

Pacific Northwest 2024 Sheep's Wool PreFeasibility Study

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Abstract

Pacific Northwest sheep's wool producers have a surplus of coarse to medium grade wool and would be served by a tri-state (WA, OR, ID) wool pool to aggregate and sell their wool to an expansive, mid-size market. A wool pool of this size would warrant a Pacific Northwest Wool brand identity as well as a scour facility and development of necessary infrastructure

Table of Contents

Introduction

In 2023, Northwest Agriculture Business Center (NABC) staff member Emily Manke along with members of the Southwest Washington Growers Cooperative (SWGC) founded the Pacific Northwest Wool Producers Committee to investigate opportunities for wool sales and collaboration, and build infrastructure for sheep's wool producers in the Pacific Northwest[1].

Committee members and stakeholders communicated that Washington wool producers and beyond have been locked into a cottage industry[2] when it comes to growing and selling wool. Raw wool prices are so low that producers report they cannot justify overhead costs to keep more than approximately 30 sheep, let alone larger flocks. The current system and infrastructure in the Pacific Northwest region inhibits growth for producers as well as expansion in wool related sciences, education, economics, and communities.The Pacific Northwest lacks infrastructure to accommodate mid-size wool growing and processing businesses.

Image credit, Cooke Creek Sheep Company

Owing to this fact, *The Pacific Northwest 2024 Sheep's Wool Prefeasibility Study* set out to assess the volume of processable wool in the region and to help determine if wool producers in Washington, Oregon, and Idaho will be served by creating an expansive, mid-size marketable Wool Pool within the existing Southwest Washington Growers Cooperative.

The primary stakeholders in this project are sheep's wool producers in Washington, Oregon, and Idaho, including ranches raising lamb and sheep primarily for meat and/or grazing. Other stakeholders include shearers, protein fiber processing minimills[3], equipment manufacturers, wool buyers, wool-based retail businesses, local agricultural cooperatives, and educational institutions.

[1] For the purposes of this study, "Pacific Northwest" includes the entire tri-state area of Washington, Oregon, and Idaho.
[2] The definition of "cottage industry" is as follows: a business or manufacturing activity carried on in a person's home (Oxford Languages, 2024)
[3] Small-scale or cottage sized mills that process fibers sourced from animals - as opposed to plants - including but not limited to sheep, alpacas, llamas, goats, rabbits, yak, and silk.

Purpose

The *Pacific Northwest 2024 Sheep's Wool Prefeasibility Study* will assess the volume of processable wool in the tri-state area and aim to help determine if wool producers will be served by creating a mid-size marketable Wool Pool within the existing Southwest Washington Growers Cooperative. The purpose of the study is to identify the location, flock size, volume, breed/type, and grade of wool in the region and determine whether or not producers are interested in joining a tri-state wool pool.

Background

Image 1 presents sheep and lamb inventory[4] data from the USDA National Agricultural Statistics Services.

Image 1

OFFICIAL ESTIMATE: SHEEP & LAMBS INVENTORY VALUES, WASHINGTON

YEAR JAN 1	ALL SHEEP & LAMBS (000 Head)	VALUE PER HEAD (Dollars)	TOTAL VALUE (000 Dollars)	YEAR JAN 1	ALL SHEEP & LAMBS (000 Head)	VALUE PER HEAD (Dollars)	TOTAL VALUE (000 Dollars)	YEAR JAN 1	ALL SHEEP & LAMBS (000 Head)	VALUE PER HEAD (Dollars)	TOTAL VALUE (000 Dollars)	YEAR JAN 1	ALL SHEEP & LAMBS (000 Head)	VALUE PER HEAD (Dollars)	TOTAL VALUE (000 Dollars)	YEAR JAN 1	ALL SHEEP & LAMBS (000 Head)	VALUE PER HEAD (Dollars)	TOTAL VALUE (000 Dollars)
				1895	465	1.75	814	1925	570	11.40	6,384	1955	315	16.72	5,266	1985	53	62.00	3,286
				1896	510	1.75	892	1926	580	12.30	7,018	1956	297	15.91	4,725	1986	58	68.00	3,944
1867	58	2.10	122	1897	550	1.85	1,018	1927	610	11.10	6,710	1957	275	17.00	4,675	1987	59	75.50	4,455
1868	69	2.05	141	1898	575	2.20	1,265	1928	645	11.70	7,482	1958	285	21.73	6,193	1988	72	78.50	5,652
1869	83	2.05	170	1899	600	2.75	1,650	1929	700	12.30	8,470	1959	306	23.08	7,061	1989	74	76.50	5,661
1870	100	2.10	210	1900	607	3.15	1,912	1930	735	9.80	7,130	1960	330	18.72	6,176	1990	83	85.00	7,055
1871	120	2.30	276	1901	745	3.05	2,272	1931	735	6.30	4,557	1961	321	16.62	5,336	1991	81	82.00	6,642
1872	144	2.60	374	1902	815	3.05	2,486	1932	706	4.10	2,824	1962	302	13.73	4,146	1992	78	70.00	5,460
1873	166	2.80	465	1903	775	2.90	2,248	1933	727	3.30	2,399	1963	279	16.74	4,670	1993	75	78.00	5,850
1874	191	2.80	535	1904	725	2.80	2,030	1934	742	4.50	3,302	1964	247	15.82	3,908	1994	60	82.00	4,920
1875	220	2.70	594	1905	655	2.65	1,736	1935	764	5.10	3,824	1965	213	17.31	3,688	1995	55	83.00	4,565
1876	264	2.60	686	1906	610	3.05	1,860	1936	707	6.70	4,721	1966	180	21.00	3,826	1996	55	85.00	4,675
1877	304	2.50	760	1907	568	3.55	2,016	1937	705	7.10	4,935	1967	168	22.10	3,735	1997	54	92.00	4,968
1878	350	2.30	805	1908	535	3.75	2,006	1938	646	7.40	4,780	1968	157	22.00	3,454	1998	53	92.00	4,876
1879	385	2.20	847	1909	507	3.40	1,724	1939	652	6.80	4,434	1969	153	26.20	4,027	1999	50	84.00	4,200
1880	431	2.15	927	1910	476	3.90	1,856	1940	629	7.50	4,724	1970	141	27.00	3,839	2000	50	95.00	4,750
1881	475	2.15	1,021	1911	486	4.25	2,066	1941	639	7.80	4,961	1971	144	27.50	3,960	2001	54	105.00	5,670
1882	499	2.30	1,148	1912	486	3.50	1,701	1942	637	9.60	6,084	1972	137	26.00	3,562	2002	56	109.00	6,104
1883	499	2.45	1,223	1913	501	4.20	2,104	1943	621	10.20	6,315	1973	129	27.50	3,548	2003	55	116.00	6,380
1884	499	2.40	1,198	1914	506	4.40	2,226	1944	527	10.20	5,355	1974	117	36.00	4,212	2004	46	120.00	5,520
1885	474	2.40	1,138	1915	546	4.80	2,621	1945	474	9.70	4,559	1975	92	33.50	3,082	2005	46	134.00	6,164
1886	450	2.25	1,012	1916	568	5.30	3,010	1946	450	11.30	5,070	1976	78	39.50	3,081	2006	50	137.00	6,850
1887	405	2.00	810	1917	585	7.10	4,154	1947	394	14.60	5,771	1977	74	46.50	3,441	2007	51	136.00	6,936
1888	364	1.95	710	1918	661	11.40	7,535	1948	344	16.20	5,647	1978	77	52.00	3,986	2008	52	142.00	7,384
1889	328	1.85	607	1919	740	11.80	8,732	1949	312	18.80	5,871	1979	75	68.00	5,090	2009	53	123.00	6,519
1890	320	2.30	736	1920	710	10.90	7,739	1950	299	18.50	5,518	1980	83	73.50	6,101	2010	60	126.00	7,560
1891	345	2.60	897	1921	590	6.80	4,012	1951	316	28.11	8,883	1981	80	78.50	6,280	2011	56	177.00	9,912
1892	350	2.70	945	1922	510	5.30	2,703	1952	332	33.39	11,087	1982	83	61.50	5,105	2012	52	259.00	13,468
1893	375	2.85	1,069	1923	515	8.20	4,172	1953	341	17.62	6,010	1983	65	57.50	3,738				
1894	415	2.40	996	1924	532	8.90	4,682	1954	329	15.82	5,205	1984	62	59.00	3,658				

The Pacific Northwest became a bellwether in the sheep industry early on when the Hudson's Bay Company founded the Bell Vue Sheep Farm on San Juan Island in 1853 and shortly after, Pendleton Woolen Mills was founded in Oregon in 1863. Market trends for woolen products increased with colonization of the Pacific Northwest, peaking in 1902 with the total head of sheep in Washington State at a count of 815,000.

Over the following one hundred years, sheep production dwindled with the rise of plant based and synthetic fibers. The first rayon[5] was produced commercially in the United Kingdom in 1905 and US manufacturing began in 1911. In 1931, the Rainier Pulp & Paper Company partnered with DuPont[6] to manufacture "the world's first high purity cellulose pulp made from western hemlock" in Shelton, WA and

[4] This number reflects producers raising sheep for meat, milk, as well as wool.
[5] Rayon Viscose is a manufactured regenerated cellulosic fiber derived from wood pulp and regarded as an alternative to silk.
[6] DuPont Chemical Company was based out of Delaware the leading producer of rayon at the time as well as the first fully man-made synthetic fiber, nylon (another "artificial silk") and later polyester, acrylic, and spandex.

called themselves *Rayonier*. DuPont went on to invent nylon in 1931, polyester in 1946, acrylic in 1955, and spandex in 1958.

These synthetic fabrics were more affordable and easier to care for than natural fabrics like silk, cotton, and wool and were often referred to as "wash-and-wear" fabrics because they required little or no ironing. This gave synthetic fiber cloth, garments, and supplies the upper hand over wool in the eyes of the consumer and marked the significant decline in the demand for wool and wool production not only in Washington, but all of America.

The wool industry was hit hard again in the 1980-90's when polar fleece and synthetic outerwear became popular as well as the shift in workplace fashion from "business" to "business-casual" attire. This meant men's and women's wool suits became obsolete and for businesses like Pendleton, wool blankets and bedding became their top seller.

According to the USDA National Agricultural Statistics Services as shown in Image 1, the market hit a low of 46,000 head of sheep in 2004. Table 1 shows the total number[7] of sheep and lambs in the tri-state region as of January 31, 2024 according to *American Sheep Industry Association* data. Washington experienced an all-time low of 45,000 head of sheep and lamb in 2024.

Table 1

State	Head of Sheep and Lambs	US Producer Ranking
Idaho	235,000	6th
Oregon	155,000	9th
Washington	45,000	30th

The Pacific Northwest had a thriving wool industry that has all but died out within the last century along with other regional agricultural and mining histories. The innovation, practicality and affordability of synthetic fibers throughout the 20th century hindered the market for wool and deemed growing wool an uneconomical crop for producers. Due to the climate crisis and concerns about personal health, natural textile options such as wool, bamboo, linen, and cotton are growing in terms of market share.

Survey and Assessment Criteria

The study will consider the following to assess Pacific Northwest regional wool production:

Producer Location

Participants were asked to disclose the location of their flock in order to expose regional hotspots for wool industry. This will help determine what areas want and need infrastructure, including potential aggregation sites, and routes for wool pick-up. The authors of this study considered the fact that the study's authors are based out of Thurston County, WA, so the Western Washington region will be overrepresented in terms of ratio to other Washington regions and other states.

Size of Flock

Anyone with two or more sheep in the tri-state area was invited to take the survey in order to generate a current average farm or flock size. It was intended to gather responses from large and small producers to best meet the needs of the current market and gauge interest in expansion.

[7] This number reflects producers raising sheep for meat, milk, as well as wool.

Volume

Participants were asked to disclose how much sheep's wool in pounds they produce annually, as well as any sheep's wool they may have stored. This data helps determine the scale of infrastructure needed to process and sell the wool already in production and will inform recommendations for development.

Breed

Participants shared the types of wool they produced relating to the breed of sheep. This data informs the flock's intended use as meat, dairy, specialty fiber, fine/medium/coarse grade wool, or a combination. The breed type and intended use further informs recommendations on producer needs as well as development and scale of infrastructure.

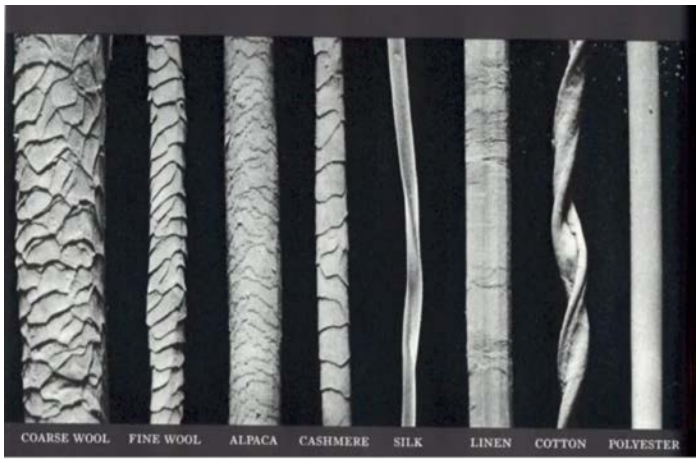


Image credit, Penn State's Center for Visual/Material Studies

Table 2

Grade	Micron[8] Count
Fine	19 or less
Medium Fine	20-22
Medium	20-29
Medium Coarse	29-31
Coarse	30 or more

Grade

For the purpose of this study, participants were asked to categorize their wool into the five general grades listed in Table 2. Different grades of wool serve different purposes. Finer wools are fit for skin-to-skin contact and are best utilized for garments and some blankets or bedding. Coarser wools are too abrasive for skin-to-skin contact, but may serve well for outerwear (such as coats or sweaters) and are ideal for domestic and contract textiles[9]. Understanding the grade of wool being produced will inform the market by assessing the supply and helping determine potential uses for product development.

Interest

Producers were asked if they would be interested in joining a cooperative wool pool to access larger, mid-size markets, and pool resources to add value to their raw wool. Value-added wool products include but are not limited to the wool pellets, bedding, rug/carpet, and insulation industries that make use of waste wool or medium and coarse grade wool grown from hardier breeds of sheep may be raised for sheep-dog training, meat, or grazing. Producer interest is key in determining the feasibility of a wool pool and understanding where producer interest lies will inform how to develop infrastructure.

[8] Wool grade refers to the fiber fineness. Fineness is determined by the diameter of the fiber measured in micrometers, or microns (1/25,400 of an inch). A low micron count indicates a finer wool, while a high micron count indicates coarse wool. Medium and coarse grade wool serves especially well for bedding (mattresses), carpets or rugs, and insulation.

[9] Domestic textiles are fabrics found in the home or private interiors while contract textiles are found in public or commercial interiors. Both include bedding items such as sheets, pillowcases, duvets, towels, and blankets as well as furniture upholstery, carpeting, and curtains.

Executive Summary

The Pacific Northwest 2024 Sheep's Wool Prefeasibility Study is funded by the Northwest Agriculture Business Center (NABC) and is a non-biased study intended to serve wool growers, processors, and wool-related businesses. Its purpose is to identify the location, flock size, volume, breed/type, and grade of wool in the region and determine whether or not producers are interested in joining a tri-state wool pool. The study has a broad goal of strengthening regional sheep's wool growing and processing infrastructure in the Pacific Northwest.

This prefeasibility study is the initial phase in the assessment process and is meant to supply a preliminary evaluation of the proposed project's potential viability. It provides a broad overview of the proposed project and examines high-level factors like market demand, basic overview of technical requirements, and rough cost estimates of the scouring equipment. This study was conducted over the course of April, May, and June of 2024.

Image credit, The Wandering Ewe Fibers

Image Credit, Soundview Fiber Mill

The Pacific Northwest 2024 Sheep's Wool Prefeasibility Study gathered data gauging the needs of wool producers and the current market for wool in the tri-state region. The results summaries and recommendations merit a "go"' decision and advise stakeholders to invest further time and resources into initiating a tri-state wool pool with a comprehensive strategic plan aiming to rebuild the regional wool industry. Organizing wool aggregation at this scale warrants construction of a scour facility and storage warehouse, suitable wool transportation and facilities access, establishing aggregation points, as well as development of other appropriate infrastructure and a Pacific Northwest Wool brand.

A "go" decision on this project would *create jobs* for ranchers, shearers, storage and transportation specialists, breeders, and more, as well as require partnership between agricultural, cooperative, port, and minimill industries. It would *curb wool waste* and *create opportunities for regenerative and closed-loop agricultural systems* at Pacific Northwest farms, benefitting workers and the regional supply chain. Innovations in agricultural practices as well as the development of local meat, fiber, and potential textile industries would be a strong draw for *agritourism*, providing a variety of attractive products for consumers. Additionally, this project would offer Pacific Northwest consumers a *locally produced and more sustainable textile option*.

Methods

Scope

Anyone with two or more sheep in Washington, Oregon, or Idaho was invited to take the survey within a three month window. The survey was formulated to collect data from producers while interviews provided qualitative data from other parts of the local wool industry such as mills and manufacturers.

Primary Data Collection Methods

The main source of data collection for this study was an e-survey distributed via email outreach and social media ads. The authors also utilized in-person outreach at fiber related events, tours, and businesses in Western Washington and conducted in-person, phone, and teleconferencing interviews with a variety of respondents listed in Table 3.

Secondary Data Collection Methods

The authors of this study also utilized statistical reports and government data such as the USDA's agricultural census data or reports, as well as articles published by reputable sources.

Table 3

Name	Association	Type
Jason Schaefer	Holy Lamb Organics	Bedding manufacturer and Retailer
Angela Wartes-Kahl	Twisted Strait Fibers	Fiber CoOperative
Faith Hagenhofer	Hercules Farm	Wool Producer
Charene Goodhue	Soundview Fiber Mill	Cottage Fiber and Weaving Mill
Jessica Schwab	Skagit Woolen Works	Fiber Mill and Retailer
Jolene Quaintence	The Wandering Ewe Fibers	Pelletizer Mill
Keith Stonelake	Pendleton Woolen Mills	Weaving Mill and Retailer
Donalee Rodger	Rodger Family Farm & Fiber Mill	Cottage Fiber Mill
Alex Hagiepetros	Carnation Farms	Regenerative Agriculture Nonprofit
Ed Berukoff	Brother MiniMills	Equipment Manufacturer
Aslan Meade	Tenino Ag Park	Business Park
Bill Teitzel	Port of Chehalis	Port

Image credit, Gardener's Kit

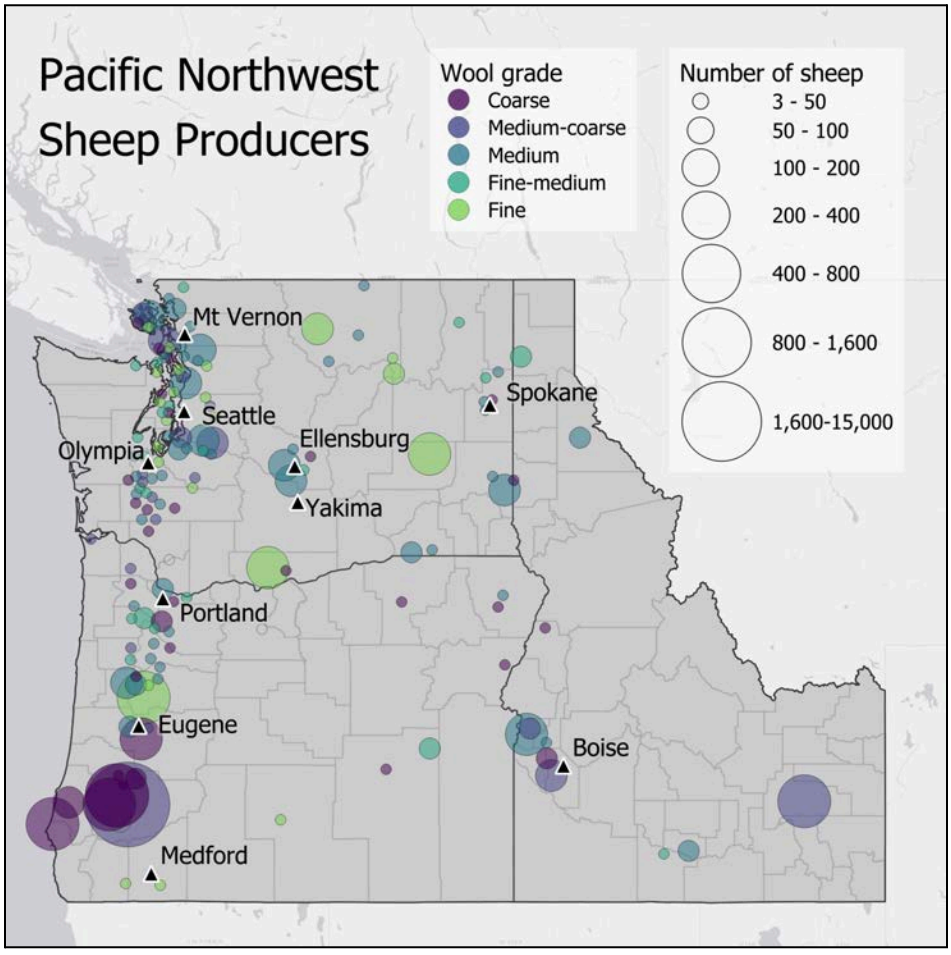
Results Summaries

Over the months of April, May, and June of 2024, 165 people responded to the *Pacific Northwest Wool Producer Survey* written by Emily Manke. Respondents answered the following questions:

What is the name of your farm? (Appendix 1)
Where is your farm located? (city, state, zip)
How many sheep are in your flock?
What breeds of sheep are you raising?
What grade (fine, medium, coarse) of sheep's wool do you produce?
Approximately how many lbs. of sheep's wool total do you produce annually?
Would you be interested in joining a cooperative to access larger markets to sell wool to?
If you have any other information that may be useful to help aggregate wool throughout the region and sell into larger markets, please share here. (Appendix 2)

Size of Flock
Producer Location

Of the 151 respondents with sheep, the average flock size was between 20-120 head of sheep and the total head of sheep accounted for in this survey is 22,021[10]. The majority of respondents are in Washington State west of the Cascade mountain range. About 30% of respondents were located in Oregon and ~8% were located in Idaho. While Washington is over-represented by the number of respondents, that data shows where the market is ready to grow.



See Appendix 3 for individual state maps.

Larger flocks tend to be in the south and south-east regions of the tri-state area where there is open space and relative proximity to the Utah Wool Marketing Association (in the case of southern Idaho) and Woolgatherer Carding Mill (in the case of southern Oregon).

[10] Please note that the sheep represented in this survey are specifically wool sheep, while the total number of sheep and lamb statistics for 2024 from the *American Sheep Industry Association* accounts for wool and hair sheep.

The above *Pacific Northwest Wool Producers* map shows a concentration of large-scale producers in the Roseburg area of Oregon. This is the location of the *Douglas County Livestock Association Wool Pool*, representing 40 producers who collectively group, market, and ship their wool, selling to the highest bidder (usually Woolgatherer) each year.

Table 4 lists wool pools registered on the *American Sheep Industry Association* website:

Table 4

State	Name	Status
ID	Bingham County Wool Pool	Active
ID	Gooding Area Wool Pool	Unknown
OR	Douglas County Livestock Association Wool Pool	Active
OR	Klamath Area Wool Pool	Unknown
OR	Tri-County Wool Pool	Inactive
WA[11]	Columbia Basin Wool Pool	Active
WA	Kittitas County Sheep Producers Wool Pool	Unknown

The *Columbia Basin Wool Pool* aggregates wool specifically for Pendleton Woolen Mills and is located in the Portland region. This wool pool only buys fine (less than 19) micron wool in large volumes and the respondents shown on the *Pacific Northwest Wool Producers* map (indicated in green) generally sell to Pendleton.

The data collected regarding flock size and location compared to the activity and location of PNW wool pools sheds light on where the local market for wool is satisfied, where it is lacking, and where it is ready to grow.

Volume

Respondents reported the total volume of wool they produced annually. From the 22,021 sheep accounted for in the survey, 314,984 pounds or approximately 157.5 tons of wool was produced in 2023.

Many respondents noted they have sheds, garages, or warehouses full of stored wool from the last 3-10 years. Gathering exact numbers on pounds of stored grease wool is not possible and the wool is not viable for processing, but is usable for pelletizing and utilizing as a soil amendment - thus still relevant to this study and qualifiable in the proposed wool pool. It is also useful for testing out new equipment, as damaging the wool is not a concern.

Many producers mentioned during in-person outreach that due to lack of infrastructure resulting in years of stored wool, they were forced to reduce their flocks. Despite the prevailing circumstances, producers want to expand their flocks and are interested in infrastructure that would justify expansion.

[11] The following Washington wool pools are listed on the *American Sheep Industry Association* website but are assumed inactive due to lack of response from listed wool pool organizers, lack of recognition from WA sheep producers contacted via in-person and email outreach, and lack of online presence: Puget Sound Wool Growers Association Wool Pool, Whitman County Wool Pool, Blue Mountain Wool Pool.

Type

Breeds of sheep reported in the survey are represented on Table 5 located in Appendix 4. The number or amount of each breed was not requested in the survey since many respondents raise mixed flocks and/or mixed breeds; thus, Table 5 lists only the breeds mentioned in the survey at unknown quantities. This data offers a baseline of what PNW producers are currently interested in raising and displays a mix of specialty, heritage, and commercial breeds.

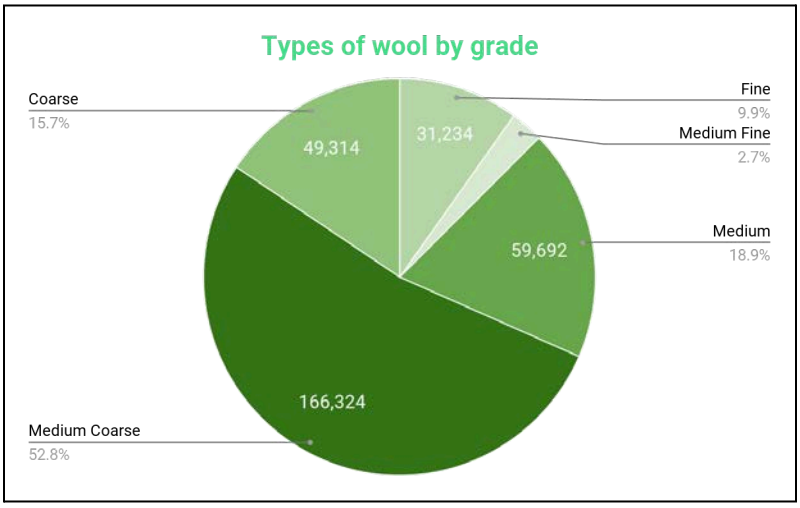
Many respondents raise small flocks of specialty and/or heritage breed sheep producing wool ideal for hand-spinners and artisans because that is what they are able to sell through other outlets. The lack of a greater market for commercial wool advised respondents choices regarding which breeds to raise.

Woolgatherer Carding Mill[12] incorporates wool from Corriedale, Suffolk, Dorset, Cheviot, Romney, Moorit, Coopworth and Columbia breeds in their Premium Eco Wool Batting, which sets comparable guidelines for what types of wool stakeholders in this project may be interested in raising or purchasing.

An established PNW wool pool will feasibly create an incentive for producers to expand or pivot to raise more commercial breeds of sheep.

Grade

The majority of participants reported producing medium-coarse grade wool (29-31 microns), representing ~53% (166,324 lbs) of the 314,984 pounds documented.



Many of the Pacific Northwest producers of fine wool (19 microns or less) who responded to the survey stated they sell their wool to Pendleton Woolen Mills and would not be interested in joining a wool pool. For this reason and since several established minimills currently process fine and specialty fibers, the authors of this study concluded that for a wool pool to be feasible, it would focus on coarse-medium grade wool non-exclusively.

Being that the majority of producers polled raise sheep with medium to coarse grade wool, the authors of this study recognize the potential that a secondary market for locally produced bedding, carpets/rugs, insulation, and wool pellets is

Grade	Pounds	Percent
Coarse	49,314	15.7
Medium Coarse	166,324	52.8
Medium	59,692	18.9
Medium Fine	8,420	2.7
Fine	31, 234	9.9
Total	**314,984**	**100%**

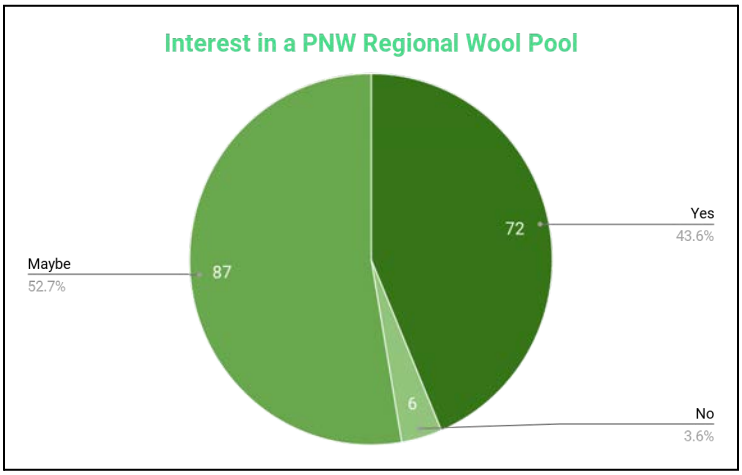
[12] Woolgatherer Carding Mill is an Organic Certified by the Oregon Tilth producer of several different wool products - including Wool and Cotton Batting, 100% wool Insulator Barrier, as well as wool and cotton textiles - made from domestically sourced and manufactured EcoWool.

prepared to grow - especially in the Western Washington and Portland Metropolitan regions.

Other principal buyers of coarse to medium grade wool mentioned by respondents are the Utah Wool Marketing Association[13] and Woolgatherer Carding Mill in California, however; according to some respondents, the price producers get for their wool does not justify the cost of shipping hundreds, and sometimes thousands of pounds of raw wool to Utah or California. Producers are thus left without a feasible market for coarse to medium grade wool.

Interest

Participants were asked if they would be interested in joining a cooperative to access larger markets for selling their wool. Of the total 165 respondents, only 6 said “No.” 72 responded with a definite “Yes” answer and 87 responded with a “Maybe.”



Respondents who stated they were not interested in a wool pool either keep specialty breed sheep for wool-related hobbies or sell their fine wool to Pendleton Woolen Mills.

It is clear from these results that sheep producers in the tri-state region are interested in and need help selling their wool, but a producer’s specific needs based on flock size, breed, and location are so varied that the majority of respondents were unsure if this project would be right for them - lending to a “Maybe” response. Understandably, participants in this survey want to see how this project develops and which organizations are involved before they commit.

Five of the survey respondents and an additional four interviews were from fiber mills and domestic/contract textile manufacturers. All of these respondents expressed interest in buying scoured wool from the proposed wool pool. These businesses want to buy clean, ethically sourced[14] wool domestically not only to save on shipping and transportation for their small businesses, but also to support a strong local economy.

[13] Utah Wool Marketing Association is a non-profit wool brokerage and storage warehouse formed in 1926 by a group of sheep producers as a cooperative to assist producers in gathering and marketing their wool.
[14] For the purposes of this study, “ethically sourced” refers to wool that meets all or most of the criteria for EcoWool described on Woolgatherer Carding Mill’s website: https://thewoolgatherer.com/domestically-sourced-and-manufactured-eco-wool/

Data Based Solutions

Based on the findings of this study, the authors have concluded that there is enough wool in the region to justify a tri-state wool pool and producers want and need infrastructure in order to expand their flocks and sell their wool to a larger market.

Wool aggregation at this scale is feasible only if there is a *scouring facility* to match its volume and a *brand identity* for Pacific Northwest wool, demanding a higher price by adding value to the scoured wool. A mid-size scour facility would only be feasible with a large *wool pool*, the two would work symbiotically.

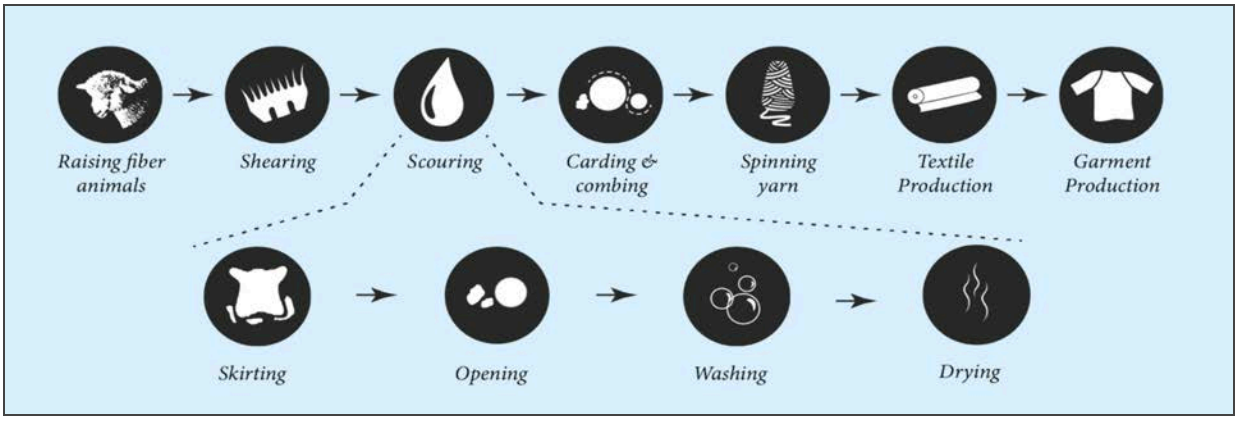


Image credit, Hudson Valley Textile Project initiative: Clean Fleece New York.
Phases of wool processing from sheep to garment, emphasizing the basic processes involved with wool scouring.

Evaluation Criteria

For a wool pool and scour facility serving the Pacific Northwest region to be feasible there needs to be:

- **Producers growing wool.**

For stakeholders such as Holy Lamb Organics and minimills looking to buy locally sourced wool, the proposed wool pool needs to scour at least 50-65,000 pounds of clean wool annually. This means it needs to aggregate closer to 85-100,000 pounds of grease wool per year[15] to meet market demand. Sheep are shorn once or twice a year depending on breed and many growers do not have storage and need to sell or send off their wool immediately after shearing. To best serve producers, this wool pool would need to have annual (Spring only) or biannual (Spring and Fall) collection services.

- **A fair market, affordabilty, and monetary incentive.**

The wool pool needs buyers offering a fair price for coarse to medium grade grease wool. On the other hand, buyers need to be able to afford scoured wool from this wool pool.

According to the American Sheep Industry Association *Weekly Market Summary* (see Image 2), as of July 26, 2024 the price of medium grade clean wool was $2.30 per pound while coarse grade clean wool was only $1.00 per pound. Including the cost of storage and shipping from China, New Zealand, and England, buyers are currently paying between $3.00 - $6.00 for coarse to medium grade clean wool.

Image 2

AMERICAN SHEEP INDUSTRY ASSOCIATION
YOUR INDUSTRY ADVOCATE SINCE 1865

NEWS EVENTS ISSUES PRODUCER

	Current Week	Prior Week	Percent Change
Australian Wool, Delivered FOB, US$/lb. CLEAN **			
17 micron (Grade >80s)	$5.19	$5.07	2.4%
18 micron (Grade 80s)	$4.62	$4.61	0.2%
19 micron (Grade 70-80s)	$4.27	$4.34	-1.6%
20 micron (Grade 64-70s)	$4.12	$4.13	-0.2%
21 micron (Grade 64s)	$4.05	$4.08	-0.7%
22 micron (Grade 62s)	$4.00	$4.07	-1.7%
23 micron (Grade 60-62s)	NQ	NQ	NA
24 micron (Grade 60s)	NQ	NQ	NA
25 micron (Grade 58s)	$2.30	$2.18	5.5%
26 micron (Grade 56-58s)	$1.86	$1.84	1.1%
28 micron (Grade 54s)	$1.30	$1.26	3.2%
30 micron (Grade 50s)	$1.17	$1.15	1.7%
32 micron (Grade 46-48s)	$1.00	$1.04	-3.8%
Merino Clippings	$2.20	$2.26	-2.7%

* The Net Cutout Value accounts for an average cost of $77.00 per cwt. paid by firms covered under LMR for processing and packaging.

** A 75-85 percent range of Australia price can be used as an estimated value of clean domestic prices.

In an interview with Jason Shaefer of Holy Lamb Organics, he stated that his business and potentially other buyers would be willing to pay $3.00 - $6.00 for domestically grown coarse to medium grade wool if it meant supporting local producers and the Pacific Northwest fiber economy. Furthermore, based on interviews with a Washington

[15] Grease wool weighs more than clean wool due to the vegetable matter, soil, feces, and lanolin that is washed out in the scour process.

pelletizer mill as well as Angela Wartes-Kahl of Twisted Strait Fibers, it is anticipated that producers with wool graded for pelletizing[16] could potentially be compensated 50 cents to $1.00 per pound.

In the next phase of this project, in-depth data collection needs to be done assessing the overhead costs for Pacific Northwest sheep's wool producers in order to determine what price per pound for grease wool would justify keeping sheep to sell wool.

Once producers know there is a fair priced market for their coarse to medium grade wool, there will be incentive for producers to expand their flocks with breeds of sheep that are conducive to the end-product of the wool grown.

- **Appropriate waste management.**

Any and all new infrastructure needs to be built with ecologically sound practices, not only to be responsible stewards of the Earth, but to keep costs down by building in efficiencies, honor the producers' wishes, meet consumer demand, and comply with potential regulations. This project would generate three primary byproducts, listed as follows:

❖ Waste wool

When shearing, waste wool refers to belly wool or any parts of the fleece determined unusable for further processing. Waste wool can also be aged grease wool that may or may not have been stored improperly lending to mold, moths, or beetles. If the proposed Pacific Northwest infrastructure stimulates the expansion or establishment of more sheeps wool producers, there will be a higher volume of waste wool in the region. This project aims to eliminate "waste wool" and supports the use of undesirable grease wool as a soil amendment.

❖ Wastewater

A scour facility will clean contaminants such as vegetable matter, feces, dirt, suint, and lanolin from the incoming grease wool and, after multiple scour cycles and capturing the lanolin (see below), will produce a large volume of nutrient rich wastewater. It would be uneconomical to pay for this wastewater to go into city or county sewage and squander its potential as a liquid fertilizer. This project would prove feasible only if the nutrient rich wastewater is reused, and doesn't have to enter a sewage system. This can be achieved by acquiring a beneficial use determination[17], supporting closed-loop systems.

❖ Lanolin

Lanolin is a yellow, oily, water-repellent wax that is a byproduct of sheep's wool. It must be removed from the fiber during scouring as well as from wastewater[18] and can be captured for use in cosmetics. According to VeryWell Health, "it is classified as an occlusive moisturizer. This means it works by reducing water loss from the skin, similar to petroleum jelly."
Lanolin is captured in the initial scour baths so the water can be recycled multiple times in subsequent rinses before it becomes wastewater. From there, the lanolin would be sold and can generate additional revenue for the proposed project.

[16] This wool is currently regarded as "waste wool." Waste wool is generally shorn from the belly and face areas of sheep and either contains contaminants such as feces, suint (sheep sweat), vegetable matter, and dirt, altering the quality of the wool or is too short a staple length to be usable. Waste wool may also be wool that has been stored for too long - rendering the fiber brittle or discolored - and may be infested with mold, moths, or beetles. While this wool retains all the desired benefits for a soil amendment, without being pelletized this wool is sent to the dump or burned, lending to the categorization of "waste."
[17] A Beneficial Use Determination (BUD) is a statewide exemption from Washington's solid waste permitting requirements. It is a process that the Washington State Department of Ecology uses to evaluate whether solid waste can be reused in a way that doesn't harm the environment or public health.
[18] If lanolin is not removed in the scour process, it gunks up subsequent wool processing equipment, causing malfunctions. It also prevents the fibers from gripping to each other when being spun into thread and yarn. Similarly, lanolin will gunk up plumbing and sewage, sticking to pipes and causing eventual blockages.

- **Transportation and Storage.**

This project requires a system for wool collection and storage, entailing a mobile aggregation service that would travel to multiple drop points in the tri-state region and return to a 5,000-10,000 square foot[19] warehouse.

Image belongs to Bernard Spragg and was sourced from Flickr.
Bales of wool in a warehouse. Wool is baled in a hydraulic press then packed into standardized nylon bags. Bales should weigh between 110 kg (243 lb) and 204 kg (450 lb), unless the wool is under 18.6 microns, in which case they may be a minimum gross weight of 90 kg (198 lb).

Producers mentioned in the survey and during in-person outreach that a major pinch point is moving wool to where it can be sold and/or stored. If cost is a barrier to purchase a vehicle with capacity to transport large volumes of wool, they will not produce large volumes of wool - inhibiting growth and expansion of sheep production. Likewise, if a producer doesn't have adequate storage to keep their wool free of mold and pests, it becomes waste. Furthermore, for a producer to send their wool via USPS or private shipping options, the cost of shipping is more than the going rate for their wool.

To meet the producers where they are at, this project needs to establish drop points at fiber events (related to Education and Outreach, see below) and entertain the possibility of picking up wool on-site after shearing if the volume of wool is great enough.

The warehouse needs to have the capacity to store grease wool waiting for processing, clean wool, and possible wool on consignment as well as minimal storage for a stock of wool pellets. The warehouse would require pelletizing on-site as well as employ a team of wool brokers[20] to sort and grade grease wool for its appropriate processing into pellets, pooled scour, or possible specialty scour[21].

[19] The warehouse size specified in this study is an estimate and further research needs to be done in future phases of this project that considers - among other items - the site size and evaluation, measurements of equipment, and amount of baled wool stored.
[20] A wool broker is a marketing agent who acts on behalf of wool growers to sell their wool. Their services include but are not limited to warehousing for storing and testing wool, marketing, arranging bales into lots for testing and cataloging, preparing catalogs about each lot including valuations based on current market rates, managing direct sales or wool to be sold at auction, as well as managing travel bookings for wool lots.
[21] This study entertains the possibility of partnering with existing fiber processing mills, in the interest of producers, to share resources in order to carry out single-fleece processing alongside pooled or blended wool scour. Further logistical evaluations will determine the feasibility of this option.

- **Equipment.**

A tri-state wool pool and scouring facility require specialized equipment. Research pertaining to the quantity, price, dimensions, manufacturers or resellers, and installation is required in subsequent phases of this project. Below is dynamic list of general equipment and systems essential to this project:

- Appropriate wool transportation vehicle
- Forklift equipped to handle bales of wool
- Front loader tractor
- Industrial manual or rotary wool tumbler
- Hydraulic wool baler machine
- Industrial scour train
- Industrial hot water heater
- Industrial drying system (elaborate fan room or radio frequency dryer)
- Lanolin capture system via high speed centrifuge
- Wastewater management system that may require:
    - Specialized plumbing
    - Specialized storage
    - Transportation - water trucks or pipelines

- **Local or hired technicians.**

Specialized equipment requires specialized technicians to repair parts and troubleshoot when machines break down. Most minimills in the Pacific Northwest operate with antique machinery or machinery from North-East Canada or Italy. When the machines break down, they may have to wait months for a traveling technician to service their machines, to receive parts, or to search for antique parts (no longer manufactured) internationally.

For this project to be feasible, there needs to be a team of local technicians trained on repairing the specialized equipment (predominantly the scour train). Ideally machinery, parts, and labor would be domestically sourced and preferably from the Pacific Northwest.

- **Industry Collaboration.**

A goal of this project is industry collaboration potentially through a cooperative business model. Wool passes through many hands before it reaches a storefront. For this project to be feasible, it requires all regional fiber-related businesses to collaborate, effectively communicate, and ease the transportation between organizations with the interest of producers, buyers, shearers, existing fiber pools, mills, and other cooperatives in mind. Most importantly on the cooperative side, it takes producer participation and buy-in to keep the cooperative moving forward. Producers must be willing to help aggregate in order for this model to function.

- **A retail market for Pacific Northwest grown wool products.**

A Pacific Northwest Wool brand, developed by a professional marketing agency, alongside the wool producers, which incorporates regional identity, as well as a commitment to ethical and humane practices, will help add value to the scoured wool, and increase sales for producers. Additionally, further certifications such as the USDA's Biopreferred USDA Certified Biobased Product label will help inform consumers and add value to the product.

- **Education and community outreach.**

Qualitative data suggests that the majority of farm and mill owners that make up the Pacific Northwest wool industry are over the age of 50 years old. Furthermore, many of these businesses don't have anyone to inherit their trade due to lack of a viable market and educational infrastructure around wool production and processing.

This project requires continuous community interaction, education, and outreach to secure future clientele and maintain a sustainable business model that creates a legacy. Outreach and education has the dual purpose of boosting marketability of the products.

Initial Assessment

Strengths/Assets

- Shearers: The PNW has an abundance of shearers trained through the WSU Extension Shearing School, the Oregon Sheep Growers Association Shearing School, and the University of Idaho Sheep Center. Many PNW shearers travel to farms and have other sources of income since shearing in the PNW is seasonal to the Spring and Fall. Some will travel to the Southwest for industry shearing income.

- Mills: Western Washington has 16 small fiber processing mills open to the public. They process 5-45 lbs of grease wool a day. Currently, the average minimill in WA will scour about 3,000-11,000 lbs of wool a year.

  While a select few offer wool pelletizing services, most of the western WA minimills scour, pick, and card wool into batts. From there, some will create any combination of the following products based on what equipment they have: wool clouds, roving, pencil roving, core spun rug yarn, single ply yarn, plied yarn, felted products, and felted or woven rugs.

  The minimills and their customers sell primarily at regional fiber festivals, local outdoor markets, yarn or other local retailer shops, or on Facebook Marketplace.

- Wool processing equipment manufactured in the PNW: Most minimills have Belfast MiniMills (based on Prince Edward Island, Canada) or Ramella (based in Biella, Italy) equipment. Whether they buy directly from the manufacturer or second-hand, mills rely on community members with basic knowledge of working on machines for repairs or for the company's technicians to make a North American tour. This means if parts break and the millers cannot repair their machines themselves, they must wait for technicians to be in the PNW for parts and labor, which could render their mill inoperable for an uncertain amount of time.

  Brother Drum Carders/MiniMills is a local fiber milling equipment manufacturer based in Silverton, OR specializing in drum carders from the hobby to minimill scale. It is the only one of its kind, offering small to midsize industrial mill equipment including different wool carders, a picking machine, and soon a draw frame. Whether or not Brother expands to build scour equipment, they are offering products that will expand the cottage and minimill industry that will create a greater demand for wool in the PNW as well as throughout the US.

- Pendleton Woolen Mills: Pendleton processes approximately 130-200,000 lbs of domestically produced grease wool per year at the Bollman Hat Company scour plant in St. Angelo, TX. The cost of transportation to and from St. Angelo on top of scouring fees is narrowly feasible for the company, according to Keith Stonelake, wool buyer for Pendleton.

  Pendleton purchases bales of merino wool with a micron count of 19 or less with the stipulation the producer delivers the wool to the Columbia Wool Scouring Mills building in the Portland, OR area. They do not purchase coarse/medium grade wool or small quantities of fine/merino wool and although they do have partnerships with some PNW fine/merino wool producers, Stonelake stated in an interview that Pendleton often turns PNW producers away because the price of domestic wool is such that it is often cheaper to import clean merino wool. Nonetheless, Pendleton is a reliable buyer for medium to large scale fine/merino wool producers in the PNW.

  Pendleton participates in a larger market specializing in fine/merino wool and does not present relevant competition to this project. Stonelake is satisfied in the partnership with Bollmans scour plant and also expressed support for a PNW wool pool and scour facility, as well as interest in the possibility of partnering with this project in the future.

Weaknesses/Liabilities

- Duality of market infrastructure: There are two current markets for wool: small hobby or cottage industry, or the international market. This duality isolates PNW producers into a market that pulls an income less than the expenses of keeping their animals. It is not financially viable or sustainable to raise sheep in the current domestic market due to lack of infrastructure supporting midsize producers and processing.

  Due to a lack of midsize processing and market infrastructure, producers struggle to find buyers for coarse/medium wool. There have been multiple reports from producers, mills, and shearers that many operations raising sheep for meat, sheep dog training, grazing or herbivory, milk, or wool that doesn't meet market standards are dumping or burning their wool because there is no viable market for it.

- Expanding from small to midsize processing: There are 16 publicly available minimills in Western Washington, 2 in Oregon, and unknown in Idaho. Regional mills are currently operating at maximum capacity, processing between 25-300 lbs of wool a week and maintaining a waitlist up to 2 years.

- Inadequate midsize scour equipment: Minimills have a variety of equipment that varies in what types of wool they can process and to what degree[22]. When it comes to minimills it is not one size mill fits all types of wool and often mills will turn customers away if their fleeces are not suitable for the mill's equipment.

  Most minimills provide scouring services unique to their milling operation and possess the expertise to balance water pH:lanolin:scour agent ratios for different types of fiber. However, scouring is a pinch-point for small mills partly due to the lack of adequate scour equipment to match demand. Many PNW mills employ DIY wash systems with sink basins or repurposed old

[22] Including but not limited to batts, roving, yarn, and textiles. Some mills only have carding machines producing batts while others have spinners producing yarn.

washing machines. Some use the Belfast Minimill or Ramella wash systems. All three systems similarly wash 5-15 lbs of grease wool at a time.

The equipment batch size capacity jumps from scouring 5-15 lbs of wool at minimills to a *minimum* of 5,000 lbs at Bollmans. Currently there is one option for a midsize scour train manufactured out of Aotearoa (New Zealand) - the KiwiScour. The Hudson Valley Textile Project's Clean Fleece NY initiative currently operates a KiwiScour and processes between 50-100 lbs of wool a day and reports glitches and maintenance issues with the machines software. The scour equipment required for the proposed project needs to process between 200-300 lbs of wool per day in order to produce 50-65,000 lbs of clean wool per year. The KiwiScour represents small to midsize scouring capacity but is inadequate to meet the volume required within the proposed project.

- Technicians: Current mill equipment is manufactured internationally and in the event of an equipment malfunction, processors don't have access to specialty parts that must be shipped internationally and must wait for a technician to service their machine on an international tour. This model is inherently unfeasible because unless a processor knows how to work on their equipment software or can manufacture spare parts, their mill can become inoperable until a technician travels to the PNW.

- Transportation: There are currently two domestic scour facilities:
    - Bollman Hat Company scour plant in St. Angelo, TX requires a minimum batch size of 5,000 lbs grease wool and charges less the larger the batch.
    - Chargeurs Wool in Jamestown, SC

  Referencing the lack of infrastructure, PNW producers are responsible for moving their grease wool from the farm to an appropriate processing facility. At the small to midsize level, it is feasible for producers to transport in private vehicles like vans or farm trucks. For utilizing the Bollman or Chaugers facilities to be most financially feasible, producers would need to transport a minimum load of 65,000 lbs of grease wool. It is not financially or environmentally economical for PNW producers to transport their wool to either of these scour facilities and both are designed to process large quantities of wool at a time beyond the scope of this project at this time.

  Furthermore, for possibilities of regional processing, 1-10 hours of private transport carried out by a demographic of people over the age of 50 for a price of wool that may not even cover transportation costs is similarly impractical for PNW producers.

Key Stakeholders

The primary stakeholders in this project are *producers growing coarse to medium grade wool in Washington, Oregon, and Idaho.* This includes ranches raising wool sheep primarily for meat and/or grazing where wool is a byproduct of their sheep operation.

Other stakeholders include shearers, fiber mills, equipment manufacturers, wool buyers, wool-based retail businesses, local agricultural cooperatives, and educational institutions. Some of the specific key stakeholders and their roles in the project are as follows:

Holy Lamb Organics
Natural Bedding

Image credit, Holy Lamb Organics

Holy Lamb Organics is a natural bedding retailer specializing in wool mattresses, pillows, toppers, and comforters operating out of Oakville, WA with a retail store in downtown Olympia, WA. Their natural mattresses are hand-made with an emphasis on sustainable business practices and dedication to healthy living and the environment.

Wool used for bedding and domestic textiles is graded as medium to coarse. Holy Lamb Organics incorporates medium/coarse grade wool from Suffolk, Dorset, Cheviot, Romney, Moorit, Coopworth and Colombia breeds of sheep in their products, sourced from WoolGatherer in Montague, CA (scours at Bollman) and GOTS Certified wool from overseas - mainly New Zealand, India, and England. Holy Lamb receives their wool in bales of clean wool ranging in size from a minimum of 243 lbs to 450 lbs and uses approximately 50,000 lbs of wool per year but is scheduled to expand their business in the next few years.

Importing wool from overseas and shipping domestic wool sourced from up and down the West Coast to Texas and back, is not an economical source of wool for Holy Lamb; however, with the lack of a robust wool pool and wool processing infrastructure in the region, the company is left with no other options that meet their business needs. The costs that come with shipping, transport, and storage are one of the greatest operating expenses for Holy Lamb Organics and the owners, Jason and Mindy Shaefer, are seeking to source wool from the Pacific Northwest to minimize these costs.

In an interview with Jason Shaefer, he expressed unyielding support for a Pacific Northwest Wool Pool and intentions to be a key buyer, offering to pick up grease wool from a wool pool storage warehouse or, more ideally, to pick up clean wool ready for processing to be used in Holy Lamb Organic's products. Currently, Shaefer knows of many sources of PNW grown coarse/medium wool but is unable to collaborate with local growers and mills in a financially economic system due to a lack of resources and infrastructure.

Holy Lamb Organics has been identified as a key stakeholder in this project and their cooperation would satisfy the market feasibility of this project.

Twisted Strait Fibers

Small batch and specialty fiber processing

Image credit, Twisted Strait Fibers

Twisted Strait Fibers is a cooperatively owned fiber processing mill based out of Port Gamble, WA composed of fiber farmers and fiber artists. The members of the cooperative have a passion for all natural fibers including wool, cashmere, alpaca, llama, mohair and yak. They emphasize and share fiber related knowledge with each other with the intent to grow stronger as a group and community by offering local fiber processing, a sales platform for member's products, and more.

Presently, the Board of Directors at Twisted Strait Fibers have directed their focus to adding a small to midsize scour train to the fiber processing mill. They have been conducting in-depth technical research on scour equipment and recently returned from a business trip to Clean Fleece New York, an initiative of the 501c3 non-profit Hudson Valley Textile Project, to review the operating mid-size scour train in use there.

In an interview with Twisted Strait Fibers Board of Directors member Angela Wartes-Khal, it became evident that partnership between Twisted Strait Fibers and the Washington Wool Growers Committee would be mutually beneficial for resource sharing and support. Twisted Strait Fibers has been very generous in sharing their research and this author has established that the respective scour projects would serve two different markets (see Table 5), effectively supporting PNW producers of a variety of different breeds and grades of wool, supporting a "no wool producer left behind" initiative.

Table 5

WA Wool Growers Committee	Twisted Strait Fibers
Coarse/medium sheep's wool only → no fine or specialty fibers processing	All fibers: any grade (fine/medium/coarse), any type (various protein fibers, not sheeps wool exclusive)
Wool blend only (subject to change)	Breed specific possible as well as wool blends
Standardized scour ratios → type:temp:scour agent	Scour ratios variable depending on type
Reliably scouring upwards of 50,000 lbs of sheep's wool p/year	Lbs scoured p/year variable
Services supportive to all growers, but possibly more economic for large-scale producers with coarse/medium grade sheep's wool specifically	Services supportive to all growers, but especially supportive to small-scale producers and/or fine wool or specialty fibers specifically

Location, transportation, and storage are constraints for Twisted Strait Fibers. For the proposed project, joining forces with Twisted Strait Fibers means growers could send all their wool to one place - regardless of type or grade - and have it be sorted for pelletizing, pooled scour, or specialty scour through Twisted Strait Fibers. This system would solve transport and storage for growers and fellow cooperatives as well as pool resources such as trucks, equipment, storage space, and an employed brokerage team. Pooling resources is economically, environmentally, and financially beneficial to all parties.

Partnering with Twisted Strait Fibers would satisfy this project's need for industry collaboration and emphasize market cooperation.

The Wandering Ewe Fibers
Pelletizer mill

Western Washington currently has two wool pelletizing businesses, with plans for another in the next few years as well as an up-and-coming pelletizer mill in Brownsville, OR.

One of the Western Washington mills is The Wandering Ewe Fibers, a wool pelletizing business operating out of Belfair, WA. Wool pelletizing is the process of collecting waste wool and processing it into an effective soil amendment.

Image credit, The Wandering Ewe Fibers

Wool pellets consist of wool, lanolin, feces, vegetable matter, and variable protein matter from moths or beetles. Pellets can improve soil structure by adding organic matter aiding in erosion prevention, preventing soil compaction, and promoting water infiltration and root penetration. Wool pellets also aid in water retention and a natural slug and snail deterrent.

The Wandering Ewe Fibers is currently processing approximately 300 lbs of grease wool a week and is ready to expand with the goal of processing 200 lbs of grease wool a day. Their current barriers to expansion include - but are not limited to - lack of funds, transportation, and storage.

In an interview with the company's founder, Jolene Quaintence, it was established that The Wandering Ewe Fibers would be interested in contracting or partnering with this project to incorporate an on-site pelletizing operation with the caveat of operating separately from The Wandering Ewe Fibers brand.

Ideally, grease wool would be moved from drop points to a storage warehouse where it can be graded and sorted for pelletizing, pooled scour, or specialty scour. Wool pelletizing would be done on-site at the storage warehouse, eliminating further transportation and storage constraints for the pelletizer operators, while wool slated for scour would be sent to appropriate facilities.

This system is beneficial to growers because it minimizes transportation and storage hurdles and maximizes the amount of wool going back into the economy and ecosystems. Growers can send in and sell *all* their wool, regardless of quality.

Incorporating a pelletizing mill on-site at the storage warehouse would satisfy this project's need for feasible wool waste management and support closed-loop agricultural systems.

Brother MiniMills
Fiber milling equipment manufacturer

Brother Drum Carder and MiniMills was founded in 2007 by Ed and Gabriel Berukoff and is a domestic fiber processing equipment manufacturer in Silverton, OR. They started making hand-crank drum carders and have since expanded to manufacture carding machines appropriate for the region's cottage and minimill fiber processing industry and now ship internationally. They have a “focus on quality, affordability, and customer satisfaction” and are thus interested in meeting the needs of their customers.

Recently, the need for more efficient wool scouring equipment has arisen from multiple mills in the PNW region and Brother MiniMills has been approached and requested to make scour equipment. In a brief interview with Ed Berukoff, he stated that Brother is not currently working on manufacturing a scour train simply because they are directing all their attention to rolling out their new cottage/minimill carding line. However, they are in the earliest stages of crowdsourcing and collecting data researching what type and size of scour equipment would serve their customers most effectively. This includes creating equipment that satisfies an affordable price point for the average minimill, but is not exclusive to that demographic.

Berukoff affirmed that his company would potentially be interested in manufacturing appropriate equipment to fit the needs of this project, albeit at an unknown price point due to the premature nature of the equipment’s development. More cogent information on this equipment is “at least two years out” according to Berukoff.

Image credit, article by Gale Zucker entitled *The Power of Scour*, featured on the website Modern Daily Knitting reporting on the Hudson Valley Textile Project’s Clean Fleece New York initiative. Clean Fleece utilizes the KiwiScour machine, manufactured in New Zealand.

Having Brother MiniMills as a local equipment manufacturer would satisfy this project's need for a feasible outlet for equipment parts and repairs.

Soundview Fiber Mill & **Rabbit Hill Wool Mill**
Fiber Processing Mills

Soundview Fiber Mill is a cottage fiber processing and weaving mill in Shelton, WA specializing in core-spun rug yarns and woven rugs. Charene Goodhue, the mill owner, stated in an interview her mill would be interested in purchasing clean coarse wool from the wool pool to use in her rugs and is a proponent of marketing a PNW Wool Brand.

Likewise, Rabbit Hill Wool Mill is a cottage fiber processing mill in Port Orchard, WA specializing in felt, roving, and yarn and would also like to purchase clean wool to use in mill and PNW branded products.

There are at least seventeen mini or cottage mills open to the public in the tri-state region, with fourteen located in Western Washington. Many of the mills have expressed interest in buying clean wool from the proposed wool pool in order to create value-added products to sell at events, local yarn stores, and fiber-related businesses. Several of the small mills also expressed support of a scour facility because scouring is a pinch point in service due to time constraints. If small mills could receive clean wool, they could remove their scouring operations and make room for other processing equipment like looms, needle felters, or spinning machines that would create value-added, locally produced and processed finished products[23]. This would boost the small mills profitability as well as foster education around local fiber production.

Creating relationships with small mills like Soundview Fiber Mill and Rabbit Hill Wool Mill satisfies the market feasibility of this project and also emphasizes industry collaboration, community outreach, and wool-based education.

[23] This statement is mill dependent and does not imply that *all* the small mills *want* to receive clean wool for further processing. It is meant, simply, as an option that could benefit some small mills. Many mills offering single-fleece processing prefer to do their own scouring because it ensures the wool is set up for their specific milling equipment.

Northwest Agriculture Business Center
Technical Service Provider

Established in 2006, Northwest Agriculture Business Center (NABC) provides northwest Washington farmers with the skills and the resources required to profitably and efficiently supply their products to consumers, retailers, wholesalers, foodservice operators and food manufacturers. Its main office is located in Mt. Vernon in the heart of Washington's Skagit Valley farm region.

NABC offers a number of technical support services for farmers including:

- Provides business development services to farmers and producers of value-added agricultural products
- Connects individual and groups of producers to buyers; increasing opportunities and sales
- Offers training in business topics and enhanced access to funding and lenders
- Provides support to new and existing agriculture-based cooperatives
- Identifies and creates regional agriculture infrastructure

Northwest Agriculture Business Center's mission states that it will 'improve the economic vitality of the agriculture industry within the northwest Washington counties of Island, King, San Juan, Skagit, Snohomish and Whatcom, and southwest counties of Lewis, Thurston, Grays Harbor, Pacific, Mason and Pierce, by providing business resources and hands-on guidance to new or existing businesses that provide value-added or innovative agricultural products or services.'

NABC staff have been integral partners in forming, managing, and formalizing **Washington Wool Growers Committee (WWGC)**, including forming and drafting a charter and performing administrative tasks for the group's monthly meetings. Moving forward, with the help of a recently awarded USDA Rural Cooperative Development Grant, NABC will partner with WWGC to develop a strategic plan for the group, continue managing the monthly meetings, revamp the charter, and pursue additional funding.

The Southwest Washington Growers Cooperative (SWGC) was formed in late 2019. The co-op is committed to working together to support agricultural development in Southwest Washington. The goal of the co-op is to help small and mid-sized farmers in Thurston, Lewis, Grays Harbor, Mason and Pierce counties use the power of cooperatives to improve our local food system. Simply put, SWGC helps farmers sell more farm products right here in Southwest Washington.
SWGC Operates Two Pools:

- The Southwest Washington Food Hub
- The Southwest Washington Grain Project

The Southwest Washington Food Hub- Farmer-owners help operate this marketing and distribution outfit to sell produce, meat, and dairy to consumers, schools, food access organizations and more.

Southwest Washington Grain Project-Co-op members have collaborated to develop rail transload capacity at the Port of Chehalis , providing the cornerstone for a malting barley program being established with Great Western Malting of Vancouver WA, and Talking Cedar. The Port of Chehalis was recently awarded funds to build grain storage on site, which will help the grain program by providing upright grain storage with rail access, necessary infrastructure for mid-sized grain growers and their customers.

Members of SWGC were the first to mention a lack of outlets for wool from meat sheep, spurring the initial formation of the group.

Potential Sites

Three potential sites for the proposed facility were identified through the research process. All of the sites have existing infrastructure, planned infrastructure, or both, that would benefit a mid-sized scour plant and wool storage facility. Each site has benefits and drawbacks, and will be further scrutinized and selected in the next step of the process, the strategic plan.

Carnation Farms
Community-based hub for regenerative agriculture

Carnation Farms is a non-profit, certified organic organization that sits on 800 acres of forest and farmland. Originally built over 100 years ago, Carnation Farms maintains water rights to Sikes Lake & the Snoqualmie River and has had its own water treatment facility since 1974. Carnation Farms is the only organic certified farm that is using class C reclaimed water in Washington State.

Owned by Nestle until 1985, Carnation Farms continued under varied ownership until 2016 when the family (including Sarah Stuart Oderyd, co-founder of the Carnation Farms nonprofit organization and 5th generation on the farm) decided they wanted "the new Carnation Farms to be a public non-profit benefiting the community" and have been on a "trajectory towards regenerative farming" ever since.

Carnation Farm's general mission is as follows: "We strive to be a community-based hub for regenerative food and agriculture that educates and empowers the work of culinary, food, and farming professionals. We aspire to help create a thriving regional food system connecting farmers and culinary professionals around shared values of regenerative food, health and equity."

The following is an excerpt from Carnation Farm's *Intentions*:

"Although Carnation Farms has been a certified organic farm for many years, leadership will go further to fully engage in regenerative practices which build soil health, protect watersheds, and make resources and farm assets more open and available to a broader, diverse community of stakeholders, in the years ahead…

Innovation Hub: As a non-profit organization, Carnation Farms intends to establish an open-source range of shared resources over the next 1-3 years, including regenerative farming and food best practices, collective testing of new technologies, processing facilities, and shared value-added product development and distribution…"

As well as an excerpt from Carnation Farm's *Regenerative Farming Principles*:

1. Restoring the relationship between animals and soils: We recognize the importance of animals in regenerative farming. Animals are walking composters that bring biology and fertility back to the earth. We commit to nurturing the relationship between animals and soils, leveraging their natural abilities to re-invigorate the land.

With these principles and intentions in mind along with Carnation Farm's commitment to regenerative agriculture research and their expansive acreage, Carnation would be an ideal site for a midsize scour facility serving the proposed PNW Wool Pool.

The authors of this study met with Alex Hagiepetros, the Livestock Manager at Carnation Farms. Hagiepetros currently raises about 50 head of Romney, Finn, and Romney/Finn cross sheep. The sheep are raised for meat and fiber. Hagiepetros is currently in the process of phasing out the farm's poultry program to expand the sheep program over 200+ acres of grazeland. As the flock grows, Carnation Farms would be interested in possibly selling a portion of their wool to the proposed wool pool, especially if they could incorporate a PNW Wool brand certification to their product.

One of the greatest general constraints in building a wool scouring facility involves wastewater management. Not only does Carnation have water treatment infrastructure already in place should it be needed, but they also present the opportunity to utilize the facility's "wastewater" as effective fertilizer in their upland pastures, supporting a closed-loop regenerative system.

Moreso, Carnation Farms has a number of large farm buildings throughout the 800 acres and a number of large barns specifically in the upland pasture. These upland barns - and possibly the whole facility - have the potential to be outfitted with rainwater catchment systems that would directly feed the scour facility's water needs. This system, in correlation with use of liquid fertilizer, would be an ideal regenerative agricultural practice, cutting water waste (sewage costs) on this project significantly. If stored rainwater is not sufficient, water from wells, Sikes Lake, or the Snoqualmie River could act as an emergency back-up to meet water needs.

A constraint involving Carnation Farms as a potential scour facility site has to do with its location 20 minutes off of Interstate 5 on country roads. Ease of transportation is a goal of this project, but with only two major influxes of wool per year and drop points ranging throughout WA, OR, and ID - having appropriate transportation moving wool from the storage warehouse to the scour facility can prove a feasible option, minimizing traffic to and from the farm.

Scour mills wash wool slowly, whether it is processing 5 lbs of wool or thousands of pounds. Washing wool quickly would result in felting of the product, rendering it useless. The speed of washing could be a labor constraint - the mill operator/s would load the scour machine then would need additional relevant tasks to fill up their part or full time shifts. At minimills with additional equipment and processing, the washing time is filled with other mill tasks, but at a scour specific facility that operates at midsize market capacity, there is the potential for there not to be enough regular work for a mill operator. If the scour facility was housed at Carnation Farms, there is ample opportunity for a mill operator to be dual employed as a site technician or groundskeeper for the farm.

Partnering with Carnation Farms would satisfy this project's need for a feasible site to house a midsize scour facility and also aligns with goals related to waste management, closed-loop agricultural systems, industry collaboration, and community outreach.

The writers of this study have toured Carnation Farm and met with Livestock Manager Alex Hagiepetros to explore the prospect of Carnation Farms as a potential scour facility site. However, the next steps in the process would include weighing the pros and cons of other potential scour facility sites. If Carnation Farms proved the top choice, then the project would be presented to Carnation Farm's Director of Regenerative Agriculture and Executive Director. With their approval, there would then be collaboration with staff already in place at Carnation Farm to carry out intensive site evaluation and research regarding

utilization of wastewater as liquid fertilizer, among other areas of inquiry. The ideas presented here are hypothetical and will require more collaboration and evaluation in subsequent phases of this study.

Port of Chehalis
Public port district

The Port of Chehalis is an industrial park located south of the Chehalis city limits and on the east side of Interstate 5. It is situated almost directly in between Portland and Seattle with access to all of the important transportation networks serving the west coast including rail service by Burlington Northern, Union Pacific and Amtrak as well as proximity to multiple deep water ports (Ports of Tacoma, Olympia, Longview, Vancouver, Kalama and more) offering containerized shipping and other services. The Port also facilitates industrial site sales and works with private industry to determine the best approach to meet a business's needs when locating a new facility or expanding an existing facility.

The Port is also home to the Southwest Washington Grain Project. The following are from the SWWA Grain Project's FAQ page:

"**What is the Southwest Washington Grain Project?**
The Port of Chehalis (Port), in collaboration with regional agriculture partnerships, is working to construct a public grain storage and transloading facility. This facility will allow local farmers to aggregately store and move products via rail. The project will expand opportunities for regional producers and mid-tier grain commerce in the region.

Thus far, the Port of Chehalis has completed the construction of a rail spur and preliminary site stabilization that has allowed local growers through the Southwest Washington Growers Cooperative to gain partial access to regional buyers.

Once fully constructed, the facility will provide the conveyance and physical infrastructure necessary to transload small grains from regional producers' trucks into rail cars and from rail cars into trucks and aggregate storage. The facility will be able to store approximately 12,600 bushels of grain and transload at a rate of 7,500 bushels per hour, with room to expand capacity in the future based on funding.

Once built, who will be able to use the facility?
Once built, as a public facility, the Grain Storage and Transload Facility will be accessible for public use. The Southwest Washington Growers Cooperative is just one entity that will have access to use the facility through storage and transfer fees. There are a plethora of other creative potential uses, such as farm animal feed or industrial product distribution. Anyone interested in using the facility is encouraged to contact the Port of Chehalis with questions relating to the transload facility, including lease options.

Besides the Port of Chehalis, who else is involved in the project?
The Southwest Washington Grain Project has been a partnership of numerous agencies and entities since its inception in 2018. Along with the Port of Chehalis other partners have included:

- Northwest Agricultural Business Center (NABC)
- Southwest Washington Growers Cooperative

- Lewis County Board of County Commissioners
- Economic Alliance of Lewis County
- WSU Extension Thurston County
- Representatives Abbarno and Orcutt
- Congresswoman Gluesenkamp Perez
- Economic Development Administration
- And so many more

We have also worked closely with a number of elected officials, local governments, and community boards and organizations throughout the length of this project and will continue to do so as we move forward.

Will there be future expansion on the Southwest Washington Grain Projects?
The Southwest Washington Grain Project is situated to facilitate future related projects in agribusiness and correlated industries. The project site is located on Maurin Road in the Port's Business & Industrial Park as part of a larger parcel that could hold future development. While Southwest Washington Grain Project will be operational on its own, future development could expand its offerings including additional storage silos or bins. The rest of the land could house multiphase development, depending on future funding and partnerships."

Image credit, Port of Chehalis. Site plan for the SWWA Grain Project.
See Appendix 5 for SWWA Grain Project Utility Plan.

The entirety of the wool pool project has overlapping themes with the SWWA Grain Project. Both share the goal of aggregating product for small to midsize producers in order to reach larger markets. "The Southwest Washington Grain Project is situated to facilitate future related projects in agribusiness and correlated industries" and the Grain Storage and Transload Facility could accommodate the proposed project's building requirements. The projects also currently share or may share organizational partnerships in the future such as with the NABC, WSU Extension Program, Economic Development Administration, a number of elected officials, and partnerships between cooperatives.

Bill Teitzel, the Port's Operations Manager, and Lindsey Senter, the Chief Executive Officer, indicated in an interview that the proposed project matches the Grain Projects theme of building an agricultural district based out of the Port of Chehalis as a means to boost agriculture in the PNW region. Teitzel recognized the market potential of the proposed project with an "if you build it, they will come" frame of mind and Senter was interested in the potential of this project to boost agritourism in the area.

A constraint brought up in the interview had to do with wastewater. The Port is not interested in managing waste water via water treatment or water stabilization ponds (WSPs). Teitzel mentioned the possibilities of beneficial use determination to have the wastewater applied to local farmlands. This option would imply a wastewater storage and transportation arrangement that may or may not be feasible depending on how many gallons of water it takes to clean upwards of 50,000 lbs of wool annually.

Owing to the aforementioned project overlaps as well as the location and connections with transportation networks, the Port of Chehalis is well suited as a potential site for the proposed wool pool project. If this project followed a cooperative business model, it would be especially beneficial to pool and share resources with the Grain Project and Twisted Strait Fibers - both cooperatives - in terms of transport, facilities, and state funding and would satisfy this project's need for industry collaboration.

Tenino Agriculture Park
Business and innovation park

The Southwest Washington Regional Agriculture Business and Innovation Park (Tenino Ag Park) is "an integrated multi-tenant business park focused on value-added, agricultural/food-related enterprises, including a state of the art hospitality event center and business resource and innovation hub located within the City of Tenino on a 13-acre site…The Park itself will become an agri-tourism destination and will be promoted in a cohesive way with other North Lewis and South Thurston County attractions and as part of the Thurston County Bountiful Byway. Future phases of the Park may also include establishing research and educational components…[The Tenino Ag Park] is currently recruiting Park tenants who have established businesses in value-added food processing, manufacturing and/or packaging."

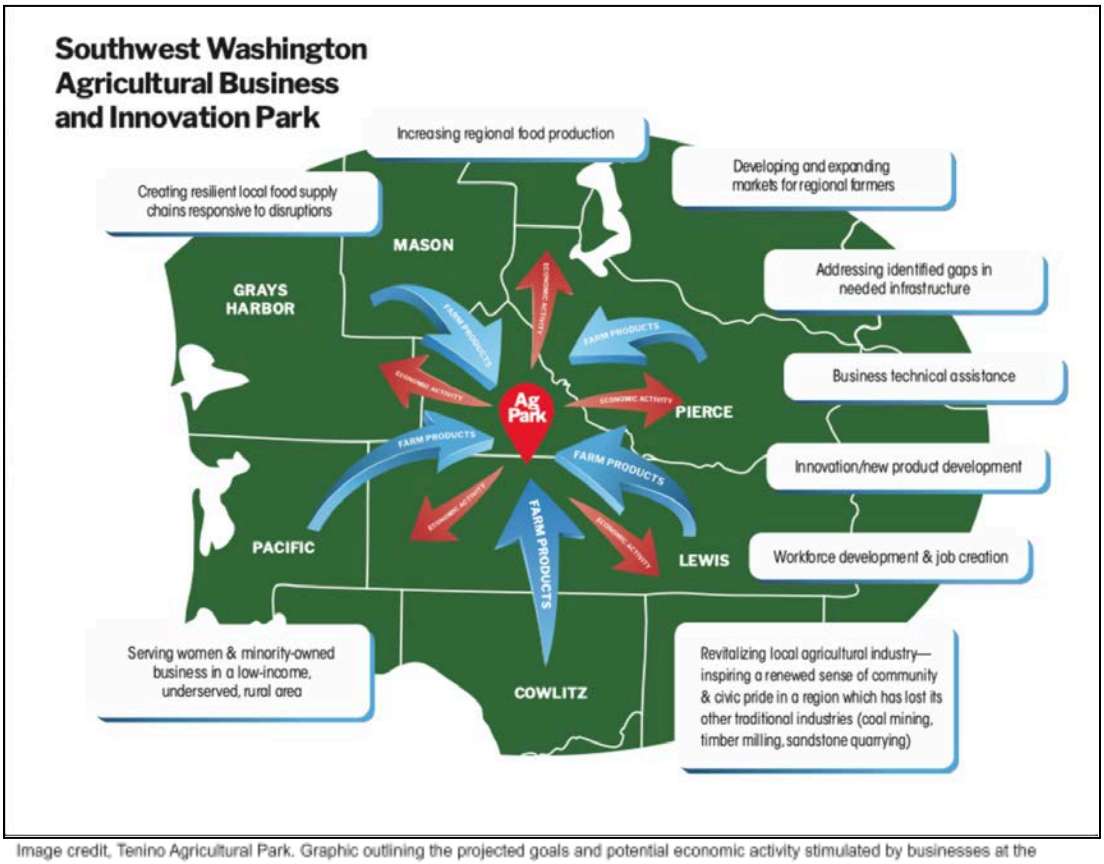


Image credit, Tenino Agricultural Park. Graphic outlining the projected goals and potential economic activity stimulated by businesses at the Tenino Ag Park.

The proposed project meets all of the goals outlined by the Tenino Ag Park in Image 3 and clearly identifies a gap in needed infrastructure. Sheep are effective livestock animals to keep for such

agricultural purposes as grazing, silvopasture, wool, fertilizer, soil amendments, milk, and meat. Because sheep are such dynamic animals to raise, growing the number of sheep operations in the tri-state region by creating necessary infrastructure would help build resilient food supply chains and has the potential to increase regional food production as well as increase workforce development in a variety of wool production and processing fields. Sheep meat (lamb or mutton), milk, and locally grown wool are not mainstream commodities in the United States and would qualify as innovative “new” products in multiple markets.

Moreso, the majority of wool growers and wool-related businesses in the small to midsize tier are women-led, owned, and operated with a growing interest from indigenous would-be farmers. If the proposed project operated within the Tenino Ag Park, growers would have the opportunity to sell their sheep’s wool, milk products, and meat all in one place, effectively revitalizing local agricultural industry and encouraging agritourism.

The back lots of the Tenino Ag Park are scheduled to house a regional scale meat processing facility and meat processing facility and would be financially and economically convenient or beneficial for producers to drop off their wool and animals for slaughter at the same location.

The Tenino Ag Park will be located off of Old Highway 99 about fifteen minutes from Interstate 5 and the property backs up to holding pools that may be associated with the city wastewater treatment plant. It is unlikely to be financially feasible to buy water from the city and pay to have it treated, but could apply for beneficial use determination as would be done at the Port of Chehalis site. More information needs to be collected regarding the specifics of water usage at the proposed facility and the usage of the proximate holding pools to make assumptions. Presently water usage and wastewater management is a constraint for the Tenino Ag Park accommodating the proposed project.

Currently, the Tenino Ag Park does not have buildings available for rent or lease but does have available plots of land. If the proposed project were to be situated at the Tenino Ag Park, it would have to pay for a warehouse to be built from the ground up. This could prove beneficial for this project to ensure the building meets the very specific needs of a wool storage warehouse, pelletizing mill, and possibly a scour facility.

However, in an interview with Aslan Meade, the Director of Strategic Alliances with the Thurston Economic Development Council: Center for Business and Innovation and lead of the Tenino Ag Park project, he mentioned that since a goal of the Park is agritourism, he is concerned about the possible odor resulting from large quantities of grease wool being stored and processed. More research needs to be done to evaluate what odors the proposed project would produce at the midsize level of processing and will be considered when evaluating the Tenino Ag Park as a potential site.

Another constraint Meade mentioned has to do with the business model of the proposed project. Meade stated the Tenino Ag Park is “not interested in creating a new non-profit or working with a non-profit. [They] are interested in somebody who will run a business.” This also has to do with the goal of agritourism and visitors being able to purchase products from a storefront. The business model of the proposed project will be considered in greater detail in the next phase of this project and will depend on site evaluations, cost effectiveness, and benefits to producers and key stakeholders.

The Tenino Ag Park is well suited as a potential site for the proposed wool pool project especially considering socioeconomic benefits, community outreach, and creating a retail market for a PNW Wool brand.

Assumptions and Constraints

Considering the factors referenced in the initial assessment, stakeholders, and potential sites, the following additional assumptions and constraints outline likely conditions or parameters that will be more thoroughly developed throughout the strategic plan.

Scope

Assumptions	Constraints
The *Pacific Northwest 2024 Sheep's Wool PreFeasibility Study* is a preliminary examination of the infrastructure and market for wool processing in the tri-state region. Its main goals were to: ● Assess the volume of processable wool in the PNW ● Determine if wool producers will be served by creating a mid-size marketable wool pool ● Make recommendations	The subsequent strategic plan will require in-depth: ● financial projections ● projected income statements ● day-zero balance sheet ● engineering specifics ● site evaluations ● risk assessments ● market assessments ● comprehensive business plan ● project budget These planning and implementation tools will aid in the continued success of this project but are not necessary for the preliminary stage of this project.

Schedule

The proposed project is expected to maintain operations indefinitely. Its operational life is expected to facilitate tri-state wool production, sales, and processing generationally, therefore sustaining local wool industry. An estimated schedule of start-up operations is as follows and is subject to change: ● 2024 - prefeasibility study ● 2025-26 - assessment, planning, and fundraising within the strategic plan ● 2027 - construction & outreach ● 2028 - begin operations	Many of the stakeholders or collaborators in this project are similarly in the beginning phases of project start-up or expansion. This includes: ● SWWA Growers Co-Op: Grain Project ● Holy Lamb Organics ● The Wandering Ewe Fibers ● Twisted Strait Fibers ● Soundview Fiber Mill ● Brother Drum Carders & MiniMills ● Tenino Ag Project Collaboration with any or all of these entities will present conflicts in timeframes for factors such as equipment manufacturing or warehouse space.

Assumptions	Constraints
Funding	
Congresswoman Marie Gluesenkamp Perez allocated $4.12 million in federal funding for the SWWA Grain Project as one of 15 Community Funding Projects. Rep. Gluesemkamp Perez emphasizes the importance of processing infrastructure and states that “these investments are the nuts and bolts of how government can serve the people” while also stimulating economic growth and job creation in local communities. For the proposed project to be feasible, it must work with state representatives like Gluesemkamp Perez to secure funding from the Washington State capital budget along with organizations such as the Department of Commerce Economic Development Administration (EDA), the NABC, and other business cooperatives.	After additional research and planning, construction, equipment design and purchasing, start-up costs, labor involved, and operational and overhead expenses, this is estimated to be a multi-million dollar project. External financing will rely on a thorough and compelling strategic plan.
Resources	
Access to water at a reasonable commercial rate will be critical for the cost effectiveness of this project. Ability to get a Beneficial Use Determination for the waste water, in order to avoid paying extensively for municipal sewage, or to develop a private sewage system. Additionally, access to existing trucks, whether owned by the proposed entity or a third party, to haul the wastewater and distribute it as needed off site, will be a key element in making the project financially sustainable. Access to affordable, professional, and timely trucking will be necessary for this project to succeed. Whichever site is selected, will have to have an existing storage warehouse, new warehouse construction would likely render this project financially unsound.	The wool supply, including the micron distribution, in the tri-state region will need to remain at similar levels or expand for this project to remain plausible. Available pastureland to raise larger and/or expanded flocks is a projected constraint. In line with EcoWool guidelines, producers must exercise Proper Grazing Methods which includes pasture rotation. Buyers need a stable supply of medium/coarse wool from select breeds of sheep. A PNW wool pool may request a standardization of breeds in order to create a reliable product.

Assumptions	Constraints
Technologies	
This project aims to collaborate with Brother MiniMills on development of midsize fiber processing equipment and technologies. Capturing wool grease and processing it into lanolin for resale in cosmetics will create additional revenue for the project. The tables in Appendix 6 outline some possible equipment and site criteria required for a storage warehouse and pelletizing services. If the scour facility occupies separate accommodations from the storage warehouse and pelletizer services, Table 7 outlines additional possible requirements for a separate scour facility. It would be most feasible to maintain all operations at one site, although the unique water and water treatment needs of a wool scour facility may require separate sites and will be carefully evaluated in subsequent project phases.	Complexity of processing: The equipment requirements of the proposed project are highly specialized and will require customization of technologies and systems appropriately suited to the selected sites dimensional, electrical, plumbing, and waste management needs. The scour equipment and wastewater management system are the greatest financial, environmental, and operational constraints of this project. Along with specialized equipment comes specialized technician and operational training. Education on use and repair of the required equipment will rely on trial-and-error procedures and industry collaboration.
Buyers	
The proposed project expects Holy Lamb Organics to be the primary buyer of clean wool for their bedding products. Other fiber mills are also expected to purchase clean wool to create value-added product for their mills. The proposed project could potentially sell clean wool to fiber artists, artisans, and small-batch garment or bedding producers as well. As more science emerges touting the benefits of wool as a soil amendment, wool pellets are expected to sell in large quantities to the agricultural industry. Wool pellets are also suitable for small produce farms, garden beds, and indoor plants, making them a dynamic product useful to a variety of buyers and consumers. Coarse to medium grade wool is also suitable for industrial applications such as insulation or absorbing oil or hazardous materials at spill sites.	While this project will support a “no producer left behind initiative,” it’s intended for buyers looking for medium/coarse wool. The proposed PNW wool pool is up against international competition and will have to find a price that is both competitive against China, Australia, and the UK, while simultaneously offering wool producers a fair price. This is where value adds like certifications come in, to help producers and their wool buyers get a better price for their end product.

Assumptions

Constraints

Legal/Policy

The ownership model determined for this project will be vital. Determining which organizational structure will allow a group of producers to own equipment, vehicles, wool, and intellectual property responsibly, that is functional, reduces liability, and allows producers to remain independent, have their voices heard, and maximize profits.
This structure will help shape the method of financial management, which is undetermined at this stage of the project. Moving forward in the strategic plan, financial management will be further investigated.

Potential ownership models include:

- Cooperative
    - Member-owned
- Limited Liability Corporation
    - Individual/s member-owned
- Corporation (C or S)
    - Shareholder-owned
- Non-Profit
    - No ownership
- Unincorporated Cooperative Association
    - Member-owned with patron and investor classes

Some legal constraints may include:

- Regulatory compliance
- Contract laws
- Intellectual property rights
- Permitting a scour facility
- Beneficial Use Determination
- Utility rates
- Wool Products Labeling Act

Regulatory

EcoWool and/or Global Organic Textile Standard certifications are a requirement for the main coarse wool buyer stakeholder in this project.

Due to the high volume of water required to scour wool, municipal sewage, or private septics aren't ecologically or economically sound options for the proposed facility. A permit for wastewater reuse, called a Beneficial Use Determination, will be required.

Once a site is selected, the strategic plan is developed, and funding is secure, the first step will likely be working with engineers. With any infrastructure project, completing plans with an engineer to help reduce the project's safety risk and environmental impact is a requirement. This is expected to require staff resources, and thus be a financial and time constraint.

The wool processing facility and storage warehouse must comply with all county and state electrical permits and regulations.

The wool processing facility must comply with all county and state plumbing permits and regulations.

Insuring vehicles to transport wool, warehouses to store wool, and a wool processing facility with employees will likely be a large expense for this project.

Assumptions

Constraints

Marketing

Raw wool prices have bottomed out, but domestic wool sales have seen an uptick in 2024.

The competitive landscape of the wool industry is changing and bringing new opportunities for domestic wool. This has to do with trends towards natural fibers. As this project evolves, there may be opportunities to partner with organizations growing domestic plant fibers - such as linen/flax, cotton, hemp, and nettle - and further advance the PNW fiber economy.

The stakeholders of this project are specifically located in the tri-state region of Washington, Oregon, and Idaho. The project is designed for producers in the Pacific Northwest.

While merino wool occupies the garment industry, coarse/medium grade wool is ideal for domestic and contract textiles such as blankets, mattresses and bedding, and rugs or carpets. It can also be utilized for industrial or environmental uses such as soil amendments, insulation, or bioremediation. Buyers interested in coarse/medium wool for applications such as these are this project's target audience.

Expectations

Wool products, from fiber arts to mattresses to textiles, are alluring commodities that would promote local artisans and stimulate tourism. This project has the potential to initiate local fiber arts and textile production of commodities such as socks, hats, sweaters, blankets, fabric, and more - all with PNW Wool branding. While this project is designed to serve producers, the items buyers create with the sellable product are attractive to consumers.

Fostering small and midsize business models means that consumers will have opportunities to tour wool production farms and processing centers, offering industry transparency. Agritourism invites consumers to experience wool production and processing, inspiring them to buy local and possibly invest in wool-related businesses and/or education around wool production/processing, further encouraging a legacy of wool in the Pacific Northwest.

This project is expected to create jobs in a diversity of fields ranging from mill operators to transportation specialists to wool brokers and more. If farmers have additional incentive to grow wool, that would mean larger flocks and an increased number of sheep operations, resulting in more available work for shearers, breeders, tanneries, and meat processors.

Recommendations

Pacific Northwest Wool Project[24]

Wool aggregation at this scale is feasible only if there is a *scouring facility* to match its volume and a *brand identity* for Pacific Northwest wool, demanding a higher price by adding value to the scoured wool. A mid-size scour facility would only be feasible with a large *wool pool*. The two would work symbiotically while also promoting development of necessary regional wool production and processing infrastructure, such as:

- Wool collection and storage infrastructure that may include and is not limited to mobile aggregation services, port services, warehousing, wool brokerage team, PNW wool brand.

- Transportation solutions involving strategic location(s) of storage warehouse, pelletizer mill, and scour plant that conveniently facilitate transportation services and travel times for producers.

- Appropriate Waste Management implementing wool pelletizing, water reclamation, and lanolin collection to manage project byproducts. It will incorporate the exploration of environmentally progressive byproduct management and/or treatment that, among other strategies, may include:
  - Beneficial Use Determination (BUD) permit for distribution of nutrient rich wastewater on farm or pasture land
  - Ecological wastewater systems supporting riparian/wetland environments
  - Wool pelletizing for use as a soil amendment
  - Mycofiltration systems

- Equipment & technicians proximate to the PNW region to ensure availability of parts and timeliness of repairs.

- Industry collaboration with existing PNW wool pools and cooperatives, fiber processing mills, and equipment manufacturers

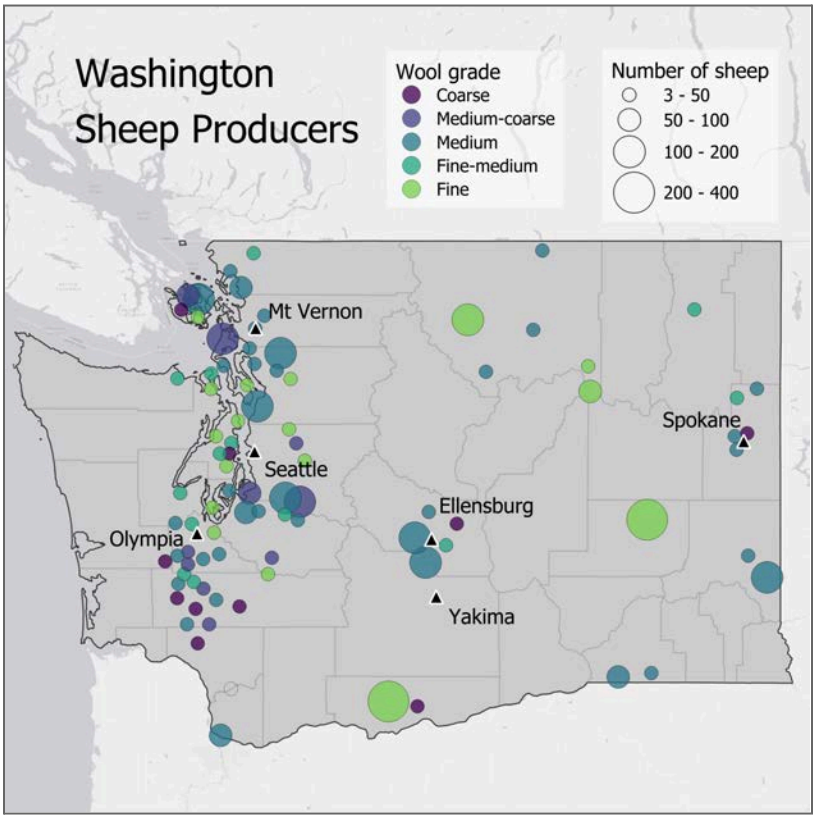
- Education, outreach, promotion: presence at fiber festivals and sheep industry events that would serve to broadcast the project, educate the community, and provide drop-points for producer's grease wool as well as stimulate a retail market for PNW wool brand products.

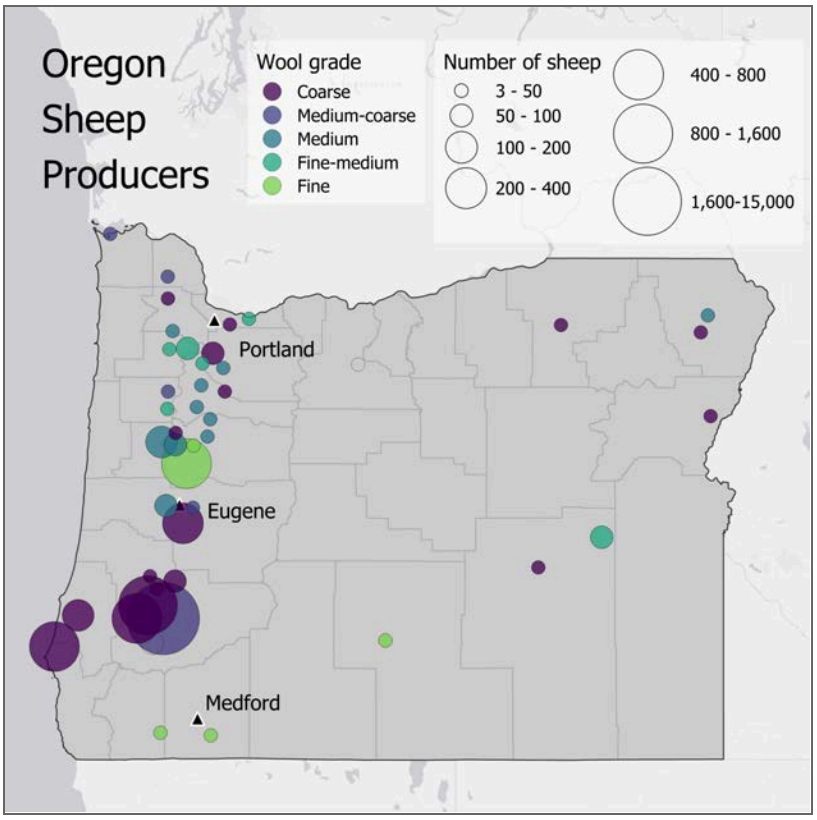
With these recommendations in mind, the NABC will develop a strategic plan that is projected to be implemented over the next two years. It will include meticulous assessments and a thorough and compelling business plan that will serve Pacific Northwest wool producers and stakeholders in the PNW fiber economy.

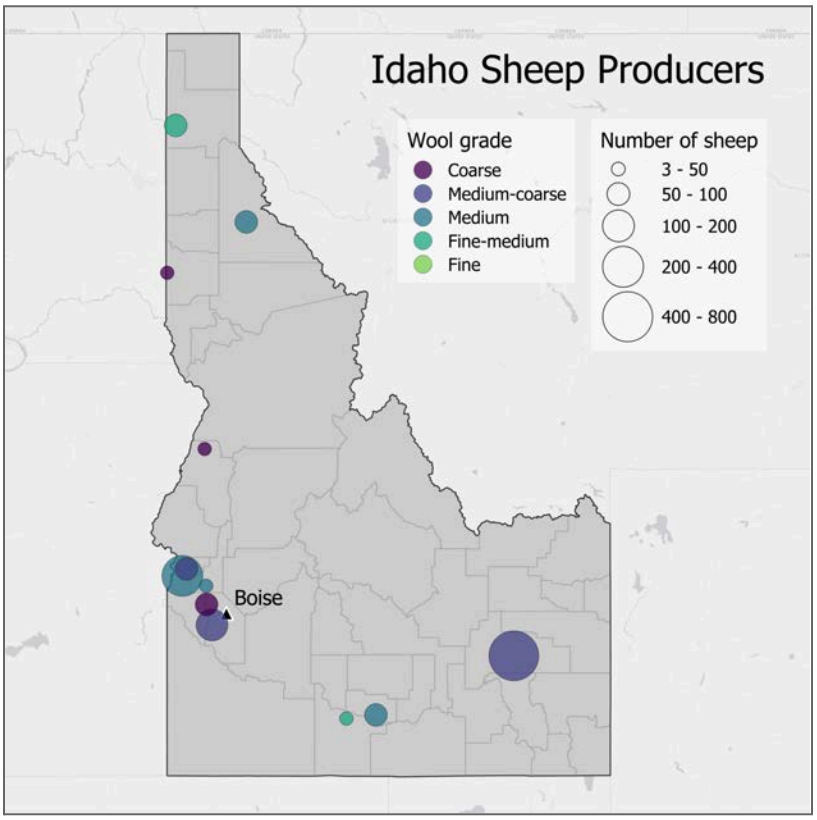
[24] Name subject to change.

Appendix

Appendix 1: Confidential
Appendix 2: Confidential
Appendix 3: Flock Size/Location State Maps




Oregon Sheep Producers
Wool grade
Coarse
Medium-coarse
Medium
Fine-medium
Fine
Number of sheep
3 - 50
50 - 100
100 - 200
200 - 400
400 - 800
800 - 1,600
1,600-15,000
Portland
Eugene
Medford


Idaho Sheep Producers
Wool grade
Coarse
Medium-coarse
Medium
Fine-medium
Fine
Number of sheep
3 - 50
50 - 100
100 - 200
200 - 400
400 - 800
Boise

Appendix 4: Type/Breed Chart

Table 5

Breed	Range of Average Fiber Diameter (µm)	Use
Babydoll	19-22	Specialty: pets, grazers, wool, meat
Black Welsh Mountain	26-32	Dual-purpose: wool, meat
Bluefaced Leicester (BFL)	24-28	Wool, meat, crossbreeding
Border Leicester	30-38	Wool, meat, crossbreeding
California Red	22-30	Meat, milk, wool
California Variegated Mutant (CVM)	21-25	Dual-purpose: wool, meat
Cheviot: Border	28-33	Dual-purpose: wool, meat
Cheviot	33-27	Wool, meat, crossbreeding, herding dog training
Cheviot: North Country (NCC)	30-33	Meat, wool, crossbreeding
Clun Forest	25-33	Meat, milk, wool
Columbia	30-23	Wool, meat, crossbreeding
Coopworth	35-39	Dual-purpose: wool, meat
Cormo	22-19	Dual-purpose: wool, meat
Corriedale	31-24	Dual-purpose: wool, meat
Cotswold	33-42	Wool, meat, milk, crossbreeding
Dorset: Horned	32 - 26	Meat, dairy, wool, grazing, herding dog training, hides, pets
Dorset: Polled	34 - 28	Meat, wool, crossbreeding
East Friesian	26-37	Milk, wool, crossbreeding
Finnsheep	31-24	Wool, meat, hides, grazing, crossbreeding, pets
Gotland	33 - 27	Wool, meat, pelts
Hampshire	33 - 25	Dual-purpose: meat, wool
Icelandic	22-36	Primitive/heritage, dual-purpose: wool, meat
Jacob	26-37	Primitive/heritage: wool, meat, hides, pets
Katahdins	26-33	Hair sheep: meat, grazing
Kerry Hill	31-33	Dual-purpose: meat, wool

Lacaune	26-37	Milk, wool, crossbreeding
Leicester Longwool	32-38	Specialty: longwool, meat, crossbreeding
Moorit	30-40	Specialty: wool
Navajo Churro	10-35	Primitive/heritage, specialty: wool, meat, milk
Polypay	22-29	Dual-purpose: wool, meat
Rambouillet	23-19	Wool, meat, milk, crossbreeding
Romeldale	21-25	Dual-purpose: wool, meat
Romney	39-32	Dual-purpose: meat, wool
Shetland	23-25	Primitive/heritage: wool, meat, grazing, pets
Shropshire	33-25	Meat, wool, milk, grazing
South African Mutton Merino (SAMM)	21-23	Dual-purpose: meat, wool
Southdown	29-24	Dual-purpose: wool, meat
Suffolk	33-25	Dual-purpose: wool, meat
Targhee	25-21	Dual-purpose: wool, meat
Teeswater	30-36	Specialty: longwool, meat, crossbreeding, grazing,
Texel	33-28	Meat, wool, milk, crossbreeding
Tunis	24-30	Dual-purpose: wool, meat
Valais Blacknose	28-38	Dual-purpose: wool, meat
Wensleydales	33-35	Specialty: longwool, meat, crossbreeding
Zwartbles	27-32	Meat, wool, crossbreeding

Appendix 5: SWWA Grain Project Utility Plan

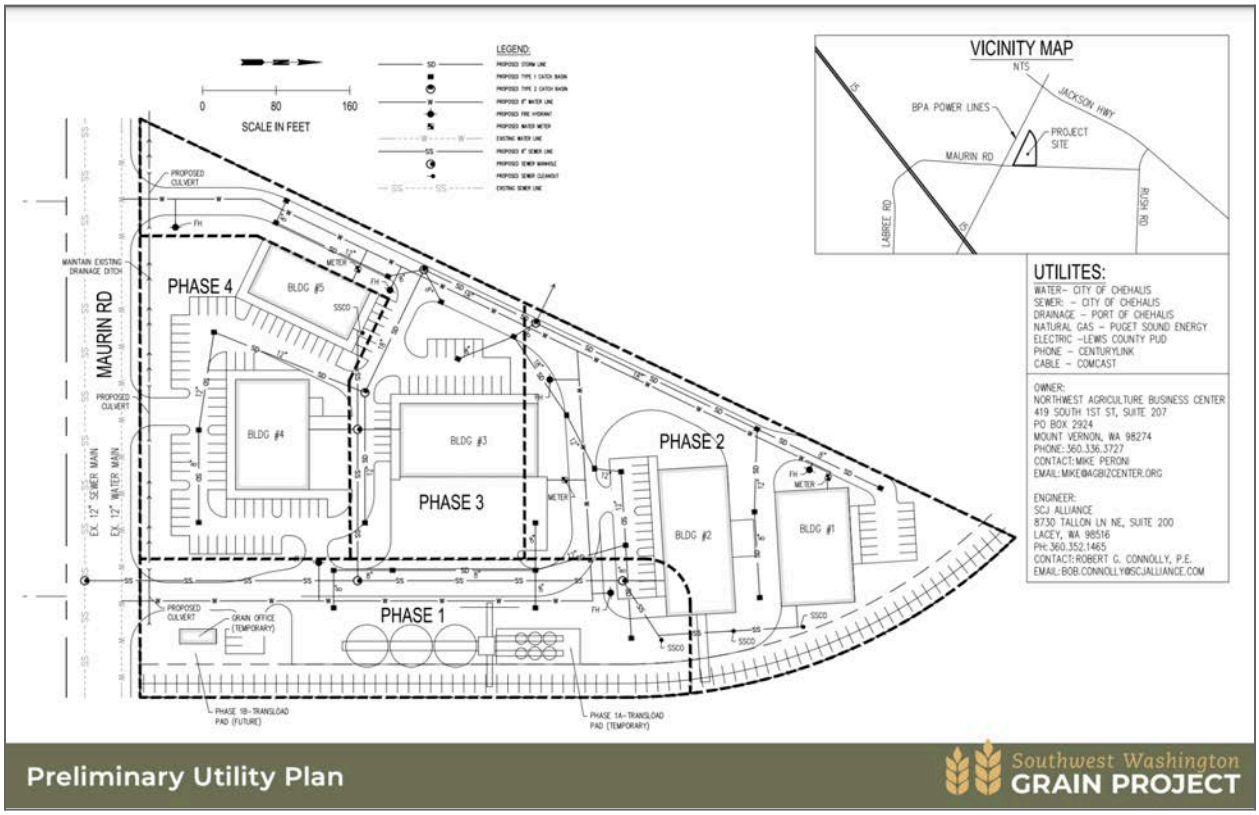


Image credit, Port of Chehalis. Utility plan for the SWWA Grain Project.

Appendix 6: Table 6 & Table 7

For a site to host a **storage warehouse and pelletizing services**, the following general criteria need to be met:

Table 6

Warehouse Space	Equipment
Loading dock Main floor: Open floor plan, 5,000 - 10,000 square ft. warehouse to facilitate: ● Unloading ● Sorting ● Wool storage: ○ Pelletizing queue ○ Wool pellets ○ Grease wool que for pooled scour ○ Grease wool queue for specialty scour ○ Clean wool ● Supply and packaging storage ● Pelletizer mill ● Office & break room	Pelletizer mil: ● Dehumidifier room/dry room ● Wool crusher machine ● Pelletizer machine ● Oven ● Packaging Appropriate wool transportation vehicle Forklift equipped to handle bales of wool and pallets Front loader tractor Manual or rotary tumblers Hydraulic wool baler machine Pallets

If the storage warehouse/pelletizer mill occupy separate accommodations, the following general criteria need to be met to host a **scour facility**:

Table 7

Warehouse Space	Equipment
~5,000 square ft. warehouse with a loading dock to facilitate baled wool. Incoming grease wool storage Outgoing clean wool storage Appropriate plumbing for water intake Appropriate plumbing for wastewater management and output Drying room Supply and packaging storage	Appropriate wool transportation vehicle Forklift equipped to handle bales of wool and pallets Hydraulic wool baler machine Industrial scour train ● Needs to scour 200-250 lbs of wool per day in order to produce 50-65,000 lbs of clean wool per year, maintain employees, and meet market demand Industrial hot water heater

Office & break room	Industrial drying system: elaborate fan room or radio frequency dryer Lanolin capture system via high speed centrifuge Wastewater management system that may or may not require: ● Specialized plumbing ● Specialized storage ● Transportation - water trucks or pipelines ● Rainwater catchment and storage ● Wastewater holding pools or tanks

These tables are meant to give an idea of the scope of space and equipment and are *not* meant as detailed logistical lists of project plans.

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