Native Seed Production Business Plan

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Executive Summary

This business plan was developed to help land managers appropriately plan their future seeding efforts both in terms of time management and seed-cost projections by taking into account the full life cycle of seed production. We hope this business plan will also help local farmers have realistic expectations about seed pricing and production timelines.

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Introduction

Native seed is the currency of ecological restoration. Producing genetically appropriate seed lots is crucial to restoration success. Native seed production is a complex process that requires long-term planning, innovation, adaptive management, and strong partnerships between local growers, restoration practitioners, landowners, and other stakeholders. As human-caused climate change, development, wildfires, and other disturbance regimes continue to threaten ecosystems in the Rogue basin, a concerted effort to clarify and streamline native seed production in our area is needed.

In this document, we attempt to summarize the processes involved with producing native seeds for ecological restoration in the Rogue Basin and their associated timelines and cost projections. Several collection and production “tracks” are possible for any given species each utilizing a combination of wild-collected seed and small- to large-scale grow-outs to produce native seed.

This business plan focuses on local seed production. Contracting with local seed growers is important because it provides a viable revenue stream for farmers while allowing for the production of large quantities of seed. However, there are some species that Rogue Valley farmers lack the capacity and/or resources to grow at a large scale. For this reason, we have developed one “track” that relies on outsourcing to larger production facilities elsewhere in the Pacific Northwest. As a general rule in the industry, such production with non-local farmers is possible for 3-5 years without compromising the local adaptation of these plants and their seeds.

Tracks at a glance:

Track Name	Average Timeline	Plot Size	Pounds Produced (range)	Price per Pound (low estimate)		Price per Pound (high estimate)
Outsourced Large Scale Production	3-4 years	1/4 acre +	50-500 +	$34	-	$87
Stair-Step for Large Scale Production	4-5 years	less than 1/10th acre then 1/4 acre +	50-500 +	$37	-	$154
Medium Scale Production	3-4 years	1/10th acre - 1/3 acre	5-49	$118	-	$649
Grant-Subsidized Diversity Species Production	3-4 years	less than 1/10th acre	0.5-8	$452	-	$7,200
Wild Seed Collection	1-2 years	NA	1-15	$54	-	$1,327

Notes: Cost projections are based on minimum and maximum cost scenarios. Any given species could fall anywhere on this cost spectrum. In general, grasses would incur lower costs per pound and forbs would incur higher costs per pound. In some cases, more than one year of seed collection will be needed to secure enough foundation seed for a grow-out. For some species, peak seed production will occur 2-3 years after sowing and this will increase the overall timeline of the project.

Track 1: Outsourced Large Seedlots

Summary

Species on this track are the most economical to produce at a large scale (¼-acre or larger plot) and often require outsourcing to large seed production facilities in other parts of the Pacific Northwest. These species have the lowest cost per pound of any production track and may make up a larger portion of a given seed mix (by volume).

Cost analysis

Outsourced Large Seedlots - Cost projections (per species)							
Item	**Timeline**	**Unit**	**Min Qty**	**Max Qty**	**Unit Cost**	**Min Total**	**Max Total**
Project planning & species prioritization	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Population scouting	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Seed collection & cleaning	Year 1	Hours	20	30	$37.00	$740.00	$1,110.00
Seed testing	Year 1	Service	2	2	$90.00	$180.00	$180.00
Secure and manage funding for large-scale production	Year 1 or 2	Hours	8	12	$37.00	$296.00	$444.00
Large-scale farmer recruitment & contracting	Year 2 or 3	Hours	4	8	$37.00	$148.00	$296.00
Seed increase contract for greater than 1/4 acre	Year 2 or 3	Pounds	500	50	$30.00	$15,000.00	$1,500.00
Seed distribution to end-users	Year 3 or 4	Hours	6	6	$37.00	$222.00	$222.00
					TOTALS	**$16,882.00**	**$4,344.00**
					Pounds produced	**500**	**50**
					Overall cost/lb	**$33.76**	**$86.88**

Species selection criteria

Candidate species meet some or all of the following criteria:

- ❏ A common “workhorse” species used in a variety of contexts and habitats
- ❏ There is consistent demand for large quantities (100s of pounds every year) of this species
- ❏ Can be wild collected locally in large enough quantities (e.g. 1 lb Pure Live Seed) within two seasons or less to initiate seed increase on a large scale
- ❏ High-precision seed cleaning and seed viability testing are required before the seed is delivered to the grower

Production timeline

Year 1 – Collection and Production Development/Initiation	**Year 3 – If needed for perennials**
Winter Project planning & species prioritization Secure funding for collection, cleaning and grow-out **Spring** Population scouting Farmer recruitment & grower contracting **Summer/Fall** Seed collection & cleaning Seed testing & treatment Bed prep & sowing	**Winter** Seed cleaning & testing **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning Seed testing Follow up seeding/plugs in bed gaps
Year 2 – Implement Lessons Learned, Increased Production Efficiency	**Year 4 – If needed for perennials**
Winter Weed management **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning Seed testing Follow up seeding/plugs in bed gaps	**Winter** Weed management **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning and testing Seed distribution to end-users

Track 2: Medium Scale Production with Local Farmers

Summary

Species on this track are grown in plots between 1/10th of an acre and ¼ acre. These species are generally only found in a subset of habitats (e.g. wetlands) and/or are very small-seeded and constitute a small proportion of a given seed mix (by volume). Demand for these species is moderate (~ tens of pounds per year) and wild populations may be relatively hard to come by and/or there is a danger of over-collecting.

Cost analysis

Medium Scale Seedlots - Cost Projections (per species)							
Item	**Timeline**	**Unit**	**Min Qty**	**Max Qty**	**Unit Cost**	**Min Total**	**Max Total**
Project planning & species prioritization	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Population scouting	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Seed collection & cleaning	Year 1	Hours	20	30	$37.00	$740.00	$1,110.00
Seed testing	Year 1	Service	2	2	$90.00	$180.00	$180.00
Secure and manage funding for seed production	Year 1 or 2	Hours	8	12	$37.00	$296.00	$444.00
Farmer recruitment & contracting	Year 2 or 3	Hours	4	8	$37.00	$148.00	$296.00
Seed increase contract for <1/10th acre > 1/3 acre	Year 2 or 3	Pounds	49	5	$80.00	$3,920.00	$400.00
Seed distribution to end-users	Year 3 or 4	Hours	6	6	$37.00	$222.00	$222.00
					TOTALS	**$5,802.00**	**$3,244.00**
					Pounds produced	**49**	**5**
					Overall cost/lb	**$118.41**	**$648.80**

Species selection criteria

Candidate species meet some or all of the following criteria:

- ❏ Wild populations are at risk of being negatively impacted by intensive seed collection efforts
- ❏ Species is only found in a small subset of habitats and/or is relatively uncommon in general
- ❏ There is moderate but consistent demand for the species and/or the species is crucial for certain management objectives
- ❏ Species is small-seeded and/or only constitutes a very small proportion of a typical seed mix (by volume)
- ❏ Requires a mix of mechanical and handwork to harvest and clean
- ❏ Production at a larger scale is either not necessary or impractical
- ❏ A farmer has been identified who is willing and able to successfully manage the subject species on a small scale (1/10th acre or less)

Production timeline

Year 1 – Planning & Collection	Year 3 – If needed for perennials
Winter Project planning & species prioritization Secure funding for collection cleaning and grow-out **Spring** Population scouting Farmer recruitment & grower contracting **Summer/Fall** Seed collection & cleaning Seed testing & treatment Bed prep & sowing	**Winter** Seed cleaning & testing **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning Seed testing Follow up seeding/plugs in bed gaps
Year 2 – Implement Lessons Learned	**Year 4 – If needed for perennials**
Winter Weed management **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning Seed testing Follow up seeding/plugs in bed gaps	**Winter** Weed management **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning and testing Seed distribution to end-users

Track 3: Stair Step for Large-Scale Production

Summary

The stair-step model is meant to utilize local, small-scale grow outs (less than a 1/10th acre) to scale up the quantity of foundation seed available. After one to three years of production locally, the seeds harvested by the small-scale grower will be sent to a seed producer who operates on a large scale (⅓-acre production beds and above) and grown for an additional 1-3 years. Species to consider for this track are those that are difficult to wild-collect and are in high demand. This approach requires up to 6 years to produce the end seed lot (for some perennial species). This longer production timeline and multiple sowing/harvest cycles may also allow for some unintended genetic shifts. These two downsides need to be weighed against the benefits of producing species where the foundation seed availability is a limiting factor and the species is in high demand.

Species selection criteria

Candidate species meet some or all of the following criteria:

- ❏ Multiple seasons of wild seed collection is required to collect enough clean seed for a 1/10th-acre production plot
- ❏ Wild populations are at risk of being negatively impacted by seed collection efforts
- ❏ Species is a relatively common component of the reference plant community
- ❏ Species can be mechanically harvested at a larger scale
- ❏ Larger scale production would result in lower prices per pound
- ❏ A large scale grower with a track record of growing subject species has been identified and is willing to produce it at the needed scale

Cost Analysis

Stair Step for Large-Scale Production - Cost projections (per species)							
Item	**Timeline**	**Unit**	**Min Qty**	**Max Qty**	**Unit Cost**	**Min Total**	**Max Total**
Project planning & species prioritization	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Population scouting	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Farmer recruitment & grower contracting	Year 1	Hours	10	10	$37.00	$370.00	$370.00
Seed collection & cleaning	Year 1	Hours	20	30	$37.00	$740.00	$1,110.00
Seed testing & treatment	Year 1	Service	2	2	$90.00	$180.00	$180.00
Grower Incentive payment	Year 1	Service	1	1	$500.00	$500.00	$500.00
Seed increase contract for > 1/10th acre	Year 1-3	Pounds	1.5	5	$500.00	$750.00	$2,500.00
Phase one cost/lb subtotals						**$1,890.67**	**$1,050.40**
Secure and manage funding for large-scale production	Year 2 or 3	Hours	8	12	$37.00	$296.00	$444.00
Large-scale farmer recruitment & contracting	Year 2 or 3	Hours	4	8	$37.00	$148.00	$296.00
Seed increase contract for > 1/4 acre	Year 2 or 3	Pounds	500	50	$30.00	$15,000.00	$1,500.00
Seed distribution to end-users	Year 4 or 5	Hours	6	6	$37.00	$222.00	$222.00
					TOTALS	**$18,502.00**	**$7,714.00**
					Overall cost/lb	**$37.00**	**$154.28**

Production Timeline – Stair Step Production

Phase 1 – Small-scale production	Phase 2 – Large-scale production
Year 1 – Collection and Production Development/Initiation	**Year 3 – Scale up to Larger Production Beds**
Winter Project planning & species prioritization Secure funding for Phase 1 **Spring** Population scouting Farmer recruitment & grower contracting **Summer/Fall** Seed collection & cleaning Seed testing & treatment Bed prep & sowing	**Winter** Seed cleaning & testing Secure/coordinate funding for large-scale production Large-scale farmer recruitment & contracting **Spring** Deliver seed lots to large scale grower **Summer/Fall** Phase 2 sowing
Year 2 – Implement Lessons Learned, Increased Production Efficiency	**Year 4 – Implement Large Scale Production Lessons Learned, Increased Production Efficiency**
Winter Weed management **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning Seed testing	**Winter** Weed management **Spring** Weed management Plot assessment & adaptive management **Summer/Fall** Seed lot harvest and cleaning Seed distribution to end-users

Track 4: Grant-Subsidized Diversity Species (Small seed lots)

Summary

Species on this track are typically less common and/or difficult and time-consuming to produce at scale. These dynamics lead to a very high seed cost (greater than $500/lb) and are meant to meet low/specialized demand.

Cost analysis

Grant Subsidized Diversity Species (small seed lots) - Cost Projections (per species)							
Item	**Timeline**	**Unit**	**Min Qty**	**Max Qty**	**Unit Cost**	**Min Total**	**Max Total**
Project planning & species prioritization	Year 1	Hours	4	8	$37.00	$148.00	$296.00
Population scouting	Year 1	Hours	8	12	$37.00	$296.00	$444.00
Seed collection & cleaning	Year 1	Hours	20	40	$37.00	$740.00	$1,480.00
Seed testing*	Year 1	Service	2	2	$90.00	$180.00	$180.00
Secure and manage funding for seed production	Year 1 or 2	Hours	8	12	$37.00	$296.00	$444.00
Farmer recruitment & contracting	Year 2 or 3	Hours	8	12	$37.00	$296.00	$444.00
Seed increase contract for less than 1/10th acre	Year 2 or 3	Pounds	8	0.5	$180.00	$1,440.00	$90.00
Seed distribution to end-users	Year 3 or 4	Hours	6	6	$37.00	$222.00	$222.00
					TOTALS	**$3,618.00**	**$3,600.00**
					Pounds produced	**8.0**	**0.5**
					Overall cost/lb	**$452.25**	**$7,200.00**

Species selection criteria

Candidate species meet some or all of the following criteria:

- ❏ Wild populations are at risk of being negatively impacted by intensive seed collection efforts
- ❏ Species is only found in a small subset of habitats and/or is relatively uncommon in general
- ❏ Species is very slow to produce seed crops
- ❏ Hand harvesting or other time-intensive process is required to agriculturally produce this species on any scale
- ❏ Species plays an important ecological role and/or is associated with other priority organisms
- ❏ Grant subsidization for this species is available
- ❏ A farmer has been identified who is willing and able to successfully manage the subject species on a small scale (1/10th acre or less)

Production timeline

Year 1-Planning and Collection	**Year 3-If needed for perennials**
Winter Project planning & species prioritization Secure funding for collection cleaning and grow-out Spring Population scouting Farmer recruitment & grower contracting Summer/Fall Seed collection & cleaning Seed testing & treatment Bed prep & sowing	Winter Seed cleaning & testing Spring Weed management Plot assessment & adaptive management Summer/Fall Seed lot harvest and cleaning Seed testing Follow up seeding/plugs in bed gaps
Year 2-Implement Lessons Learned	**Year 4-If needed for perennials**
Winter Weed management Plug planting if useful for species Spring Weed management Plot assessment & adaptive management Summer/Fall Seed lot harvest, cleaning and testing Follow up seeding/plugs in bed gaps	Winter Weed management Spring Weed management Plot assessment & adaptive management Summer/Fall Seed harvest, cleaning, and testing Seed distribution to end-users

Track 5: Wild Collection Seedlots

Summary

Species on this track are those that are abundant and easy to wild collect and/or are only needed in small quantities year to year. Species on this track are also typically slow to reach reproductive maturity and are therefore expensive to have in production.

Cost analysis

Wild Collection Seedlots - Cost Projections (per species)							
Item	**Timeline**	**Unit**	**Min Qty**	**Max Qty**	**Unit Cost**	**Min Total**	**Max Total**
Project planning & species prioritization	Year 1	Hours	2	4	$37.00	$74.00	$148.00
Population scouting	Year 1	Hours	2	4	$37.00	$74.00	$148.00
Seed collection & cleaning	Year 1	Hours	10	20	$37.00	$370.00	$740.00
Seed testing*	Year 1	Service	2	2	$90.00	$180.00	$180.00
Seed distribution to end-users	Year 1 or 2	Hours	3	3	$37.00	$111.00	$111.00
Pure live seed (PLS) weight	Year 1	Pounds	15	1			
					TOTALS	**$809.00**	**$1,327.00**
					Pounds produced	**15.0**	**1**
					Overall cost/lb	**$53.93**	**$1,327.00**

Species selection criteria

Candidate species meet some or all of the following criteria:

- ❏ Species is abundant on several local collection sites
- ❏ There is a low chance of impacting natural recruitment by collecting seed repeatedly from the collection sites
- ❏ It is not economically viable to produce this species agriculturally
- ❏ Species is slow to produce seed crops
- ❏ Hand harvesting or other time-intensive process is required to agriculturally produce this species on any scale
- ❏ Species plays an important ecological role and/or is associated with other priority organisms

Production timeline

Year 1-Planning and Collection
Winter Project planning & species prioritization Secure funding for collection cleaning and grow-out Spring Population scouting Farmer recruitment & grower contracting Summer/Fall Seed collection & cleaning Seed testing Seed distribution to end-users

Example Seed Mixes

Riparian Habitat: Example Seed Mix

Species Name	Track #	Production Class	Species Price/lb	Percent of Mix	Mix Price/lb
Achillea millefolium	Track 1	Outsourced large seed lots	$75.00	1%	**$107.55**
Achnatherum lemmonii	Track 1	Outsourced large seed lots	$65.00	22%	
Danthonia californica	Track 1	Outsourced large seed lots	$55.00	14%	
Festuca roemeri	Track 1	Outsourced large seed lots	$75.00	14%	
Asclepias speciosa	Track 3	Medium scale	$75.00	12%	
Clarkia purpurea	Track 3	Medium scale	$200.00	3%	
Eriophyllum lanatum	Track 3	Medium scale	$200.00	6%	
Gilia capitata	Track 3	Medium scale	$75.00	10%	
Madia elegans/gracilis	Track 3	Medium scale	$250.00	4%	
Amsinckia menziesii	Track 3	Medium scale	$250.00	7%	
Achyrachaena mollis	Track 5	Wild collection	$175.00	7%	
*Dodecathion hendersonii**	Track 5	Wild collection	$175.00	1%	

Oak Woodland / Grassland Habitat: Example Seed Mix

Species Name	Track #	Production Class	Species Price/lb	Percent of Mix	Mix Price/lb
Achillea millefolium	Track 1	Outsourced large seed lots	$75.00	1%	**$119.85**
Achnatherum lemmonii	Track 1	Outsourced large seed lots	$65.00	19%	
Elymus elymoides	Track 1	Outsourced large seed lots	$75.00	5%	
Festuca idahoensis	Track 1	Outsourced large seed lots	$65.00	15%	
Asclepias fascicularis	Track 3	Medium scale	$75.00	10%	
Asclepias speciosa	Track 3	Medium scale	$75.00	10%	
Clarkia purpurea	Track 3	Medium scale	$200.00	7%	
Clarkia rhomboidea	Track 3	Medium scale	$200.00	3%	
Eriophyllum lanatum	Track 3	Medium scale	$200.00	2%	
Gilia capitata	Track 3	Medium scale	$75.00	7%	
Grindelia nana	Track 3	Medium scale	$75.00	4%	
Amsinckia menziesii	Track 3	Medium scale	$250.00	2%	
Lupinus albifrons	Track 3	Medium scale	$75.00	2%	
Lupinus bicolor	Track 3	Medium scale	$75.00	2%	
Madia elegans	Track 3	Medium scale	$75.00	1%	
Agoseris grandiflora	Track 4	Diversity species	$500.00	5%	
Monardella villosa	Track 4	Diversity species	$500.00	1%	
Achyrachena mollis	Track 5	Wild collection	$175.00	3%	
Dichelostemma spp.	Track 5	Wild collection	$200.00	1%	