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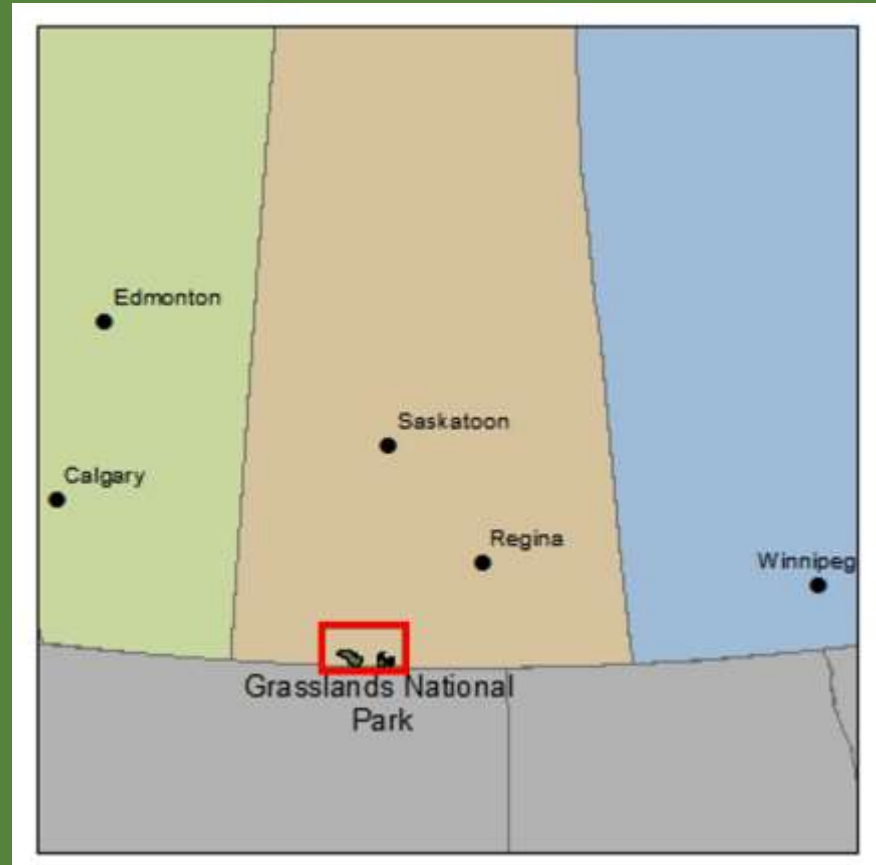
# The right seed at the right time: challenges of sourcing native seed for restoration

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# The right seed?

- Genetically diverse
- Weed free
- Locally adapted

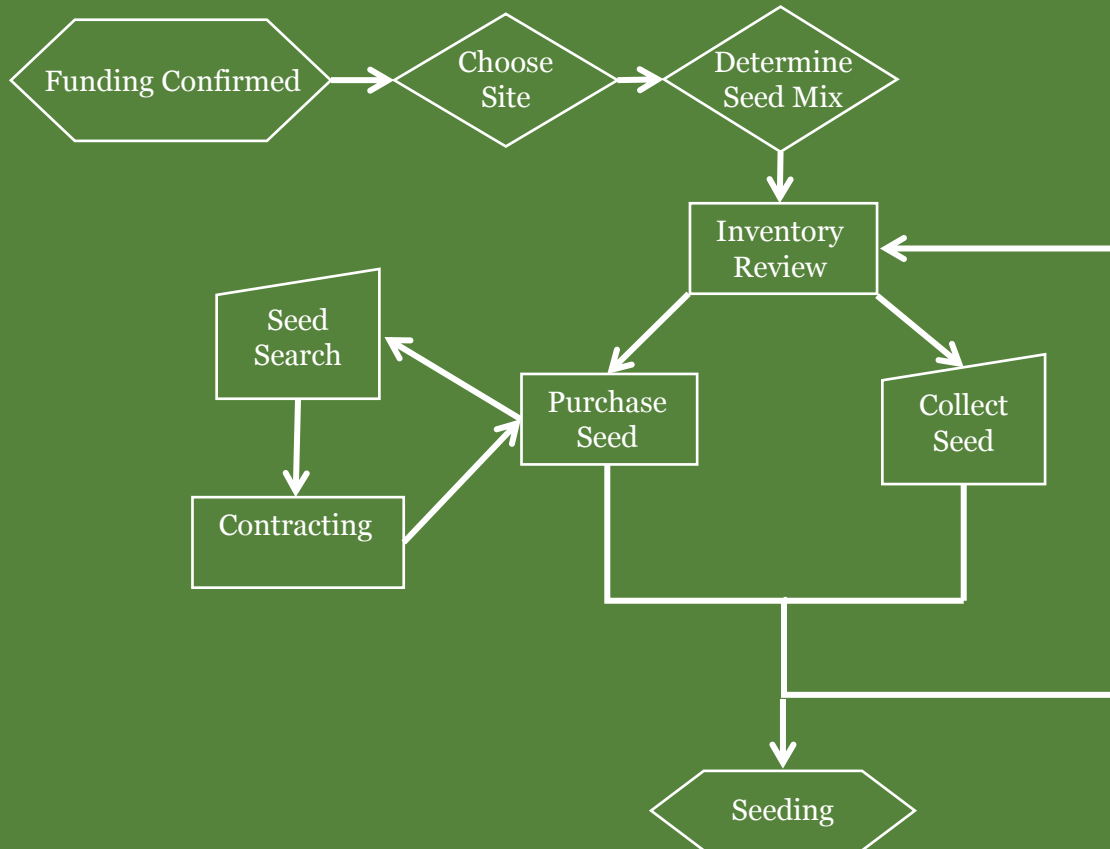




# Local Seed

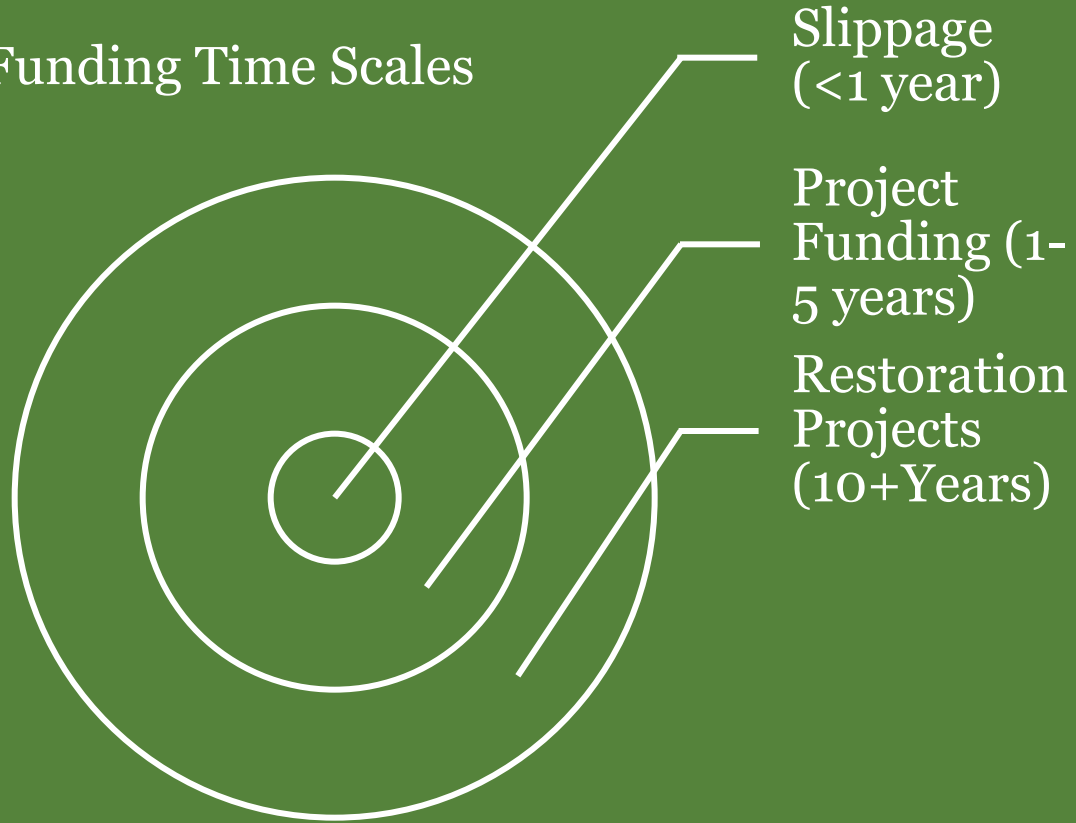
- Adapted to local conditions
  - Climate
  - Soil
  - Elevation
  - Day length
- Conditions at Grasslands National Park (GNP)
  - Low precipitation levels
  - Extreme seasonal fluctuations in temperature
  - Elevations ranging from ~2450-3300 feet

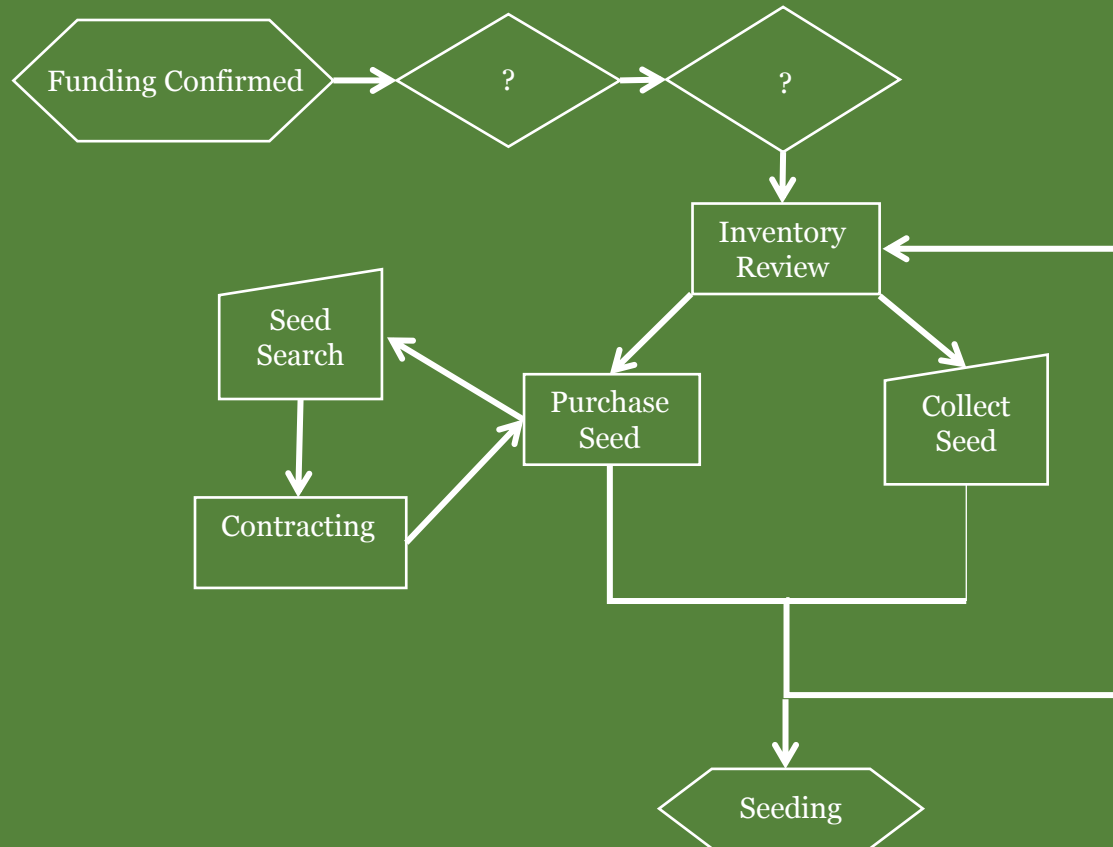






## Project and Funding Time Scales









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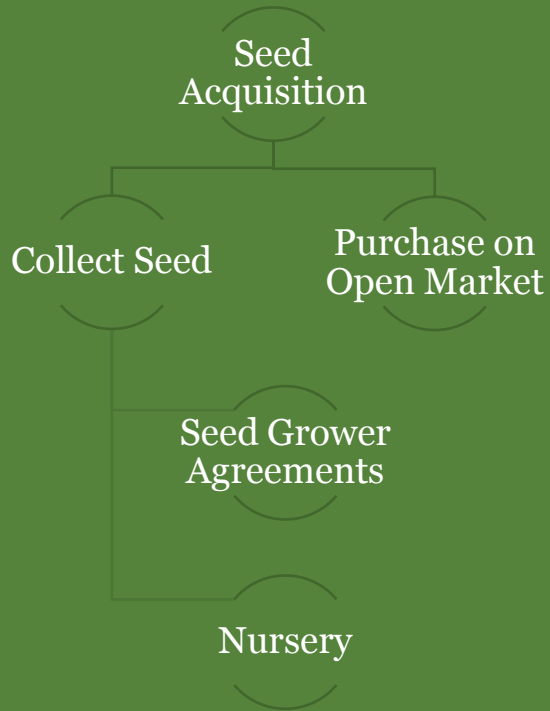
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How does Grasslands National  
Park meet this challenge?



# Diversify Seed Acquisition







# Seed collection at Grasslands National Park

- 1-6 collecting staff
- 794 man hours
- ~50% cleaning, 46% collecting, and 4% scouting
- 46 species collected





# Seed Grower Agreements

- Purpose is to propagate seed with GNP genetics
- GNP provides seed for establishment
- Initial seed investment returned once the field is productive
- GNP has first right of refusal for seed in the future, and receives a discounted rate



# Native Forb Nursery

- 6 16'\*4' raised beds
- 11 species
- Gravity driven watering system
- Direct seeding and plugs are used for planting





# Purchasing seed from the open market

- Wild versus propagated seed
- Seed source
- Seed certificate
- Generation
- Price
- Quantity



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# Pros and cons of different acquisition strategies

<u>Acquisition strategy</u>	<u>\$\$</u>	<u>Time</u>	<u>Quantity</u>	<u>Species Diversity</u>	<u>Genetic Diversity</u>	<u>Pressure on wild populations</u>	<u>Handling</u>
Seed collection	x	x	x√	√	√	x	√
Seed grower agreements	√	x√	√	x	√	√	x√
Nursery	√	x	x	x	√	√	√
Open market purchasing	√	√	√	x	x√	√	x√





# Increasing Seed Longevity

- Collection
- Drying
- Storage
- Seeding





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# Collection

- Timing collection
- Best handling practices
- Selective harvesting
- Capturing genetic diversity
- Keep good records





# Drying and Cleaning

- Bagging in the field
- Transport to base
- Getting seed spread out quickly
- Dry before cleaning
- Prioritize seed lots





# Storage

- Use hermetically sealed containers
- Forb and shrub seed lots stored frozen
- Grass lots and large forb/shrub lots stored at 4-7 °C and below 30% eRH
- Limit entry into cold storage room







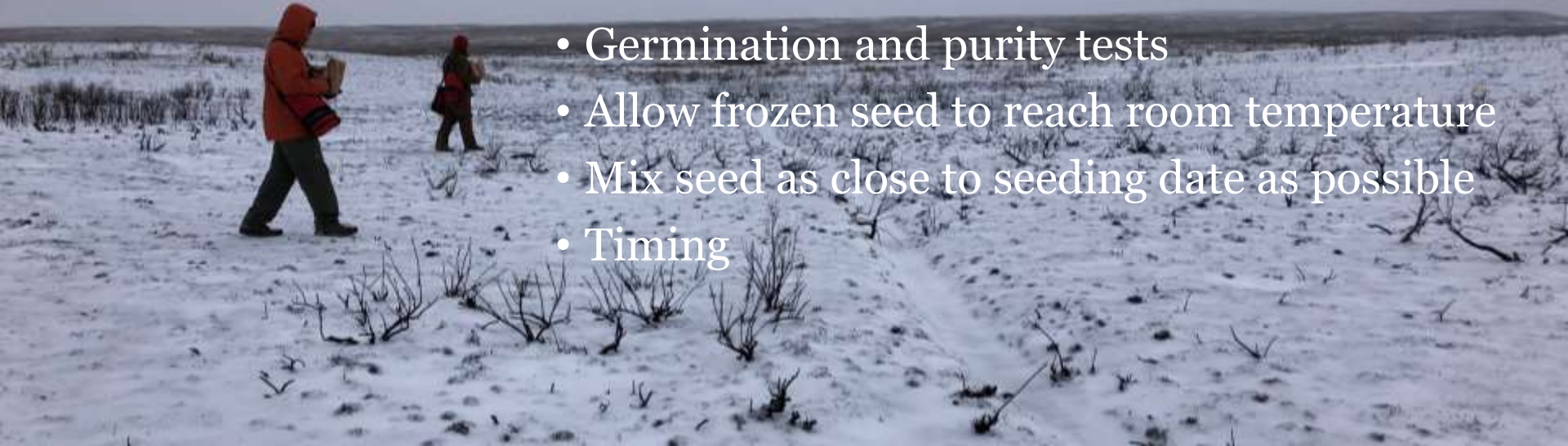
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# Seeding

- Seeding plan
- Seed lot selection
- Germination and purity tests
- Allow frozen seed to reach room temperature
- Mix seed as close to seeding date as possible
- Timing







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Rank	Site
1	Native prairie with no or limited invasive alien plant species present.
2	Native prairie with moderate invasive alien plant species present.
3	Current or historic agriculture site with high invasive alien plant species abundance.

Rank	Seed Type
1	Wild
2	Propogated seed known source and no trait selection
3	Ecovar
4	Cultivar (certified seed)

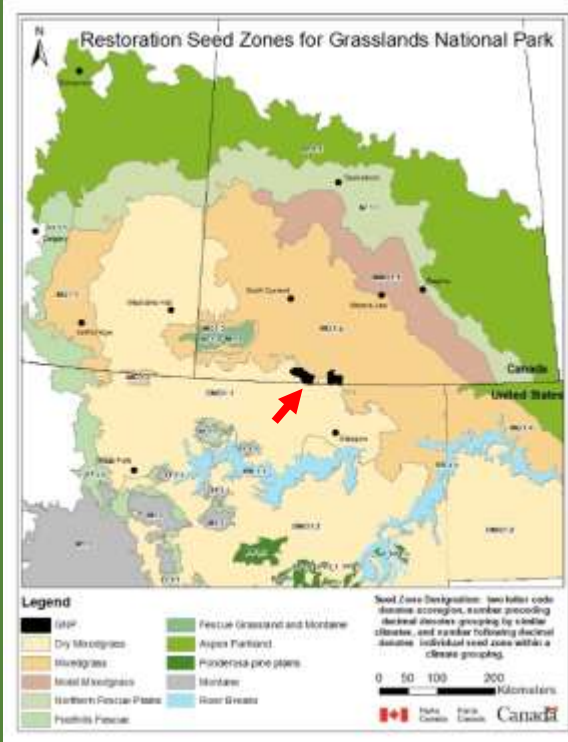
# Prioritizing seed acquisition



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	Local			Ecoregion					Ecozone				
Seed Source	GNP West Block	GNP East Block	Adjacent lands	DMG1.1	MG1.4	MG1.1	MG1.2	MG1.3	MMG1.1	AP1.1	FF1.1	NF1.1	NF1.2
Rank 1	x	x	x										
Rank 2				x	x								
Rank 3						x	x						
Rank 4								x	x				
Rank 5										x	x	x	x

# Prioritizing seed acquisition



# Prioritize seed collection and use

Site Type	Seed Type Priority	Seed Source Priority				
		1	2	3	4	5
1	1	Green	Light Green	Yellow	Orange	Red
	2	Light Green	Yellow	Orange	Red	Red
	3	Orange	Orange	Red	Red	Red
	4	Red	Red	Red	Red	Red
2	1	Green	Light Green	Light Green	Yellow	Yellow
	2	Light Green	Light Green	Light Green	Yellow	Yellow
	3	Yellow	Yellow	Orange	Orange	Orange
	4	Orange	Orange	Red	Red	Red
3	1	Green	Light Green	Light Green	Light Green	Light Green
	2	Light Green	Light Green	Light Green	Yellow	Yellow
	3	Light Green	Light Green	Yellow	Orange	Orange
	4	Yellow	Yellow	Orange	Orange	Orange

- Tolerance for seed type and source varies by site type



Most preferred



Least preferred



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