Silvertip Pipeline Incident

Post Clean-up Revegetation

Len Ballek (Herrera) and Laura Alvey (MT DEQ)

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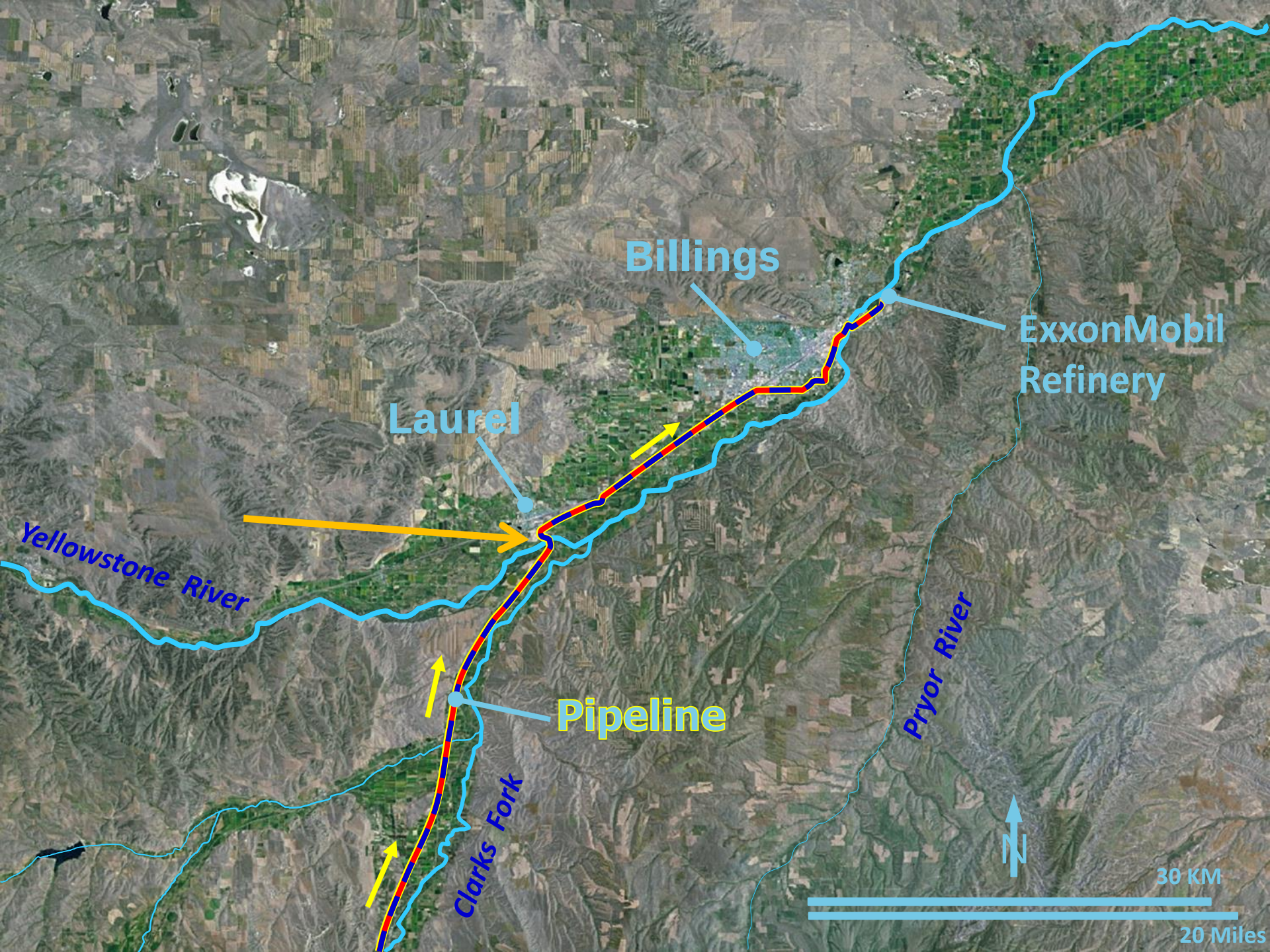
The Incident

- A 12-inch pipeline near Laurel, Montana broke on July 1, 2011
- Approximately 1,500 barrels, or 63,000 gallons, spilled into the Yellowstone River
- Yellowstone River at the peak of a 30-year flood


Billings
ExxonMobil
Refinery
Laurel
Yellowstone River
Pipeline
Pryor River
Clarks Fork
N
30 KM
20 Miles

The Response

- Shut down the pipeline
- Evacuations
- Treatment
  - Oiled vegetation cutting and removal, wipe/flush surfaces, remove soil, sediment and debris, sorbents, natural attenuation, dust fixative
- Sampling: drinking water, irrigation water, surface water, soil

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Vegetation impacts from oil cleanup operations

- Vehicle traffic
- Foot traffic
- Heavy equipment
- Staging area
- Other actions


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Fall 2011

- Refine seed mixes
- Define Revegetation Treatment Options
- Document conditions and damage by site
- Review and approve treatments by site

Seed Mix Review

Seed mix 3 - Native Riparian mix

Common Name	Species	% mix	Desired Seeds / square foot	Seeds/lb.	PLS pounds /acre
American mannagrass	*Glyceria grandis*	25.0%	20	200,000	4.4
Slender wheatgrass	*Elymus trachycaulus*	25.0%	20	135,000	6.5
Western wheatgrass	*Pascopyrum smithii*	15.0%	12	113,840	4.6
Streambank wheatgrass	*Agropyron riparium*	15.0%	12	153,000	3.4
Prairie cordgrass	*Spartina pecitinata*	5.0%	4	638,863	0.3
Basin wild rye	*Leymus cinerius*	15.0%	12	144,000	3.6
Regreen	*Triticum aestivum xElytrigia elogata*	5.0%	4	12,000	14.5
	Grand Totals	**100.0%**	**80**		**37.2**

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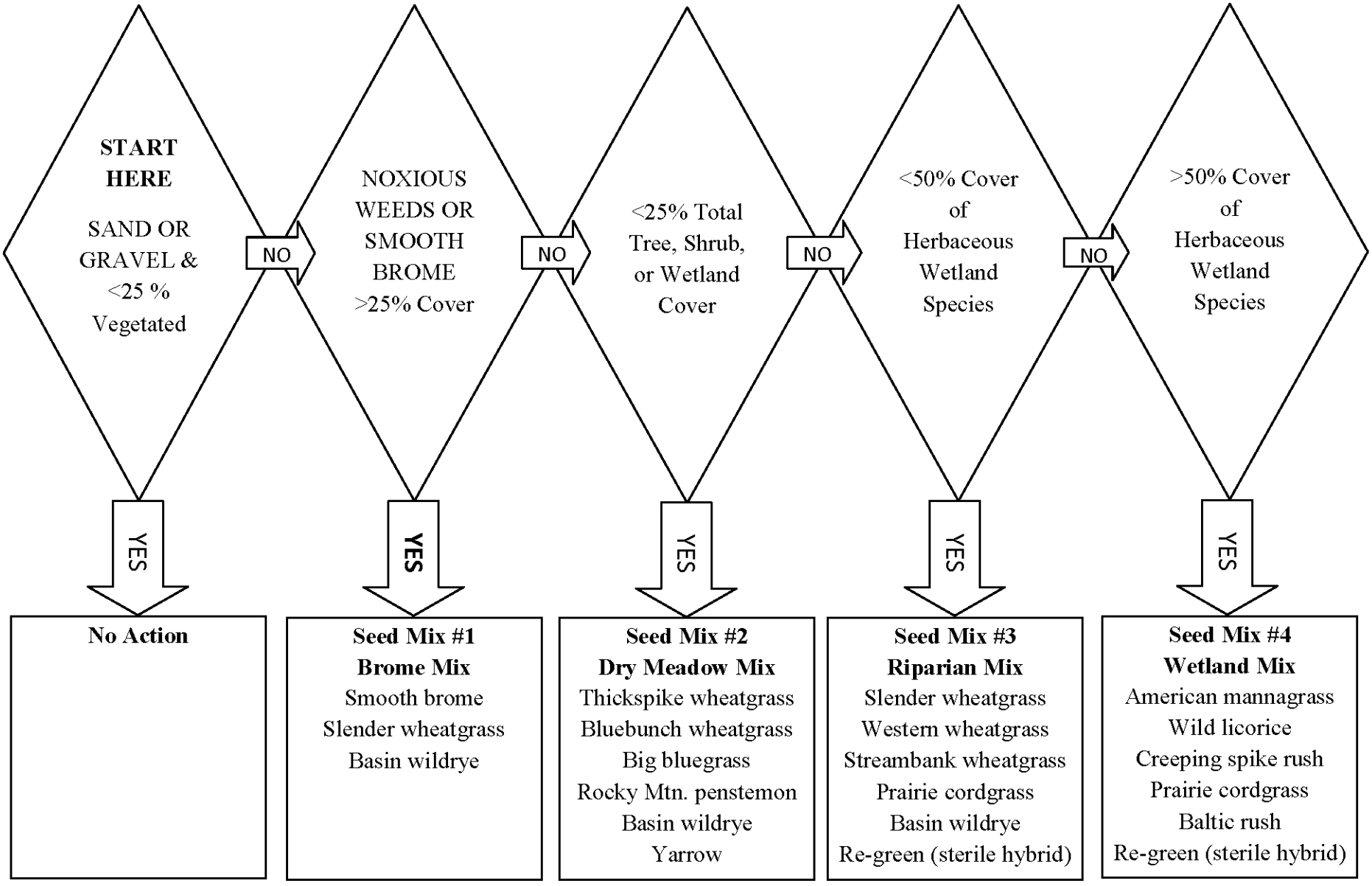
Collaborate to Develop Reclamation Options

- Field discussions



Reclamation Flow Diagram (Seeding and Raking)

Commuting to Work

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Site Visits

- Characterize damage to vegetation and document plant community, soils and weed issues

Sand or Gravel- Less than 25% Cover

- No Action

Weeds or Smooth Brome

- Seed Mix 1- Brome mix

Less than 25% Tree, Shrub or Wetland Cover

- Seed Mix 2- Dry Meadow Mix

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Less than 50% Cover of Wetland Herbaceous Species

- Seed Mix 3- Riparian Mix

More than 50% Cover of Wetland Herbaceous Species

- Seed Mix 4- Wetland Mix

October 2011 Revegetation Treatments/Seeding

Harrowing and Rolling

June 2012 Revegetation Results

- Results of seeding ranged from poor to excellent
- Natural regeneration of vegetation was the most common reason for recovery
- Recreational ATV activity was common on 20% of the sites
- Two sites did not meet reclamation requirement

Unsuccessful revegetation

Successful natural regeneration

Successful seeding

Continued disturbance by ATV's

Fall 2012 ATV Trails Rehabilitation

- Worked with landowners to determine trails needed for management activities
- Unnecessary trails treated with barriers and/or debris placement
- Signs were placed to discourage ATV traffic

ATV trails and treatments to restore vegetation

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Posting Closure of Trails

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Fencing

Woody Debris Placement

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Follow up monitoring June 2013

- Re-visit sites that were re-seeded in Fall 2012
- Inspect results of ATV trails closure and restoration efforts

Lessons Learned

- Natural recovery of vegetation
- Many areas not appropriate for active revegetation
- There are long and short term impacts of access trails and roads on a project