

Final Revegetation Monitoring:

Block P Mill and Tailings Site, MT

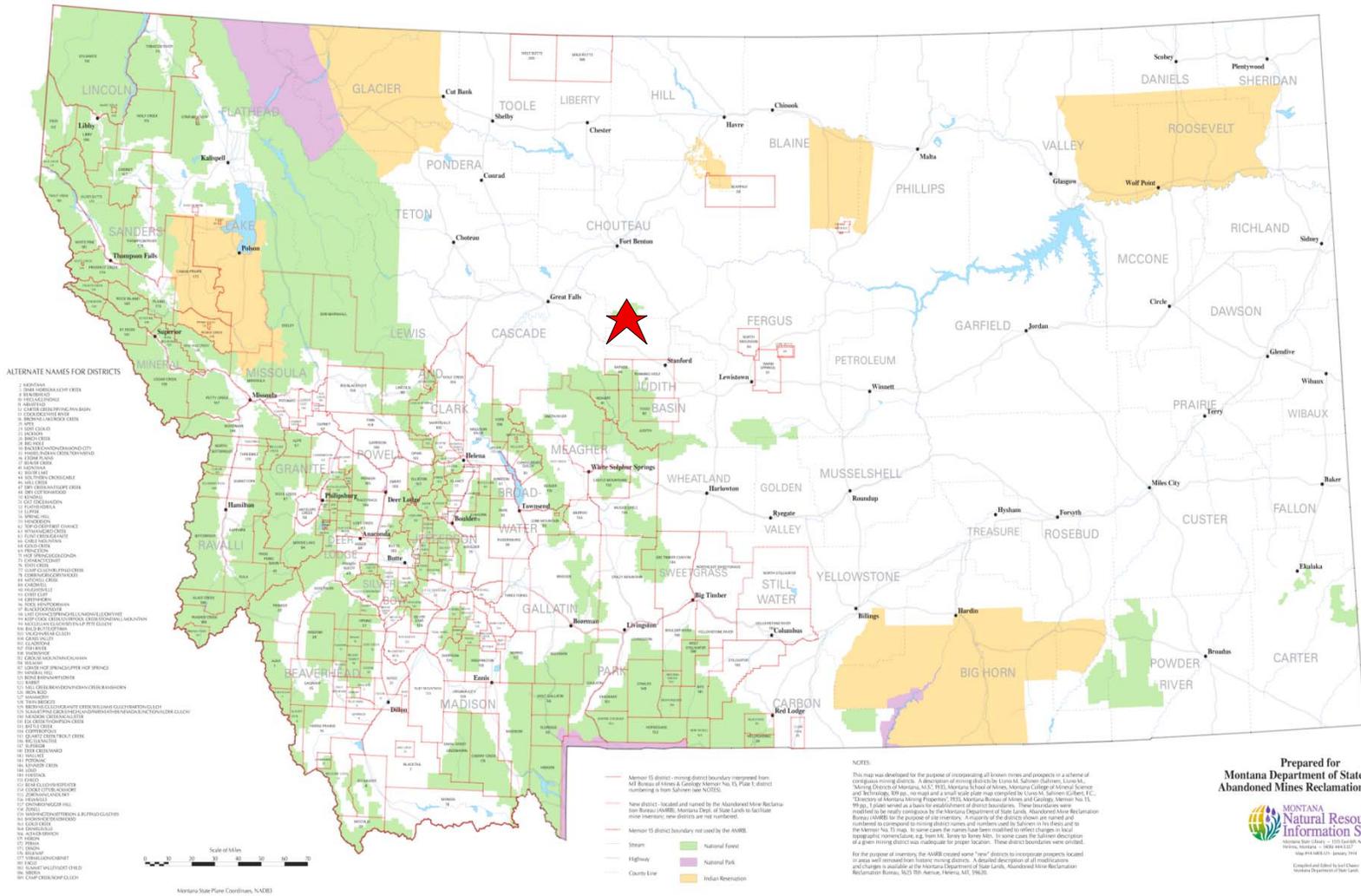


Acknowledgements

- John Carter - The Doe Run Company
- John Hunt - Barr Engineering
- Troy Smith - Arrowhead Reclamation
- Bill Thompson - Ecological Solutions Group LLC
- Bitterroot Restoration, Inc.

Barker-Hughesville Mining District

Mining Districts of Montana



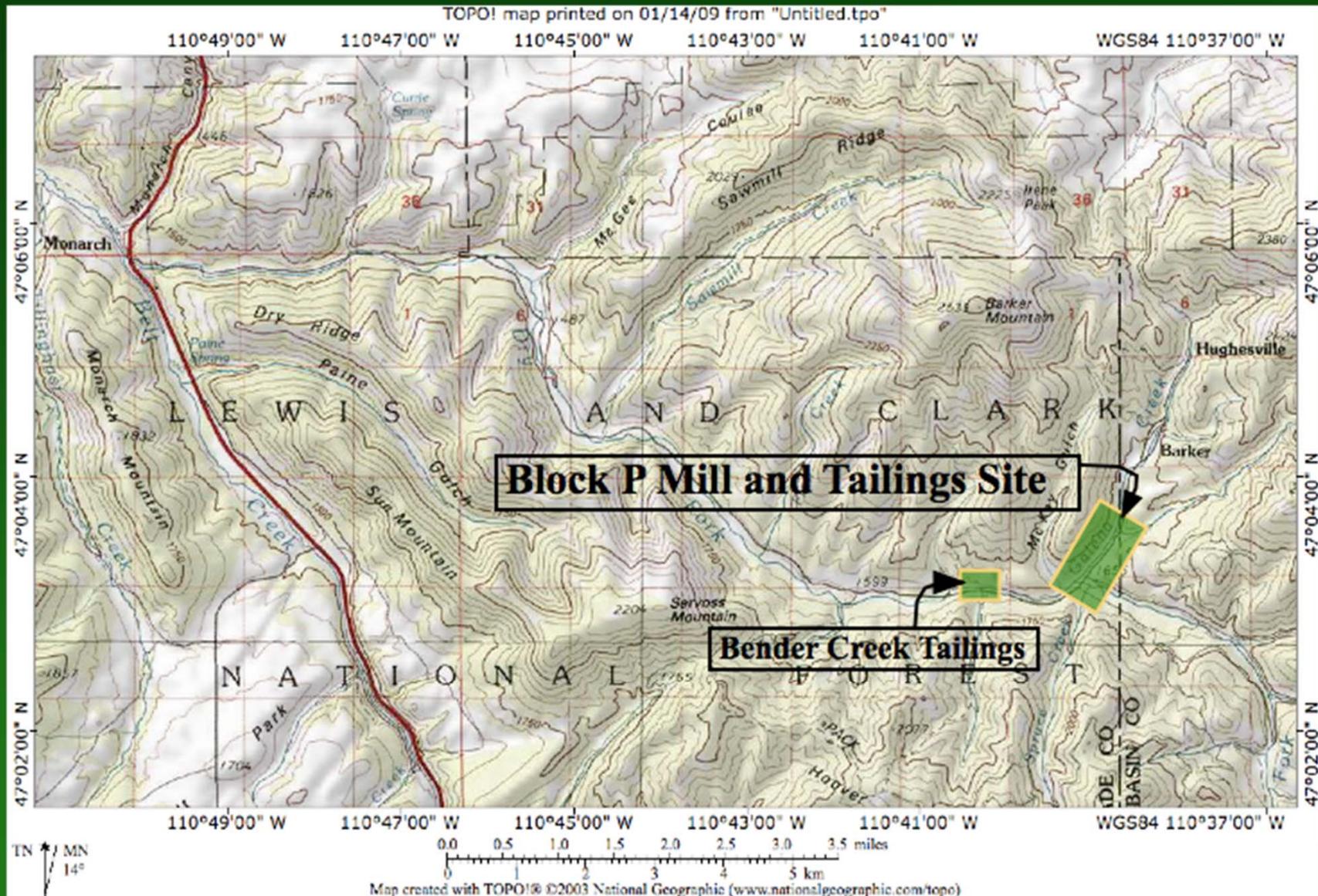
Prepared for
**Montana Department of State Lands
 Abandoned Mines Reclamation Bureau**

**MONTANA
 Natural Resource
 Information System**

Montana State Lands - 1100 Capitol Mall
 Helena, Montana - 59604-2237
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 Montana Department of State Lands

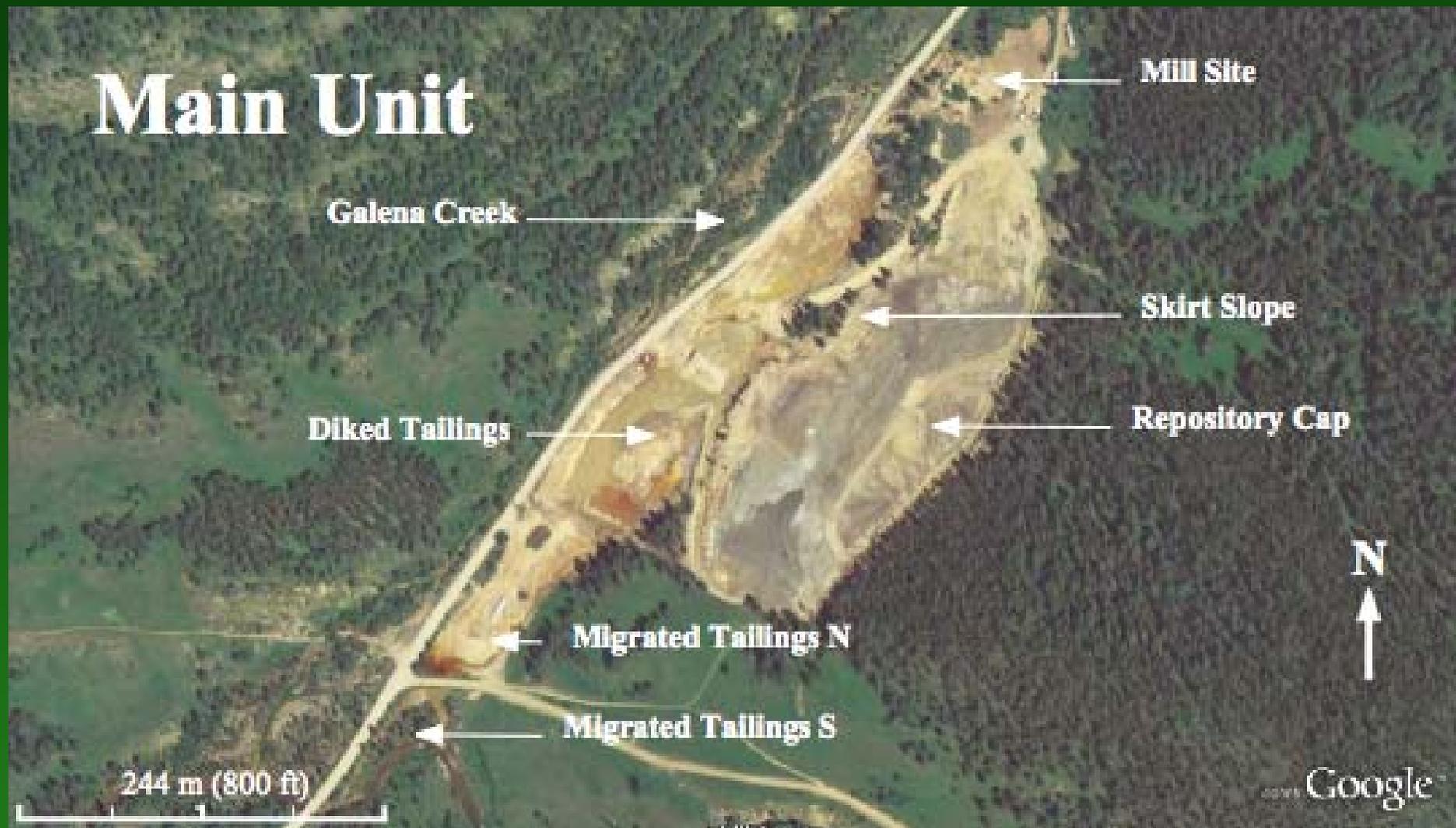
Location—Little Belt Mountains



Block P Mill and Tailings Site, MT:



Zones of Contamination



Repository Cap



Source: MT DEQ 2004

Skirt Slope



Mill Site



Galena Creek



Diked Tailings



Migrated Tailings North



Migrated Tailings South



Block P Mill and Tailings Site, MT:

Bender Creek: Tailings Deposits



Bender Creek Tailings Deposits



Block P Mill and Tailings Site, MT:

**Restoration Planning
and Implementation**

Consolidate, Cap and Cover



Restoration Zones—Block P:

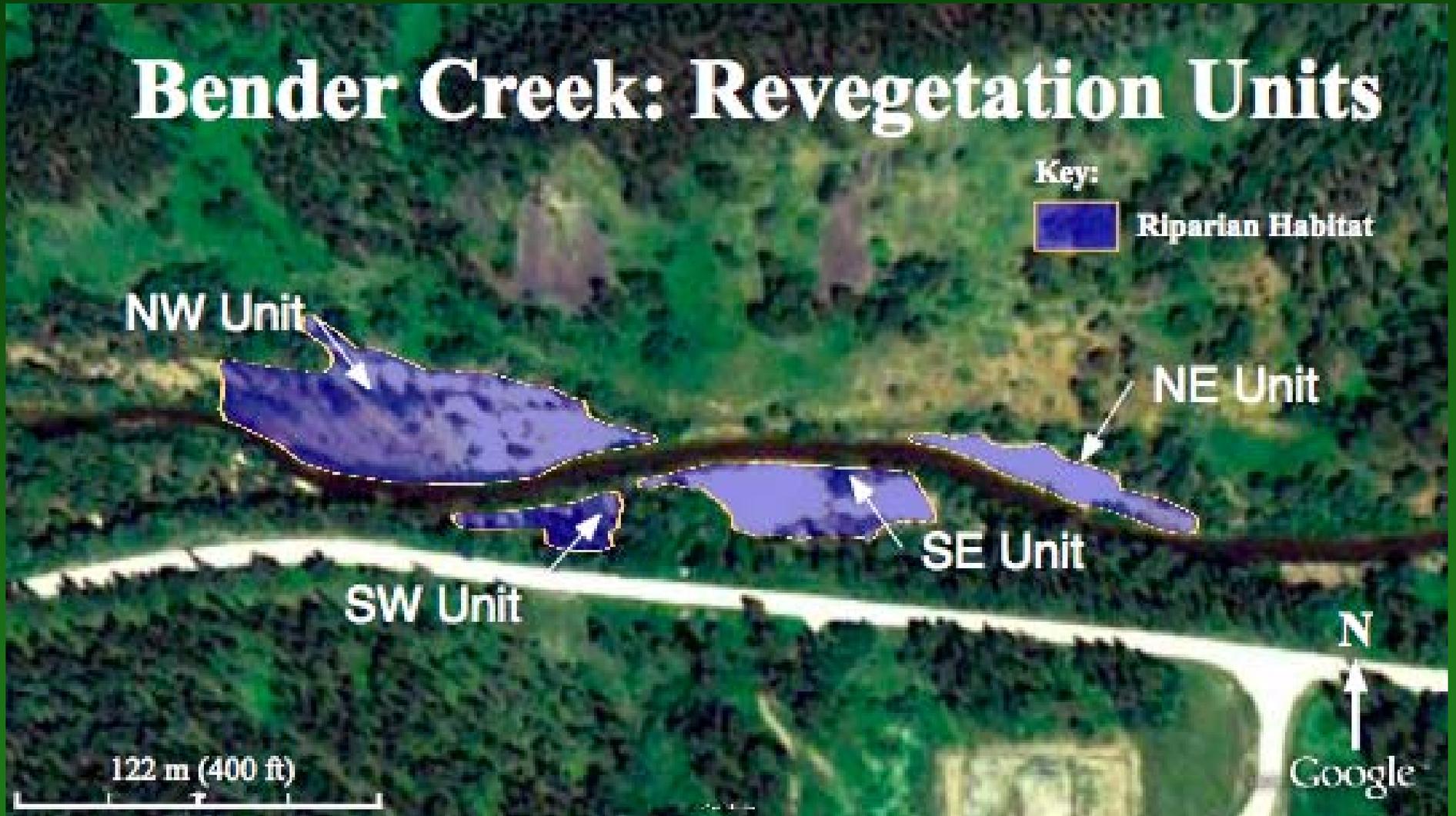


Consolidate, Cap and Cover



Block P Mill and Tailings Site, MT:

Bender Creek: Revegetation Units



Soil Conditions: Post Tailings Removal



Amendments: Lime, Compost, Biosol



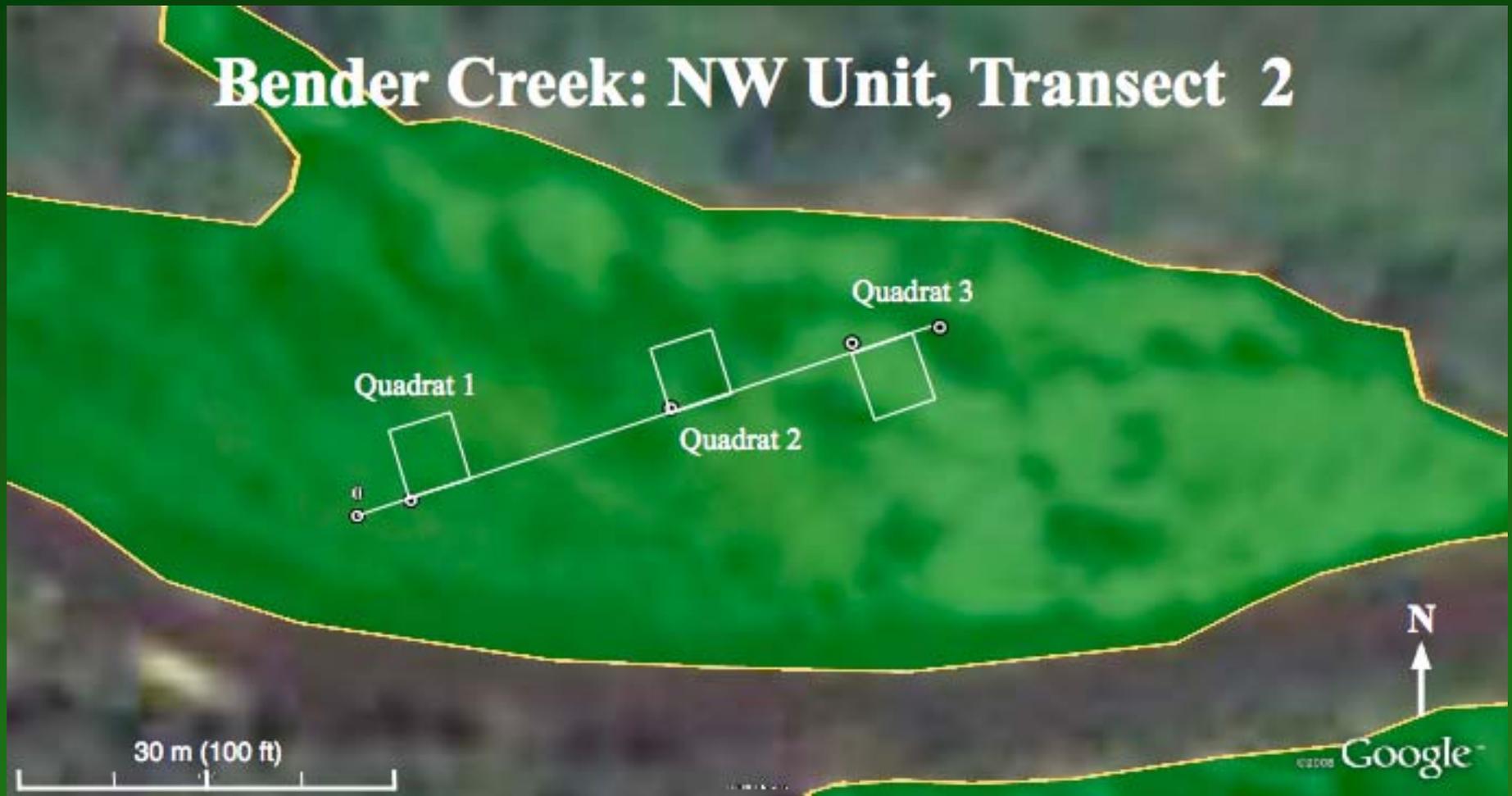
Overwintering



Seeding and Planting



Monitoring

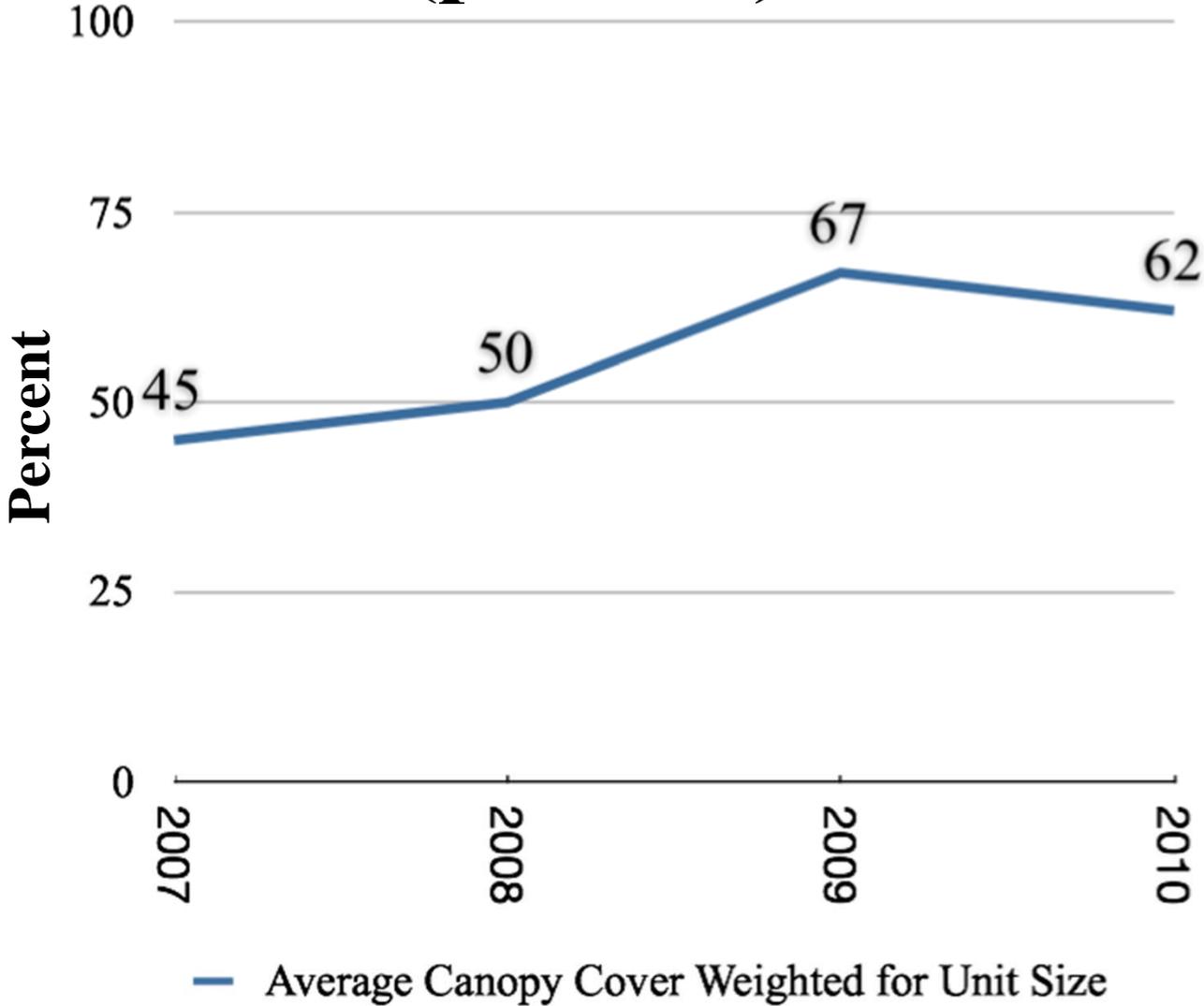


- 12 transects (50 m); 36 quadrates (10 m x 10 m)
- 1.4 percent coverage of project area

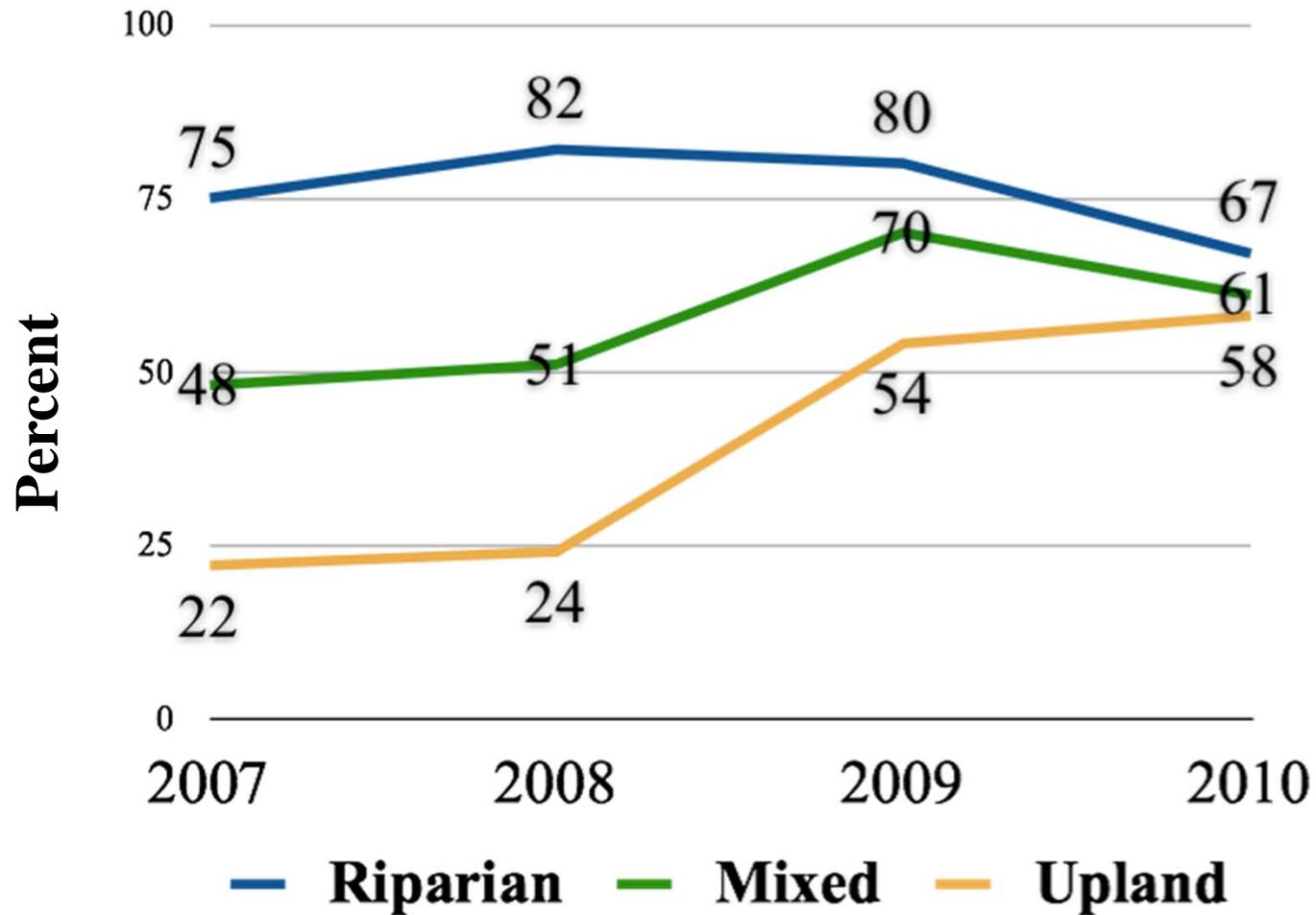
Block P Mill and Tailings Site, MT:

Quantitative Monitoring Results

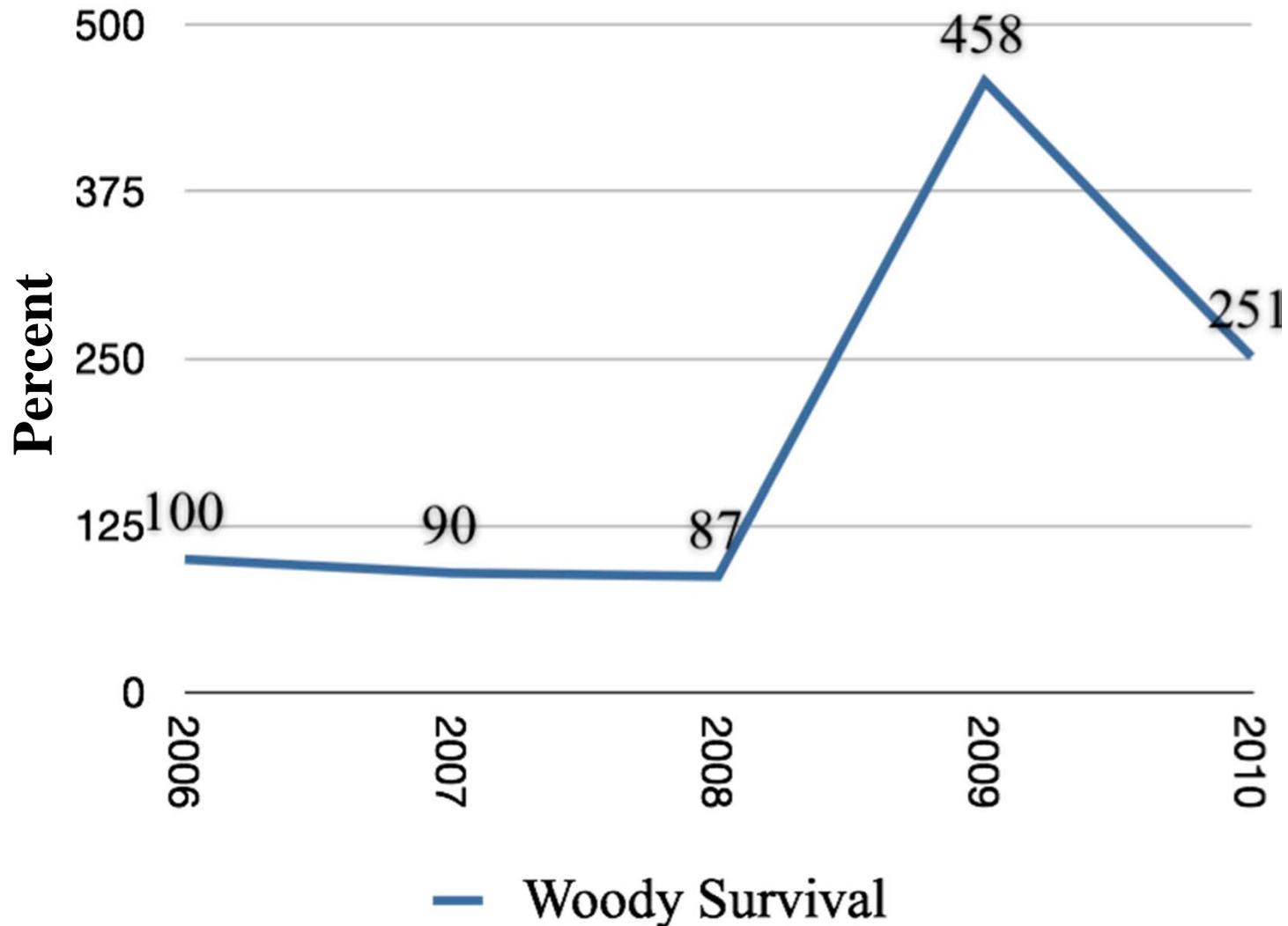
Canopy Cover Weighted for Unit Size (percent)



Canopy Cover by Habitat Type (percent)



Woody Species Survival Weighted by Area (percent)



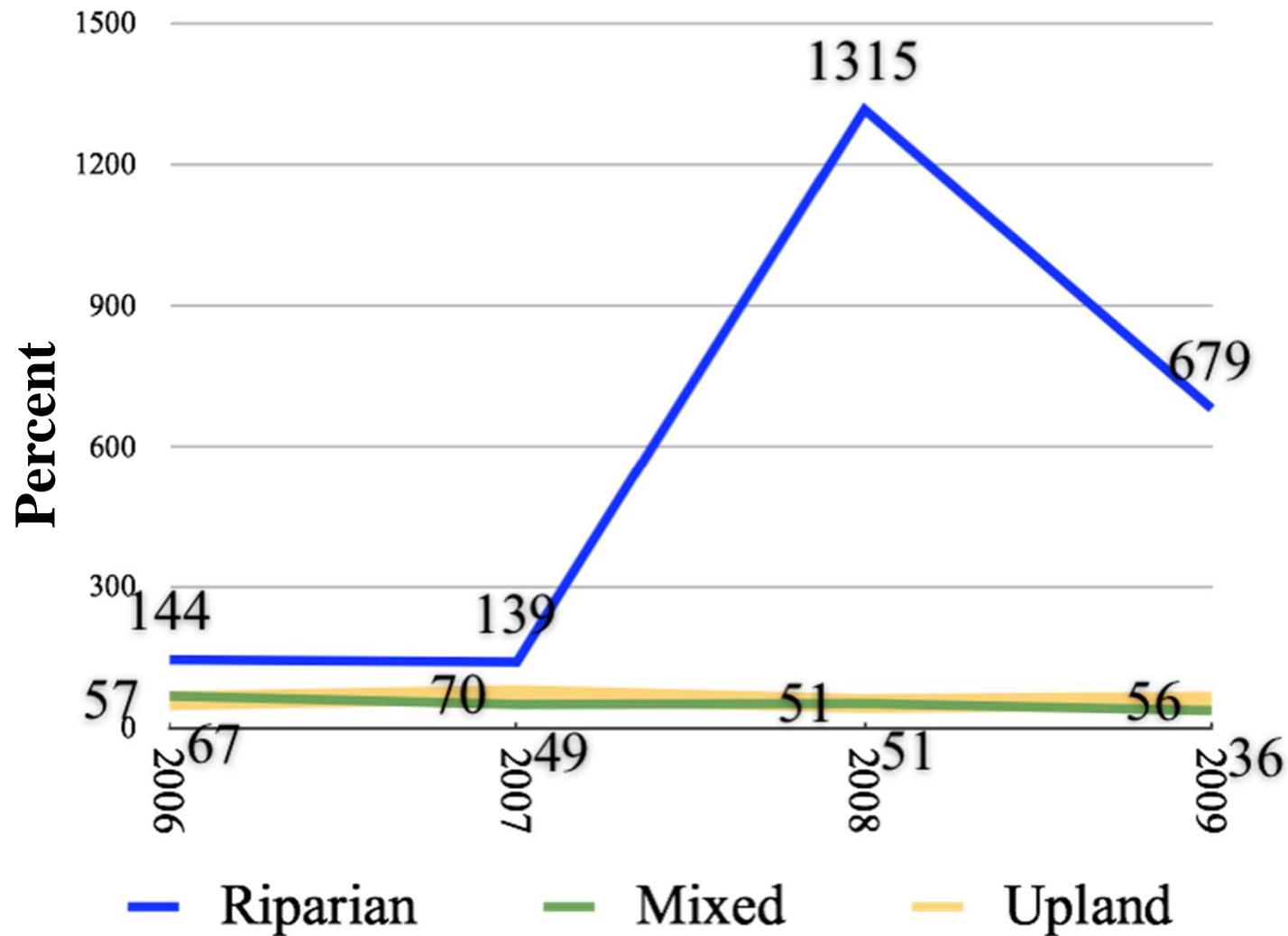
Flooding in 2009



Volunteer Seedling Establishment



Woody Species Survival by Habitat Type (percent)



Block P Mill and Tailings Site, MT:

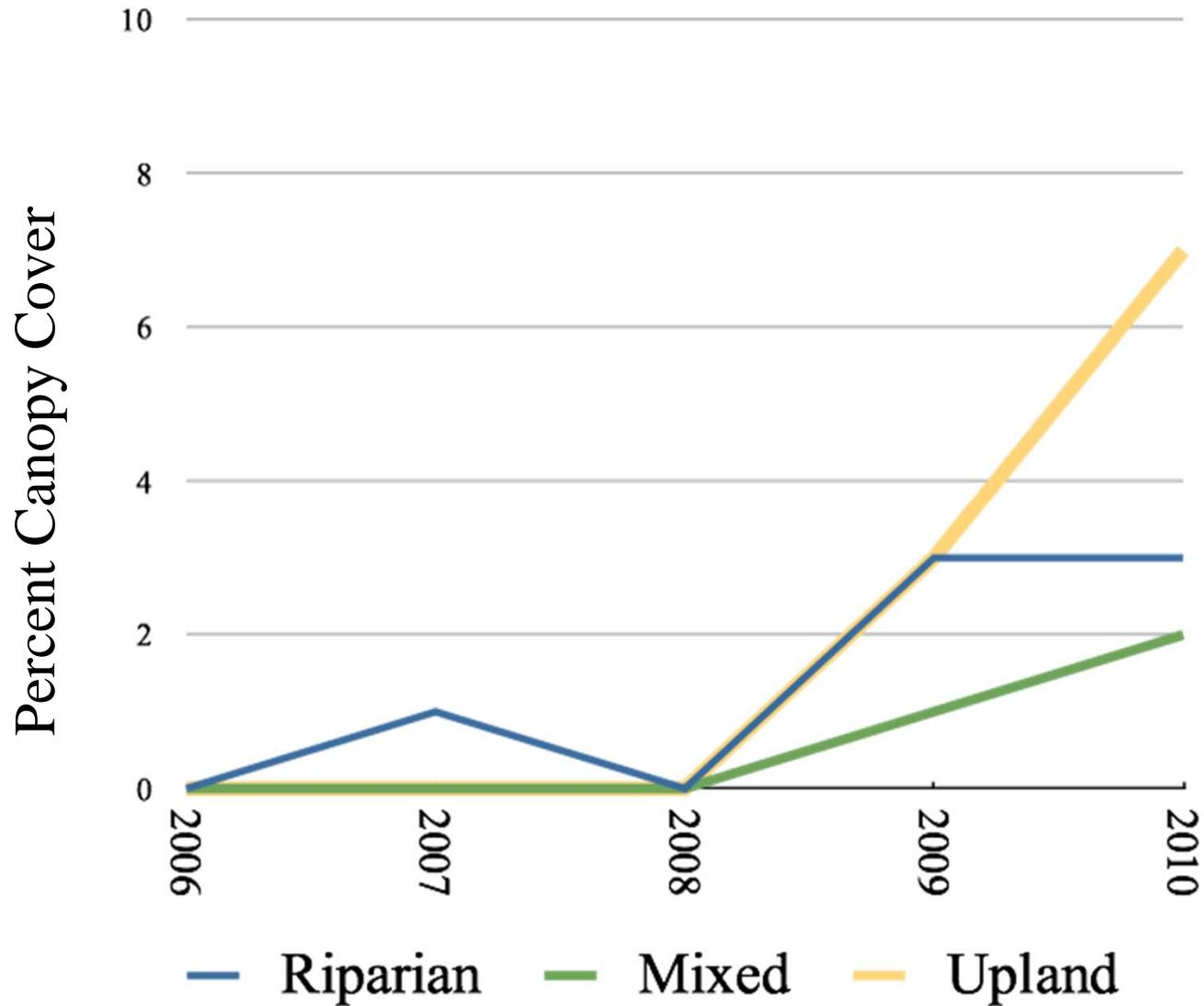
Other Volunteers

Weeds (2010 percent canopy cover)

- Oxeye daisy (*Chrysanthemum leucanthemum*) 3.62
- Canada thistle (*Cirsium arvense*) 0.21
- Field bindweed (*Convolvulus arvensis*) 0.01
- Common hound's tongue (*Cynoglossum officinal*) 0.09

- TOTALS 3.94

Weed Cover by Habitat Type (percent)



Oxeye daisy
(Chrysanthemum leucanthemum)



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Block P Mill and Tailings Site, MT:

Other Changes

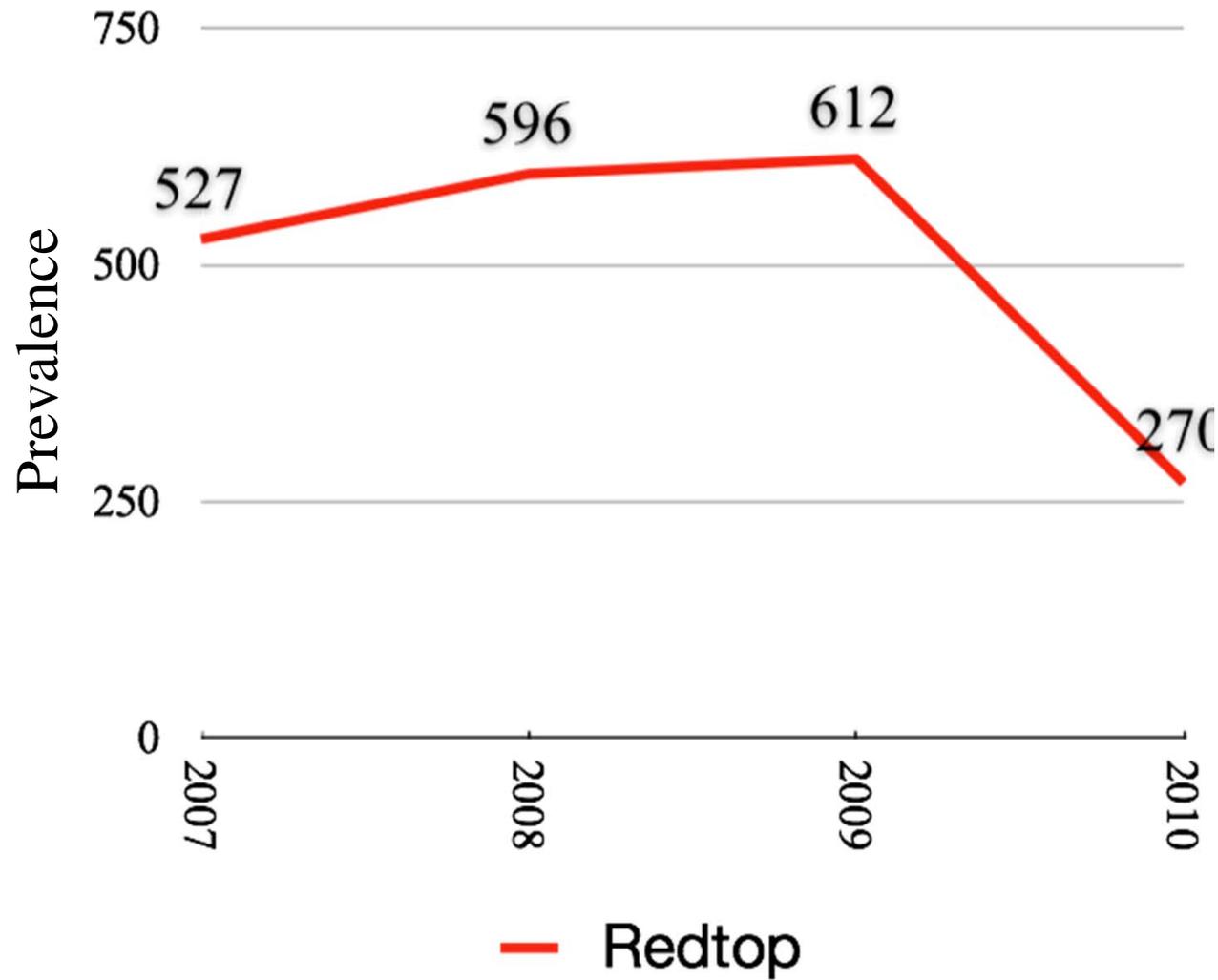
Canopy Cover * Constancy = Prevalence

- Redtop (*Agrostis stolonifera*)

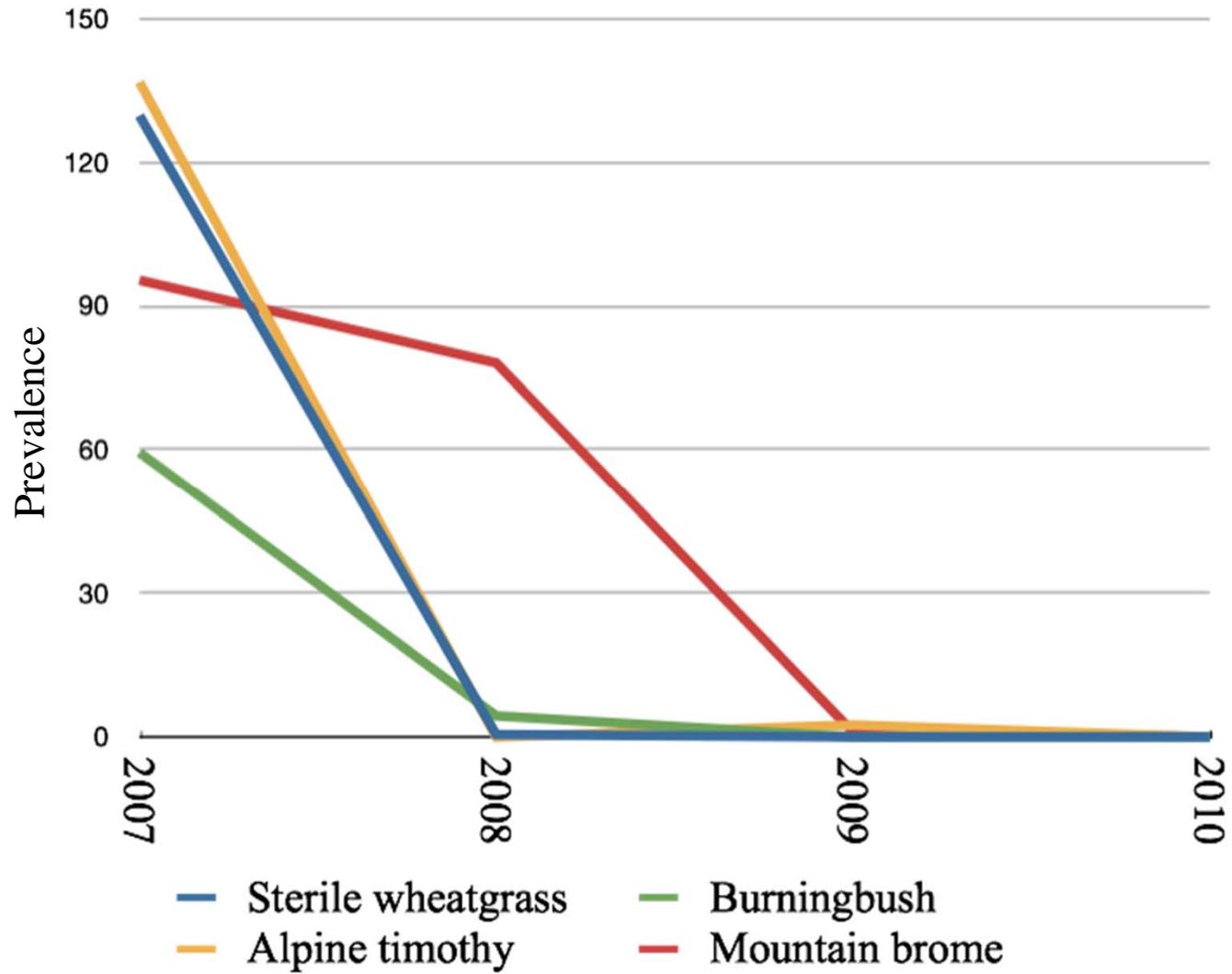
2007	Canopy cover
	25.1
<u>Constancy</u>	x 21
Prevalence	527.1

2010	Canopy cover
	19.3
<u>Constancy</u>	x 14
Prevalence	270.2

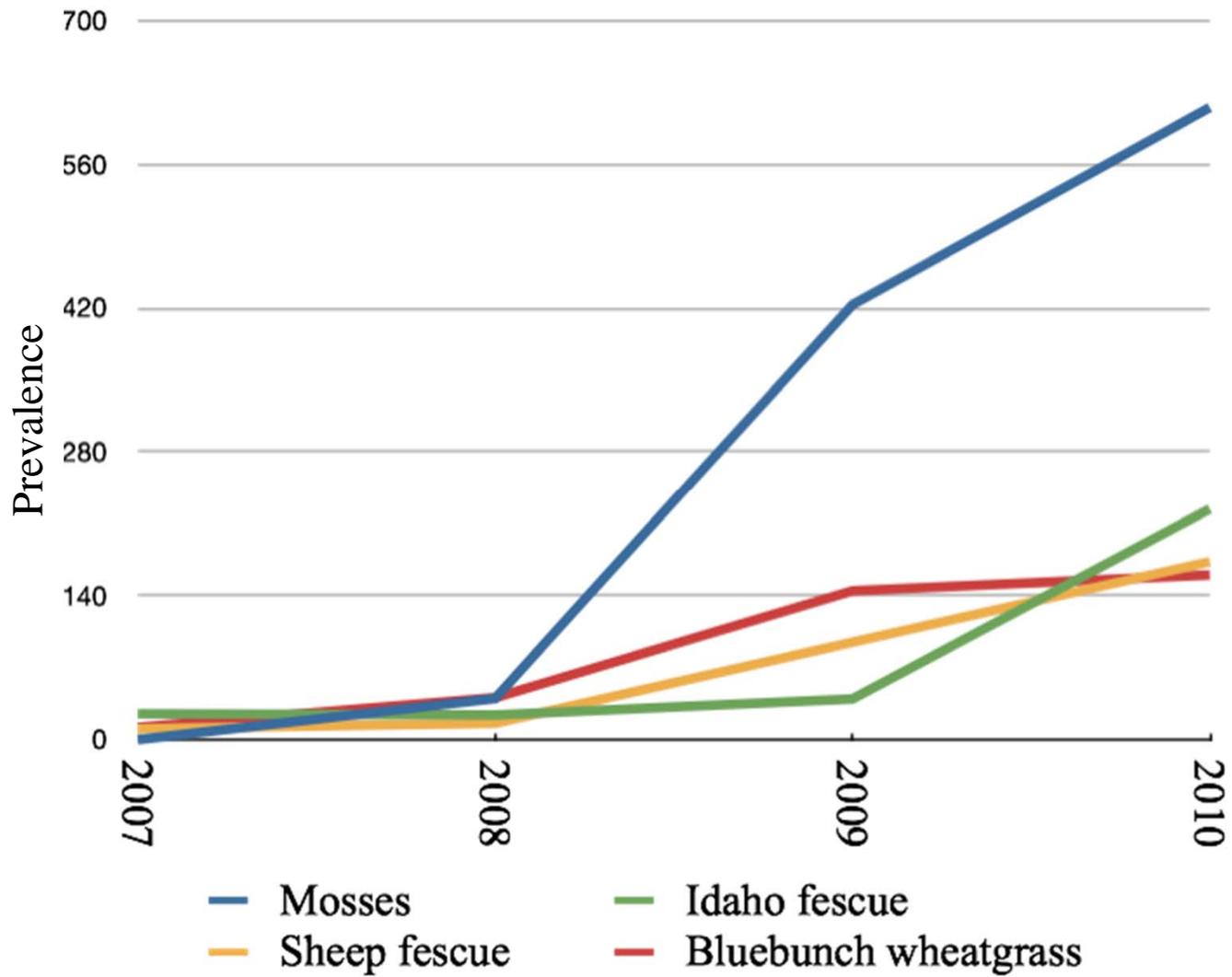
Change in Prevalence



Decreasers



Increasers



Moss

(Phylum *Bryophyta*)



Block P Mill and Tailings Site, MT:

Qualitative Status

Galena Creek Zone—Before



Galena Creek Zone—After



Borrow Area—Before



Borrow Area—After



Lower Migrated Tailings N—Before



Lower Migrated Tailings N—After



Lower Migrated Tailings S—Before



Lower Migrated Tailings S—After



Mill Foundation—Before



Mill Foundation—After



Bender Creek—Before



Bender Creek—After



Diked Tailings and Skirt Slope—Before



Diked Tailings and Skirt Slope—After



Repository Cap—Before



Repository Cap—After



Block P Mill and Tailings Site, MT:

Takehome Messages

Block P Mill and Tailings Site, MT:

- Time is an ecologist's friend
 - When amending soils, let the reactions take place
 - Let the hydrology equilibrate
- Hedge your bets
 - Plant multiple species
 - Plant multiple life forms
- Be proactive in maintenance
 - Be proactive with weed control
 - Remove tree seedlings from the cap earlier, not later
- Be prepared to observe and accept changes

Block P Mill and Tailings Site, MT:



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