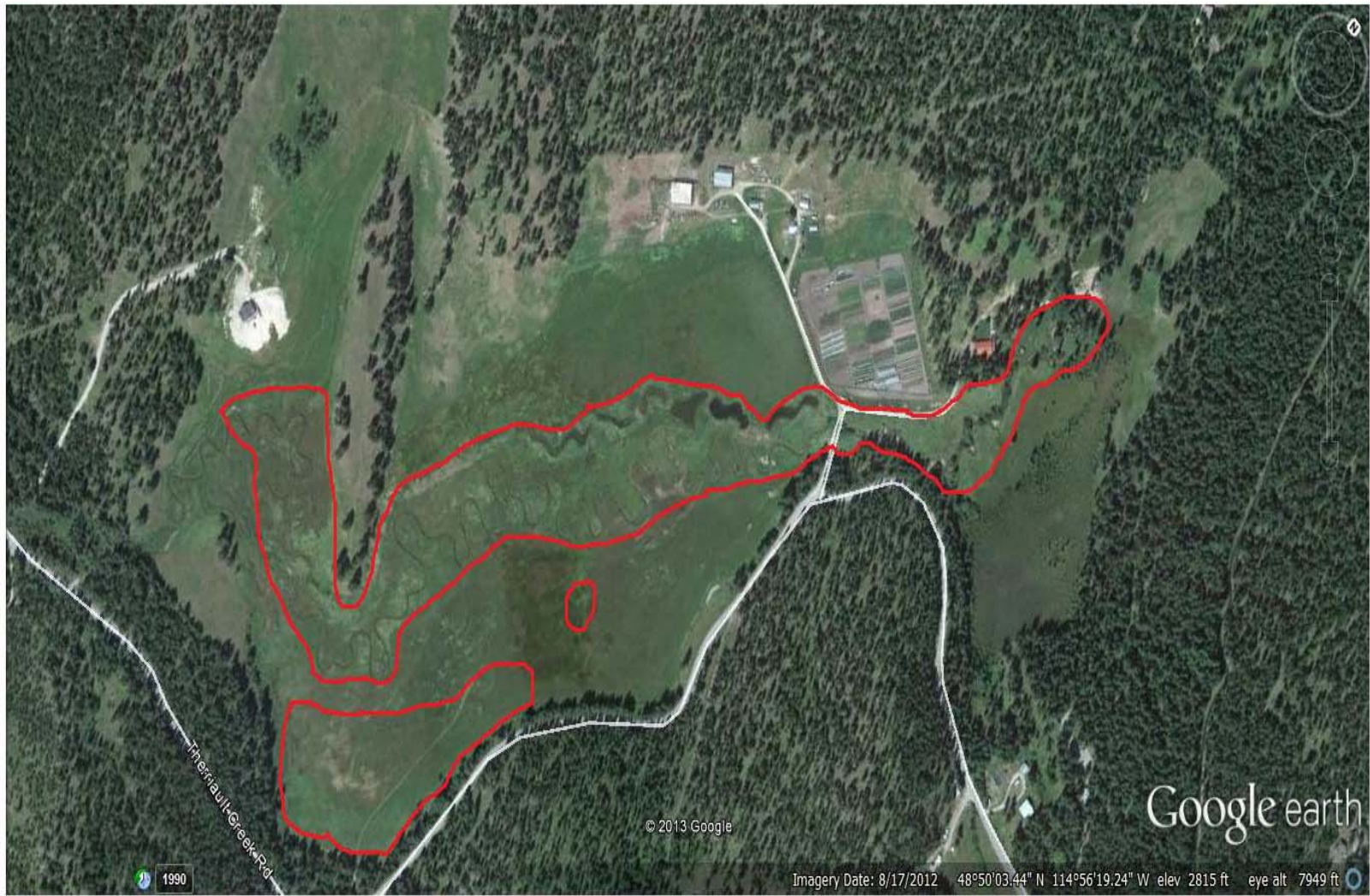
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2014: Area treated for Mullein & Houndstongue



2014: Area treated for RCG



2014: Area treated for Thistle

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 AGRICULTURAL SCIENCES DIVISION
 PO BOX 200201
 HELENA, MT 59620-0201
 Phone: 406-444-5400

DAILY PESTICIDE APPLICATION RECORD

BUSINESS <i>Forestation Inc.</i>	LICENSE# <i>102885-12</i>
NAME <i>Andrew Beltz</i>	ADDRESS <i>PO Box 1093</i>
CITY, STATE, ZIP <i>Whitefish, MT 59937</i>	PHONE <i>(406) 471-7752</i>

CUSTOMER *Geum Consulting* PHONE *(406) 363 2553*
 ADDRESS *307 State Street Hamilton, MT. 59840*

	APPLICATION #1	APPLICATION #2
Applicator/Operator Name	<i>Andrew Beltz, Jan O, Harley M</i>	<i>Andrew Beltz, Harley M, Sherry P.</i>
Date	<i>7/20/14</i>	<i>7/29/14</i>
County	<i>Lincoln Co.</i>	<i>Lincoln Co.</i>
Time Start/Stop	<i>9:30 - 4:30 pm</i>	<i>9:00 - 4:30 pm</i>
Temperature	<i>65° - 90°</i>	<i>65° - 95°</i>
Wind Speed/Direction (from)	<i>6-7 mph W</i>	<i>2-3 mph W</i>
Pesticide Manufacturer	<i>Transline Development</i>	<i>Transline "</i>
Trade Name	<i>Transline</i>	<i>Transline</i>
EPA Reg# or Formulation	<i>62719-259</i>	<i>62719-259</i>
Rate: Product/Diluent Per Acre	<i>1/2 oz / gallon</i>	<i>1/2 oz / gallon</i>
Crop or Site & Crop Stage	<i>Therriault Restoration</i>	<i>Therriault Restoration</i>
Pest(s)	<i>Thistle</i>	<i>Thistle</i>
Equipment Used	<i>ATV sprayer tank & backpacks</i>	<i>backpacks</i>
Acres/Area Treated	<i>10 acres</i>	<i>20 acres</i>

Location #1 <i>Terry Brier on Therriaultak.</i>	COMMENTS/MAP: #1 <i>83 gallons applied</i> #2 <i>23 gallons applied</i>
Location #2	

Page 1 of 4
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DAILY PESTICIDE APPLICATION RECORD

BUSINESS <i>Forestation Inc</i>	LICENSE# <i>102885-12</i>
NAME	ADDRESS
CITY, STATE, ZIP	PHONE

CUSTOMER *Geum Consulting* PHONE _____
 ADDRESS _____

	APPLICATION #1	APPLICATION #2
Applicator/Operator Name	<i>ABM Andrew Bette</i>	<i>Andrew, Riley, Jenno</i>
Date	<i>7/30/14</i>	<i>7/31/14</i>
County	<i>Lincoln</i>	<i>"</i>
Time Start/Stop	<i>9-4:30</i>	<i>8:30-4pm</i>
Temperature	<i>70-95°</i>	<i>"</i>
Wind Speed/Direction (from)	<i>1-5 South</i>	<i>3-4 West</i>
Pesticide Manufacturer	<i>Dow Agrosciences</i>	<i>"</i>
Trade Name	<i>Transline</i>	<i>"</i>
EPA Reg# or Formulation	<i>62719-259</i>	<i>"</i>
Rate: Product/Diluent Per Acre	<i>1/2 oz/gallon water</i>	<i>"</i>
Crop or Site & Crop Stage	<i>Therriault restoration</i>	<i>"</i>
Pest(s)	<i>Thistle</i>	<i>"</i>
Equipment Used	<i>Backpack & ATV</i>	<i>"</i>
Acres/Area Treated	<i>10 acres</i>	<i>"</i>

Location #1	COMMENTS/MAP: <i>ABM</i> <i>Application #1</i> <i>53 gallons applied</i> <i>Application #2</i> <i>100 gallons applied.</i>
Location #2	

Page 2 of 4
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DAILY PESTICIDE APPLICATION RECORD

BUSINESS <i>Forestonation Inc</i>	LICENSE# <i>102085-12</i>
NAME	ADDRESS
CITY, STATE, ZIP	PHONE

CUSTOMER *Geum Consulting* PHONE _____
 ADDRESS _____

	APPLICATION #1	APPLICATION #2
Applicator/Operator Name	<i>Anderson, Riley, John D</i>	<i>"</i>
Date	<i>8/31/14</i>	<i>"</i>
County	<i>Lincoln</i>	<i>"</i>
Time Start/Stop	<i>8-4:30 pm</i>	<i>"</i>
Temperature	<i>70-95°</i>	<i>"</i>
Wind Speed/Direction (from)	<i>3-4 west</i>	<i>"</i>
Pesticide Manufacturer	<i>Agrisolutions</i>	<i>Monsanto</i>
Trade Name	<i>Brash</i>	<i>Round up</i>
EPA Reg# or Formulation	<i>1381-202</i>	<i>71995-25</i>
Rate: Product/Diluent Per Acre	<i>1 oz/gal</i>	<i>2.5 oz/gal</i>
Crop or Site & Crop Stage	<i>Therriault Creek restoration</i>	<i>"</i>
Pest(s)	<i>Mullein, Horned Tongue, ^{Yellow} Tansy</i>	<i>Reed canary grass</i>
Equipment Used	<i>Backpack sprayer</i>	<i>Backpack sprayer</i>
Acres/Area Treated	<i>1 acre</i>	<i>2 acre</i>

Location #1	COMMENTS/MAP: <i>#1 8 gals Brash applied</i> <i>#2 40 gals Roundup applied</i>
Location #2	

Page 3 of 4
 forms/Daily Pesticide App Rec.doc

Compliments of the
 MONTANA DEPARTMENT OF AGRICULTURE
 AGRICULTURAL SCIENCES DIVISION
 PO BOX 200201
 HELENA, MT 59620-0201
 Phone: 406-444-5400

DAILY PESTICIDE APPLICATION RECORD

BUSINESS <i>Forestation Inc</i>	LICENSE# <i>102885-12</i>
NAME	ADDRESS
CITY, STATE, ZIP	PHONE

CUSTOMER *Geum Consulting* PHONE _____
 ADDRESS _____

	APPLICATION #1	APPLICATION #2
Applicator/Operator Name	<i>Andrew Beltz</i>	
Date	<i>8/4/14</i>	
County	<i>Lincoln</i>	
Time Start/Stop	<i>9-12</i>	
Temperature	<i>70-77°</i>	
Wind Speed/Direction (from)	<i>3-5 SW</i>	
Pesticide Manufacturer	<i>Monsanto</i>	
Trade Name	<i>Round up</i>	
EPA Reg# or Formulation	<i>71995-125</i>	
Rate: Product/Diluent Per Acre	<i>2.5 oz/gal</i>	
Crop or Site & Crop Stage	<i>Therriault Creek Restoration site</i>	
Pest(s)	<i>Reed Canarygrass</i>	
Equipment Used	<i>Backpack</i>	
Acres/Area Treated	<i>1 ac</i>	

Location #1	COMMENTS/MAP: <i>16 gallons applied</i>
Location #2	

Page 4 of 4

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