

Estimates of Migrant and Seasonal Farmworkers in Agriculture, 2018 Update

June 2018



Mallory Rahe, PhD
Oregon State University

Oregon
Health
Authority
PUBLIC HEALTH DIVISION
Health Policy and Analytics Division

Estimates of Migrant and Seasonal Farmworkers in Agriculture, 2018 Update

Table of Contents

Discussion of Estimates..... 1

Background and Study Purpose 1

Agricultural Workers: Methodology and Estimates..... 3

 Step 1: Estimate total workers for agricultural employment 3

 Step 2: Reduce the total number of workers to account for multiple job holders 5

 Step 3: Assume 33.5% of all workers are migrant and 66.5% are seasonal workers 5

 Calculation Examples 5

 Step 4: Reconcile the number of migrant crop workers with the estimates of migrant labor from the Census of Agriculture..... 6

 Table 1: County level migrant and seasonal farmworker estimates 8

 Table 2: Demand for labor calculations by commodity 9

Non-farmworkers and Children and Youth: Methodology and Estimates 11

 Steps 5-6: Estimating the number of accompanying non-farmworkers..... 11

 Step 7: Estimating the number of migrant and seasonal children and youth 12

 Table 4: Total migrant and seasonal youth and children by age in Oregon 13

Presence of Indigenous Workers- not a population estimate 13

 Table 5: Justice Department Statewide Indigenous Language Requests for 2017 Oregon..... 14

Limitations 14

Discussion of Estimates

Estimating the number of migrant and seasonal farmworkers in agricultural positions in Oregon is a difficult task. This report was completed to fulfill the policy and resource allocation needs of the Oregon Health Authority's (OHA) Primary Care Office, and therefore adopts a definition of migrant, seasonal, and agricultural work to best meet the agency's needs. The healthcare sector's need for data on migrant and seasonal farmworkers launched a national effort to estimate the size of this population in 2000. In 2002, Oregon became the 11th state in the US to estimate this type of information. This report strived to adopt the innovative methodology used in previous reports (Larson method), when replicable, while also utilizing a new source of estimates of migrant and seasonal farmworkers by county: the 2012 Census of Agriculture.

The total number of migrant farmworkers is estimated to be 28,940--a statewide increase of 2.1% statewide since the last enumeration study was completed in 2013. In this report, many counties adopt the estimate of migrant farmworkers from the 2012 Census of Agriculture when this estimate is higher than the estimate produced from the Larson method. Benchmarking to the 2012 Census of Agriculture may understate the true growth in migrant agricultural labor. The total number of migrant children and youth, estimated to be 20,954, declined since the last report as a result of now relying exclusively on data from Oregon's Department of Education (and not blending this data with patient records from Multnomah County). Readers are cautioned to take this report's assumptions into account as they use these estimates. There are many factors that could be driving change to the migrant population in Oregon since the last report, and for most we have only anecdotal evidence.

Another point of comparison is a national effort released in 2013 by Kissam and Williams¹ to estimate the number of agricultural workers and their dependents. Those authors' use a different methodology that includes agriculture, processing, and forestry work, and they find Oregon had approximately 178,758 agricultural workers and family members. This total is similar and only slightly higher than the total of 172,611 migrant and seasonal agricultural workers and family members found in this report, but the two components, farmworkers and family members, are substantially different. Kissam and Williams estimate Oregon had 66,951 agricultural workers (nearly 20,000 fewer than noted in this report) with a total of 111,808 dependents (nearly 26,000 more than found in this report).

To the extent that devising timely, transparent, and accurate estimates of this population is important to organizations across the state, I strongly encourage interested partners to seek ways to collaborate on improving the methodology for future estimates. This report relied heavily on two established methods of counting this population: the Census of Agriculture and the Oregon Department of Education Migrant Education Program. More work could be done to improve the ways of estimating the average household size, the percent of farmworkers who travel alone, and the Indigenous population.

Several counties had little to no migrant labor under any source or estimation procedure, which may reflect reality or the challenges of collecting data. Six counties had fewer than 10 migrant workers: Harney, Lake, Sherman, Tillamook, Wallowa, and Wheeler.

Background and Study Purpose

This report provides updated estimates of migrant and seasonal farmworkers in agriculture (see precise definition below) and their households using data from 2012-2016. This is the third set of estimates of

¹ Ed Kissam and Shannon Williams. "Estimate of Agricultural Workers and their Dependents in the United States", June 2013, National Legal Aid and Defender Association.

this population provided to the Oregon Primary Care Office, used in particular to analyze Health Professional Shortage Areas and other workforce access issues. As much as possible, this report follows the methodology and reporting structure established in the two prior reports released in 2002 and 2013 by Dr. Alice Larson.²

The 2002 Oregon Migrant and Seasonal Farmworker Enumeration Profiles Study was the eleventh such study to be completed nationally but was the first for Oregon. Many of the study's assumptions were revisited in an intensive second study published in 2013. Estimates from both of these studies have been used by multiple state agencies, non-profits, researchers, and others for program planning, advocacy, and informational value.

Commissioned by the OHA's Primary Care Office for use in health policy programming as stated above, the previous reports used a definition of migrant and seasonal farmworker that met these needs. For consistency, the MSFW (Migrant and Seasonal Farmworker) definition used in the 2002 and 2013 studies is incorporated into this work. The definition partially corresponds to the MSFW definition used by the Migrant Health Program, but our MSFW definition is unable to count the number of migrant and seasonal farmworkers who may have been employed in a prior year but are not currently employed. As noted below, the estimates in this report do not cover all agricultural jobs equally. No effort was made to determine the legal status of MSFWs or non-farmworker household members. Many agencies serve migrant and seasonal farmworkers and have set their own definitions, the total count of workers would change using a different set of definitions.

This report uses the following definitions:

A seasonal farmworker is defined as an individual who was actively employed in agriculture on a seasonal basis (not more than 9 months out of the survey year for some industries).

A migrant farmworker meets the same definition as a seasonal farmworker, but establishes for the purposes of such employment a temporary abode.

Agricultural employment includes jobs in crop production and some processing of crops grown in the state (see list in Table 2), nurseries and greenhouses, reforestation efforts, and specialty forest product gathering. In some counties, estimates will also cover livestock, other field crops like hay and grass seed, and aquaculture. Commercial fishing and commercial processing and packaging off-farm operations are not covered by these estimates. See the methodology section below for more details.

Estimates are provided for the following:

- Migrant farmworkers and seasonal farmworkers by county.
- Non-farmworkers present in the same household as migrant farmworkers and seasonal farmworkers (defined by the term "accompanied") by county.
- Migrant and seasonal children and youth under the age of 20, statewide only.

² Previous reports can be accessed here: Migrant and Seasonal Farmworker Enumeration Profiles Study Oregon Final 2002, <http://library.state.or.us/repository/2010/201003081303391/index.pdf>; Migrant and Seasonal Farmworker Enumeration Profiles Study Oregon Final 2013, http://www.ohdc.org/uploads/1/1/2/4/11243168/2013_update_to_msfw_enumeration_studies_report.pdf.

The methods used to create all estimate are described in brief below, while the Appendix offers more details on the methodology.

Agricultural Workers: Methodology and Estimates

This study was conducted with two primary objectives:

1. To maintain consistency with the previously used methodology;
2. To produce new estimates in a shorter time frame and with fewer resources, acknowledging that it would not be possible to update the full methodology which had relied on a statewide survey and extensive interviews with agricultural production experts.

The current report uses an expedited methodology in order to provide updates estimates in time for key policy decisions. This report accepts many of the assumptions made in the last report. Readers are encouraged to reference lengthier descriptions of adopted methodologies given in the previous reports. During the course of this study, another objective arose:

3. Compare estimates of total crop workers by county to the Census of Agriculture migrant workers by county estimates since both are based on 2012 crop acres.

Since the last study was published, the Census of Agriculture has begun collecting an estimate of the number of migrant farmworkers from businesses designated as farms (farms are defined as businesses that sold or intended to sell at least \$1,000 of agricultural products in the year the Census is taken). Federal law requires anyone who receives the Census of Agriculture to respond either online or by mail. The first set of estimates of migrant labor were collected as part of the 2012 Census of Agriculture and were released in 2014. Since the Census of Agriculture is conducted every five years, the next available estimates collected during 2017 will be released in 2019. Our current study compares the estimates calculated based on the same methodology used in the two previous studies with the estimates provided by the 2012 Census of Agriculture. The Census of Agriculture estimates only cover migrant workers and not their family members.

Step 1: Estimate total workers for agricultural employment

This report starts by estimating the total workers employed in agriculture in four different industries: crops, nurseries and greenhouses, reforestation, and specialty forest products.

Step 1a: Estimating total workers for 55 different labor intensive crops

The two previous Oregon MSFW Enumeration study reports undertook extensive efforts to:

1. Create a list of labor intensive crops in Oregon;
2. Identify the components of planting and cultivation, harvesting, and processing that were the most labor intensive for each crop; and
3. Estimate the number of hours each task would require per acre.

In order to convert the total hours of labor to number of workers, the previous reports also assumed that the average worker works a set number of hours a day and established a number of peak season days of work for each crop (See Table 2). The 2013 report applied these labor demand assumptions to acreage estimates from the 2007 Census of Agriculture (the most recent data available at the time).

All farm workers who contribute to these labor intensive tasks are assumed to be either migrant or seasonal workers and this report does not set any maximum number of hours or days of work. This assumption likely overstates the total migrant and seasonal workforce as some workers, including

owner operators, are full-time. Similarly, the same labor demands are applied to all farms without considering farm size. For labor intensive crops, medium and larger farms are likely to experience some labor efficiencies compared to smaller farms.

This report undertook this same methodology for labor intensive crops, with the intent of maintaining consistency with previous reports. Two primary changes were made:

1. The average number of hours of work performed daily by a single person was increased from 8.09 hours to 8.27 hours, based on updated information from the U.S. Department of Agriculture Farm Labor Report in the Pacific Region (Oregon and Washington). This same data source was used during previous reports, and updating the average number of hours was consistent with previous methods.
2. This report used the number of acres by county from the 2012 Census of Agriculture survey results, which were released in the summer of 2014. Updated estimates of acres of crops by county will next be released in the summer of 2019, based on data collected during 2017.

Step 1b&c: Estimating total workers for nurseries and greenhouses and specialty forest products

The list of crops in Step 1A excluded nursery and greenhouse products and the gathering of specialty forest products. These three industries are also known to be labor intensive. In the previous reports, in order to estimate the total number of workers in these areas, Dr. Larson worked with the Oregon Employment Department to calculate a 5-year average of the number of workers who worked for 9 months or less in each industry and who were covered by the state's Unemployment Insurance program. Oregon businesses are required to report employment by "all individuals, including aliens and minors, who are employed for any compensation or under any contract of hire by an employer... including contract, causal or temporary labor." Agricultural farm employers must submit records on employees once they pay \$20,000 or more in wages during a quarter or have 10 or more employees in 20 weeks of a calendar year. In addition, a second data source, the 2014 Census of Horticulture statewide count of workers who worked less than 150 days was used to estimate the number of nursery and greenhouse workers. The two derived estimates of the total size of the workforce were averaged to create a final total employment number by industry, see these calculations on the next page. These same procedures were replicated using newer data in this report.

Using five year averages of unemployment insurance records for nursery and greenhouse employment smooths the estimates. Total employment in this industry has been rather stable across 2012-2016, such that in 2016 there were only about 400 fewer workers who worked 9 months or less than in 2012. Using five year averages of unemployment insurance records for nursery and greenhouse employment smooths the estimates as well. Total employment in this industry has been rather stable across 2012-2016, such that in 2016 there were only about 400 fewer workers who worked 9 months or less than in 2012.

Step 1d: Estimating total workers for reforestation

The final labor intensive agricultural area of employment that was included in the Larson method was reforestation, or the replanting of trees post-harvest. Reforestation businesses are grouped together with other forestry support businesses which include activities unrelated to tree planting. These other business activities which include support activities for timber production, wood technology, forestry economics, marketing and consulting, forest firefighting, and forest pest control were deemed to be less likely to use labor that fit the definitions of seasonal and migrant. Unemployment Insurance records for workers who worked 9 months or less in this industry were accessed and the researcher entered a

confidential data agreement with the Oregon Employment Department to access business specific employment records in order to identify seasonal labor more directly related to reforestation. This statewide estimate was used as one source of labor and averaged with two other estimates based on different assumptions about the amount of time it takes to replant an acre of trees. See the Appendix for more details.

Step 2: Reduce the total number of workers to account for multiple job holders

As noted in Step 1 above, attempting to account for all labor needs and differences across businesses is complicated. Some people will work in more than one crop as a migrant or seasonal worker. This report, following the previous methodology, assumes that some people will fill multiple jobs at different rates by industry, i.e., “duplication rates.” The total number of identified crop jobs is divided by 2.068. This reduces total labor by one half to address that not all identified labor needs will be filled by different individuals. Reforestation jobs are divided by 1.148 to reduce total labor and total nursery and greenhouse jobs were divided by 1.057 to more accurately reflect the total number of workers. Specialty forest product jobs are not reduced, as very few jobs are present in this industry statewide.

These adjustments were derived by Dr. Larson in the 2012 report by consulting different data sources for each industry. Updating the previous methodology for handling multiple job holders is outside the scope of this report.

Step 3: Assume 33.5% of all workers are migrant and 66.5% are seasonal workers

This report, consistent with prior reports, starts with the assumption that all estimated agricultural workers are either migrant or seasonal. We do know that some crop workers do work full-time and some seasonal workers work off-farm as their primary source of income. However, it is too difficult to account for all of these scenarios. Instead this report assumes that of all identified agricultural workers, 33.5 percent of them are migrant workers and the remaining 66.5 percent are seasonal workers. Dr. Larson derived these estimated percentages by analyzing health clinic patient data in 2012 (updating these assumptions is outside the scope of this report).

Calculation Examples

Example of applying Steps 1-3 to calculate crop employment

The following example illustrates how steps 1-3 were used to estimate total employment for apricot production. This example is at the state level, but in the actual calculations, these numbers were produced for individual counties and the state total is the total of all counties. These calculations use the labor demand assumptions found in Table 2.

Step 1: Estimating total workers for apricots using the demand for labor calculations

Method 1:

$$\frac{2012 \text{ Acres (35)} * \text{Hours to Perform Task (96)}}{\text{Season length (16.83 days)} * \text{Hours per day (8.27)}} = 24.14 \text{ workers}$$

Method 2:

$$= 1 \text{ worker per acre (35 acres)} = 35 \text{ workers}$$

Average the two estimates: $(24.14 + 35)/2 = 29.6$ workers

Step 2: Divide the total estimate of workers by 2.068 to account for duplication =14.3 workers

Step 3: Assign migrant and seasonal worker percentages to the total. $14.3 \text{ workers} * .335 = 4.8$ migrant workers; $14.3 * .665 = 9.5$ seasonal workers statewide in apricot production

Example of applying Steps 1-3 to calculate nursery and greenhouse employment

The following example illustrates how these steps were used to estimate total employment in the nursery and greenhouse industry. This example is at the state level, but in the actual calculations, these numbers were produced for individual counties and the state total is the total of all counties.

Step 1: Estimating total workers for nurseries and greenhouses

Calculate total workers who were employed 9 months or less in a nursery or greenhouse

business using a 5 year average of Unemployment Insurance records = 11,557 workers

Total workers who worked < 150 days using the 2014 Horticultural Survey = 12,904 workers

Average the two estimates = 12,230 workers

Step 2: Divide the total estimate of workers by 1.057 to account for duplication = 11,570 workers

Step 3: Assign migrant and seasonal worker percentages to the total

11,570 workers * .335 = 3,876 migrant workers; 11,570 * .665 = 7,694 seasonal workers

statewide in the nursery and greenhouse industry.

Step 4: Reconcile the number of migrant crop workers with the estimates of migrant labor from the Census of Agriculture

Since the last study was published in 2013, the Census of Agriculture, a national survey conducted every five years by the United States Department of Agriculture, added a question about the use of migrant labor on farms. Responding to the Census of Agriculture is mandatory and the census has an exhaustive method for reaching farm establishments.³ While mandatory, fewer resources allocated by the Census for farm outreach meant that the 2012 Census had only an 80.1% response rate nationally. The Census of Agriculture uses the following definitions:

Farm: "Any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year." This includes any plant crops grown in the field or in a greenhouse, livestock including aquaculture, nursery products, and floriculture products.

Migrant farm workers are defined as: "a farm worker whose employment required travel that prevented the worker from returning to his/her permanent place of residence the same day."

The Census of Agriculture asks farm business operators to report the number of migrant farmworkers employed on the farm either as hired labor or contract labor.

The Larson approach used in the previous studies and the Census of Agriculture use different definitions and methods to establish an estimate of migrant workers. However, since the majority of workers are crop workers, and the two methods use the same data year (2012), it is reasonable to assume that the Larson method of estimating workers by crop and the actual reported workers for crops and all agricultural businesses should be comparable. In fact, the Census of Agriculture estimates could be larger than the estimates derived by the process explained in Steps 1A-1E for the following reason:

- The Census of Agriculture covers all farm establishments, and includes livestock production and hay, grass seed, and other crops omitted from the approach described above.

³ The 2012 Census of Agriculture methodology and details for county coverage in Oregon can be found here: https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_2_County_Level/Oregon/orappxa.pdf.

However, the Census of Agriculture estimates may be smaller than the established method of identifying migrant workers for the following reasons:

- The assumptions about labor needs per crop, as used in previous studies and described above, are too high, because we assume all acres require the same amount of labor without considering farm size and because we do not account for the use of full-time labor.
- The assumption that 33.5% of all workers are migrant workers is too high.
- Farm operators responding to the 2012 Census of Agriculture are underestimating the number of migrant workers on their farm.
- Farms that use migrant labor are less likely to respond to the Census of Agriculture.

A comparison of the two data sets showed substantial differences in the number of migrant workers across Oregon's counties. For 18 counties, the derived number of migrant workers was more than 10 percent higher than the Census of Agriculture estimate, while the opposite was true in 10 counties. In the remaining 8 counties, the two estimates were within 10 percent of each other. This analysis resulted in the following changes to the methodology:

1. The Census of Agriculture estimates of migrant workers were assumed to be a minimum number. This minimum number was adopted for the 14 counties where the derived number was less than the Census of Agriculture number. These counties are identified with a * in Table 1. This increased the total number of migrant workers by 2,033 in 13 counties and by 5,694 in Wasco County (It is unknown why these numbers differ so dramatically for Wasco County).
2. Step 1A was revised for two labor intensive crops, grapes and potatoes, using updated production data. In both cases, the new estimates reduced the total number of workers and increased alignment between the Larson method which uses a hand labor calculation and the Census of Agriculture estimate. This decreased the total number of migrant workers by 1,296 in potatoes and by 3,270 in grapes.
3. After these two revisions, the number of migrant workers statewide was now less than the estimate of migrant workers in the Census of Agriculture and no further revisions were made.
4. The new number of migrant workers was divided by .335 to derive a new estimate of total workers, and 66.5% of this total were assumed to be seasonal workers in order to maintain the previous assumption about migrant and seasonal workers.

The adjustments made to incorporate the Census of Agriculture estimates as a benchmark did more to change the distribution of migrants across the state rather than adjust their total. For example, adjusting the total labor demands for potatoes reduced the worker estimates in Baker, Klamath, and Umatilla counties the most as this crop was their largest contributing factor to total labor demands. Reducing total employment for grape harvest, pruning, and processing reduced migrant labor the most in Douglas, Josephine, Lane, Polk, and Yamhill counties, where grape production accounted for between 35-68 percent of total migrant workers.

These estimates represent the best attempt to enumerate the number of migrant and seasonal agricultural workers in the Oregon.

Table 1: County level migrant and seasonal farmworker estimates**Migrant and Seasonal Farmworker (MSFW) County Estimates, 2018**

County	MSFW		Non-Farmworkers		Non-Farmworkers		Total MSFW Workers and Non- Farmworkers
	Estimates Total	Migrant Workers	Seasonal Workers	in Migrant Households	in Seasonal Households	Workers and Non- Farmworkers	
Field agriculture, nursery and greenhouse, and specialty forest gathering							
Baker	96	32	64	29	67	192	
Benton*	1,707	572	1,135	508	1,197	3,412	
Clackamas	6,154	2,062	4,093	1,830	4,313	12,296	
Clatsop	399	134	266	119	280	798	
Columbia	143	48	95	42	100	285	
Coos*	313	105	208	93	220	626	
Crook*	146	49	97	43	103	292	
Curry	282	95	188	84	198	564	
Deschutes*	87	29	58	26	61	173	
Douglas	1,313	440	873	390	920	2,624	
Gilliam*	96	32	64	28	67	191	
Grant*	63	21	42	19	44	125	
Harney	3	1	2	1	2	7	
Hood River	9,772	3,273	6,498	2,905	6,848	19,524	
Jackson	3,287	1,101	2,186	977	2,303	6,567	
Jefferson*	469	157	312	139	328	936	
Josephine	413	138	274	123	289	824	
Klamath	140	47	93	41	98	279	
Lake*	21	7	14	6	15	42	
Lane	1,451	486	965	431	1,017	2,899	
Lincoln	65	22	43	19	46	131	
Linn	2,118	710	1,409	630	1,485	4,233	
Malheur	4,567	1,530	3,037	1,358	3,201	9,126	
Marion	13,350	4,472	8,877	3,969	9,355	26,673	
Morrow	3,040	1,018	2,022	904	2,130	6,074	
Multnomah*	1,588	532	1,056	472	1,113	3,173	
Polk	3,328	1,115	2,213	989	2,332	6,650	
Sherman*	24	8	16	7	17	48	
Tillamook	20	7	13	6	14	40	
Umatilla	2,764	926	1,838	822	1,937	5,523	
Union*	1,090	365	725	324	764	2,177	
Wallowa	7	2	5	2	5	14	
Wasco*	22,337	7,483	14,854	6,641	15,654	44,631	
Washington*	7,463	2,500	4,963	2,219	5,230	14,911	
Wheeler	1	0	1	0	1	2	
Yamhill*	6,191	2,074	4,117	1,840	4,339	12,370	
Oregon Statewide	82,961	27,792	55,169	24,663	58,138	165,762	
Reforestation	3,428	1,148	2,280	1,019	2,402	6,849	
State Total	86,389	28,940	57,449	25,682	60,540	172,611	

*2012 Census of Agriculture migrant labor estimates, these values include migrant labor in livestock production

Table 2: Demand for labor calculations by commodity

Crop	Task	Method 1		Method 2	
		Hours per task per acre	Work Days	Hours per task per acre	Work Days
Apples	harvest	187.38	30.48		
	prune/thin	47.92	35		
Apricots	harvest	96	16.43	1 worker/acre	
Asparagus	harvest	59.59	28.57	3 worker/acre	
Beans - lima					
green/dry	preharvest	10.65	5.71		
Beans - green/snap	grade/clean/box/ storage	35.95	32.86		
Beets	harvest	29.02	43.57		
	prune/tie/train	162.93	21.43		
Blackberries	harvest	137.3	48.57		
	prune/thin/train	162.93	21.43		
Blueberries	harvest	648	51	.25 workers/acre	
	prune	60	21.43	48	21.43
	process/pack	140	51	.05 worker/acre	
	weed	65	8.13		
Boysenberries	harvest	76.5	15		
	prune/tie	57.5	21.43		
Broccoli	harvest/pack	101.44	43.57		
Cabbage	harvest	114.69	38.57		
Cantaloups	harvest	73.42	23.9		
Carrots	wash/grade/size/ pack	7.88	21.43		
Cauliflower	harvest	87	44.29		
Celery	harvest	125.7	10.71		
	harvest 1 & 2	28.66	10	185.63	43.57
	harvest 3 & 4	2.5 workers/acre		.33 workers/acre	
	harvest 5	.8 workers/acre			
Cherries - Sweet	prune	44.75	43.57		
	preharvest	13	6.67		
Cherries - Tart	preharvest	13	6.67		
Chestnuts	all activities	45	17.86		
Christmas Trees	all activities	31.7	21.43	Apply to 2015 acres	
	1. harvest-dry 70% 2. harvest-wet 30% - Coos				
Cranberries	wet only	24	12.5	12	12.5
Cucumbers/ Pickles	harvest	105.72	47.86		
	grade/pack	53.88	47.86		
Currants	harvest	75	13.57		
Garlic	plant/pre-harvest	18	21.43		
	harvest	115.73	87.86		
Grapes - Wine	mechanically harvested (87.5%)	3.85	17.14		
	hand harvested (12.5%)	200.83	17.14		
	general harvest 1	1.74 workers/acre			
	overall harvest	average both methods			
	prune/thin 1&2	.3 workers/acre		1/3rd of harvest workers	

Table 2: Demand for labor calculations by commodity, continued

Crop	Task	Method 1		Method 2	
		Hours per task per acre	Work Days	Hours per task per acre	Work Days
Grapes - Wine cont.	prune/thin 3&4	.1375 workers/acre		59.15	39
	process	0.0667 workers/acre			
Hazelnuts	all activities	1.46	7.86		
Herbs	harvest	293	33.57		
Hops	harvest	.0567 workers/acre			
	tie/train	15.43	18.4		
Kiwifruit	harvest	175	155		
Lettuce	harvest	109.6	59.29		
Loganberries	harvest	137.3	48.57		
Mint	Prune/weed	4	31		
Nectarines	harvest	38	30		
Onions	weed	100	21.43	82.94	21.43
	sort/pack	.25 workers/acre		.5 workers/acre	
Other berries	harvest	246.46	31.25		
Other crops	prune/tie/weed	10.55	23.67		
Peaches	harvest	87.59	32.86	1 worker/acre	
Pears - Bartlett	harvest	68.57	18.2	5 workers/acre/day	
	prune/thin	46.8	35		
Pears - Bosc and others	harvest	72.57	15	1.6 workers/acre	
	prune/thin	36.07	41.43		
Peppers - all types	harvest	176.09	57		
	grade/pack	156.08	57		
Plums	harvest	34	16.19		
Potatoes	general labor	3.44	54.29		
	sort/pack	5.06	54.29		
Pumpkins	harvest	46	53		
Radishes	harvest	105	32		
Raspberries	harvest	76.5	18.57	no est. for Clackamas, Washington, Multnomah	
	prune	40	22		
Rhubarb	harvest	120	15.71		
Spinach	harvest	150	9.29		
Squash - summer	harvest	83.79	30		
Squash - winter	harvest	82.46	30		
Strawberries	harvest	465.47	40.77		
Sugar beets	preharvest	5.91	21.42		
Sweet corn	harvest	44.21	31.07		
	pack	.175 workers/acre			
Sweet corn-seed*	detassel	71.6 acres/worker			
Tomatoes	harvest	166.67	32.69		
Turnips	harvest	178.5	77.15		
Walnuts	harvest	80	22.86	no est. for Washington	
Watermelon	harvest	78.01	28.54		

Non-farmworkers and Children and Youth: Methodology and Estimates

Steps 5-6: Estimating the number of accompanying non-farmworkers

To better understand the health needs of migrant and seasonal farmworkers, this report also estimates:

- the percent of migrant and seasonal farmworkers who live and travel with household members (accompanied migrant and seasonal farmworkers),
- the average number of people in an accompanied migrant and seasonal household,
- the average number of farmworkers and non-farm workers per accompanied household,
- the total number of children and youth under the age of 20, who may or may not be farmworkers.

There are not adequate data sources for estimating the percent of workers who are accompanied or the average number of people per accompanied household specific to Oregon. These estimates carry forward the assumptions from past reports, which were based on patient records from some health clinics, the Oregon Child Development Coalition and the Oregon Human Development Coalition, and a national survey. While updating this report, the newer national survey was consulted - in the 2014 data, the average number of farmworkers per household had declined to 1.69 in migrant households and 1.24 in seasonal households. Adjusting this population component without being able to adjust the total household size greatly increased the total number of non-farmworkers. In an effort to not overstate the size of the population, all population components were retained from the previous reports. The first step in creating these population estimates are to source four population parameters (see Table 3).

Table 3: Population Component Assumptions used to estimate non-farmworkers

Population Component	Estimate	Data Source
% of accompanied migrant and seasonal farmworkers	75.8%	Patient databases from 8 health centers or farmworker clinics; using 2012 data.
Average number of people per accompanied household	4.09 people/accompanied household	Patient databases from 6 health clinics, the Oregon Child Development Coalition, and the Oregon Human Development Coalition; using 2012 data.
Average number of farmworkers per accompanied household	2.05 farmworkers per household	2005-2009 National Agricultural Workers Survey (NAWS) data for Region 5: CO, ID, MT, NV, OR, UT, WA
Average number of non-farmworkers per accompanied household	$2.04 = 4.09 - 2.05$ = Household size – farmworkers per household	Mathematical equation

These population parameters are used in the following three equations to estimate the total number of non-farmworkers that accompany both migrant and seasonal farmworkers. The examples below use the current data for migrant farmworkers:

Equation 1: Determine the total number of farmworkers living in accompanied households(hh).

$$\begin{aligned} & \text{Total migrant farmworkers (28,940) * \% Accompanied farmworkers (0.758)} \\ & = \text{Total accompanied migrant farmworkers (21,936)} \end{aligned}$$

Equation 2: Determine the total number of accompanied migrant farmworker households

$$\frac{\text{Accompanied workers (21,936)}}{\text{Avg. farmworkers per hh (2.05)}} = \text{Total accompanied farmworker hh (10,700)}$$

Equation 3: Determine the total number of non-farmworkers accompanying migrant and seasonal farmworkers

$$\begin{aligned} & \text{Total accompanied farmworker hh (10,700) * Non – farmworkers per hh(2.04)} \\ & = \text{Total Non – farmworkers accompanying migrant workers (21,829)} \end{aligned}$$

Step 7: Estimating the number of migrant and seasonal children and youth

The previous reports used a combination of data sources to derive an estimate of the total number of children and youth accompanying migrant and seasonal farmworkers. These estimates were derived separately from the estimates of total people per household and average number of farmworkers and non-farmworkers per household to allow for the possibility that some children and youth may be farmworkers while others are not. This report replaces the previous methodology with one data source: the number of eligible migrant children from the Oregon Department of Education’s Migrant Education Program.

The Oregon Department of Education releases data on the total number of eligible migrant children and youth in seventeen age or grade categories, which also includes people ages 20 and 21. The definitions used by the agency differ from the definitions used to identify migrant farmworkers; however, this methodology is preferable to the above since the state employs a network of trained ‘recruiters’ who seek to identify and recruit migrant children. In addition, they use a linked software system to avoid double counting. The system counts all migrant children encountered and separately notes the number of children who go on to utilize one or more educational programs. More details can be found on the state’s methods on page 19 of this report:

<https://www2.ed.gov/admins/lead/account/consolidated/sy15-16part2/or.pdf>.

Previous migrant enumeration studies have limited children and youth to people under the age of 20 and created only six age categories. Table 4 uses the number of eligible migrant student data from the 2014-2015 school year and assumes students are evenly distributed across grades by age (i.e. 50% of 12 year olds are in 6th grade and 50% are in 7th grade) to produce estimates which preserves the previous age categories. The final estimate of 20,954 children is lower than the total identified eligible migrant youth (21,187), as people in the unassigned grade category (UG) and a portion of the out-of-school youth category (OSY) that reflects 20- and 21-year-olds are removed. These numbers were then used to calculate new averages of all children and youth per age group. The percent of migrant children in each category was applied to seasonal farmworkers – consistent with previous reports. It is unknown to what extent these two populations are similar.

This data is an estimate of the population and should not be considered a complete count. This data source was chosen to maintain consistency with the estimates produced by the Oregon Education Department, and because this process was more transparent than the previous methods.

Table 4: Total migrant and seasonal youth and children by age in Oregon
Estimated number of migrant youth and children

Age Groups	Migrant Percent	Number of Migrant Children and Youth	Seasonal Percent	Number of Seasonal Children and Youth
< 1	2.9%	617	2.9%	1224
1 to 4	11.5%	2,420	11.5%	4804
5 to 12	52.6%	11,030	52.6%	21895
13 to 14	11.0%	2,307	11.0%	4578
15 to 18	18.6%	3,891	18.6%	7724
19	3.3%	689	3.3%	1368
Total	100.0%	20,954	100.0%	41,592

Presence of Indigenous Workers- not a population estimate

This report is unable to produce a statewide estimate of Indigenous workers. Yet, it is critical to understand the presence and needs of Indigenous workers separately from all migrant and seasonal farmworkers due to the extra challenges these populations may face navigating health care systems. This report is only able to provide one indicator of the presence of Indigenous populations in Oregon: language requests recorded by the Oregon Judicial Department.

In 2012, there were 96 requests for 15 different languages; the total number of requests more than quadrupled to 451 in 2017. In 2017, 12 Oregon counties submitted language requests; an increase from 6 counties in 2012 and 10 counties in 2011 (see Table 5). These trends suggest that the number of Indigenous people living in Oregon is increasing and that this population is present in more counties. Clackamas, Linn, and Polk counties are shown in Table 4 with 0 requests in 2017 although each county had multiple requests in prior years.

Table 5:

Oregon Justice Department Statewide Indigenous Language Requests for the Calendar Year 2017

2017	Benton	Clackamas	Clatsop	Deschutes	Lane	Lincoln	Linn	Malheur	Marion	Morrow	Multnomah	Polk	Umatilla	Washington	Yamhill	# by Language
Akateko								1	1		30					32
Chuj									16				7	1	4	28
Huichol													7			7
Ixil											5					5
Mam	33	1			4	29			46		3		16	1		133
Maya Yucatan																18
Mixteco								1	22						5	28
Mixteco Alto									1							1
Mixteco Bajo						3			30		1		2	12	4	52
Nahuatl		2												6		8
Q'Anjobal		1									3		27	2		33
Quiche	4									2	6		13			25
Purepecha (Tarasco)		2		13							4					19
Trique								1	10		8			1		20
Zapoteco		2			6	2			16				9			35
Total Requests by County	37	8	0	13	10	34	0	3	142	2	78	0	81	28	8	
County Language Count	2	5	0	1	2	3	0	3	8	1	9	0	7	7	3	

Limitations

This report represents a best effort to rely on existing secondary sources of data in order to estimate the MSFW population. This population changes rapidly and in response to a wide number of different incentives, which complicates these efforts. The provided estimates should not be considered definitive but rather as reasonable estimates.

- This report uses multiple data sources, which may count the same migrant more than once. A duplication rate has been applied to the total, which may or may not fully account for all duplication.
- Only the Census of Agriculture explicitly estimates the number of migrant workers and the number of seasonal non-migrant workers. This report attempts to count all seasonal workers and assumes that only 33.5 percent of all seasonal jobs (after the duplication rate has been applied) are held by migrant workers.

- Irregular data collection and releases require the report to use data sources from 2012 through 2016.
- Migrant populations change quickly. This report prefers to utilize all data sources available which allows some estimates to be averaged over multiple data points instead of relying on only the most recent time period. This smoothing may over or under estimate the current population count.
- The majority of migrant labor in Oregon appears to be in the agricultural production sector. Changes in mechanization rates, weather, and yield estimates may affect required labor in each commodity differently. This study was unable to update all of the assumptions from the last study; for example, it is likely that as agricultural production continues to become more efficient that the per acre labor utilization rates used in this report are now too high.
- Oregon contains many small population counties which can reduce the quality and completeness of estimates of the number of acres per crop provided in the Census of Agriculture. This can lead to underestimating migrant workers in these small counties.
- This report does not uniformly cover migrant and seasonal labor used for livestock and fishing, or the processing of animal products. This was done so as to provide a report that was in congruence with Dr. Larsen's previous works. It is well understood that workers in these industries can be incorporated into a broader definition of "migrant" or "seasonal." Therefore, in addition to what has been said above, it should be noted that the totals provided here represent a very conservative and intentionally incomplete estimate of a total migrant and seasonal worker profile in Oregon.

Appendix: Technical Description of the Methodology

Table of Contents

Introduction	3
Updating the Established Methodology for Workers	3
Table A1: Method and data sources for estimating workers	4
Step 1. Estimate total workers in five different industries: crops, Christmas trees, nurseries and greenhouses, reforestation, and specialty forest products.....	5
Step 2. Reduce the total number of workers by industry.....	7
Step 3. Designate total workers as either migrant or seasonal workers	8
Step 4. Reconcile the number of migrant workers with the estimate of migrant labor from the 2012 Census of Agriculture	8
Updating the Established Methodology to Estimate Households, Non-Farmworkers, Children	10
Table A3: Method and data sources for estimating households, non-farmworkers, children.....	10
Step 5: Estimate four population parameters	11
Step 6: Derive the total number of non-farmworkers living in households with MSFW	12
Step 7: Estimate the number of migrant and seasonal youth and children by age	12
Discussion of methods used to estimate children and youth.....	14
Updating the Established Methodology for Estimating the Presence of Indigenous People.....	15
Table A8: Data Source for estimating the presence of Indigenous People	15
Recommendations for Future Estimates	15

Introduction

This appendix provides a detailed description of the methodology used and considered while preparing the 2018 estimates of the migrant and seasonal farmworker (MSFW) population in Oregon. As noted in the main body of the report, this update prioritized consistency among methods with the two previous enumeration studies released in 2002 and 2012 (Larson method). One notable difference is that the current review was an expedited update which relied exclusively on secondary data. No interviews or surveys were administered to collect data, and this study chose not to collect data from primary health care clinics in order to produce draft estimates between January 15, 2018 and March 5, 2018. The second difference is that, unlike previous enumeration efforts, a new secondary source of migrant farmworkers by county data was available through the 2012 Census of Agriculture.

Updating the Established Methodology for Workers

This section describes the steps taken to: estimate the total number of agricultural workers in specific industries; to designate those workers as migrant or seasonal labor; and to reconcile the updated Larson method, which would use 2012 county crop acres as the basis of deriving estimates of labor demand, with the 2012 Census of Agricultural estimates of migrant farmworkers. Table A1 summarizes the numerical component of the enumeration study, lists the data source or sources used in the 2013 and 2018 estimates. As a summary, Table A1 does not fully describe all data sources used by Dr. Larson in the previous enumeration studies. This table omits data sources Larson considered using but ultimately did not and does not fully describe data sources that were not updated in this study. Interested readers are encouraged to reference the previous reports for more detailed descriptions of the study methodologies used in prior estimations.

Table A1: Method and data sources for estimating workers

Survey Component	2013 Data Source	2018 Data Source
Step 1: Estimate total workers in four different industries		
1a. Total Crop Workers by County I. Acres by county for 55 crops II. Workers by 55 crops by task	I. 2007 Census of Agriculture II. Oregon Ag and Fisheries Statistics '05, '07, '08, '10 III. Demand for Labor (DFL) method	I. 2012 Census of Agriculture II. 2015 Christmas Tree Survey III. Demand for Labor (DFL) method – revised estimates for grapes and potatoes.
1b. Statewide estimate of nursery and greenhouse workers	I. UI* # of workers in NAICS 1114 who worked 3 quarters in a year or less (2008-2012 average) II. 2010 Oregon Nursery and Greenhouse Survey	I. UI* # of workers in NAICS 1114 who worked 3 quarters in a year or less (2012-2016 average) II. 2014 Census of Horticulture, workers who worked less than 150 days
1c. Forest gathering and specialty products workers	UI* # of workers in NAICS 11321 who worked 3 quarters in a year or less (2008-2012 average)	UI* # of workers in NAICS 11321 who worked 3 quarters in a year or less (2012-2016 average)
1d. Statewide estimate of reforestation workers	I. UI* # of workers in NAICS 1114 who worked 3 quarters in a year or less (2008-2012 average) II. Rule of thumb averages	I. UI* # of workers in NAICS 1114 who worked 3 quarters in a year or less (2012-2016 average) II. Rule of thumb averages
Step 2: Reduce the total number of workers in the above 5 industries, some workers take multiple jobs, not all crop, nursery/greenhouse, or reforestation jobs are filled by migrant or seasonal workers.		
Estimate a duplication rate for crops, nursery/greenhouse, and reforestation workers. No rate is applied to forest gathering employment.	Oregon Human Development Corporation, client database, and Oregon Employment Department number of workers and number of jobs in agriculture.	Estimates not updated due to an incomplete methodology. Rates used for both studies are shown in Table A2 below.
Step 3: Designate the total number of workers in each industry as either migrant or seasonal workers		
% of MSFW who are migrants, assume remainder are seasonal	Patient databases from 9 health centers or farmworker clinics • Statewide: 33.5% migrants • Washington: 20.1% migrant • Yamhill: 21.3% migrant	I. Start with previous estimates II. Revise Washington and Yamhill to the state average based on Census of Ag data
Step 4: Reconcile the number of migrant crop workers with the estimate of migrant labor from the Census of Agriculture, adjusted the DFL for 2 crops in Step 1A, used as a minimum		
4a. Compare derived number of total migrant crop workers to Census of Ag count of migrant labor 4b. Use Census estimates as a minimum # of migrants (overrides calculations in Steps 1-3 for 14 counties) 4c. Revise DFL method for grapes and potatoes to reduce total labor, increases alignment between Census of Ag and DFL method. 4d. Divide # of migrant workers by 0.335 to derive total workers and seasonal workers for all counties.		
Notes: *Unemployment Insurance (UI) records filed by employers, Oregon Employment Department		

Step 1. Estimate total workers in five different industries: crops, Christmas trees, nurseries and greenhouses, reforestation, and specialty forest products.

1a. Total crop workers

The field agriculture estimates used a Demand for Labor (DFL) calculation that examined the number of workers needed to perform seasonal agricultural tasks where extensive hand labor is involved: harvesting, planting, pruning, weeding, and thinning operations. Sometimes sorting, grading, packing, and boxing operations are included in these estimates. The list of crops that require hand labor was first identified in the 2002 report, updated in 2013, and kept the same as 2013 for this report.

DFL calculations estimate the number of full-time equivalent (FTE) hand labor “jobs” available during the period of peak labor demand for crop production. These calculations, prepared for each crop in every county, were derived through a formula using four elements:

- Acres = 2012 Census of Agriculture disclosed crop acres
- Hours to Perform Task = hours needed to perform each task on a single acre
- Season Length = number of days for peak activity
- Hours per day = hours of work per farmworker during peak activity

Agricultural DFL Calculation:

$$\frac{\text{Acres} * \text{Hours to Perform Task}}{\text{Season length} * \text{Hours per day}}$$

The acres for 55 commodities were taken from the 2012 Census of Agriculture; the statewide total of nondisclosed acres were evenly allocated to all nondisclosed counties for each crop. One exception, Christmas trees, utilized two separate estimates of acreage as described below. The estimated hours to perform each task and the list of hand labor intensive tasks, as well as the season length for each commodity, were created in consultation with existing estimates made on the cost of producing crops per acre, known as enterprise budgets, and Extension Service specialists at regional land grant institutions. While it is likely these numbers have changed since 2012, it was outside the scope of work to systematically update all components. Instead this report assumes the previous estimates and only updates the labor requirements for two crops: grapes and potatoes. See details in Table 2 in the main text of the report.

The hours per day calculation was taken from the U.S. Department of Agriculture “Farm Labor Report” of quarterly data for agricultural work hours per week in the Pacific Region (Oregon and Washington). A five-year average (2013-2017) produced an estimate of 8.268 hours per day, and this number was applied uniformly to all agricultural commodities. This is an increase over the last 5-year average of 8.09 hours per day used in the 2013 report.

One crop, Christmas trees, incorporates two sources of acreage data: the 2012 Census of Agriculture acreage estimates and acreage from the nine largest production counties in the 2015 Christmas Tree Survey (Benton, Clackamas, Douglas, Lane, Linn, Marion, Polk, Washington, and Yamhill). This is a slight adjustment from the previous report to accommodate changes in available data. The calculations are averaged over both years. The 2015 acreage estimates indicate that the acres in operation have declined in all nine listed counties. Christmas tree production used 27.9% fewer acres statewide in 2015 (41,223 acres) compared to the 2010 Christmas Tree Survey, and 23.9% fewer acres compared to the 2012 Census of Agriculture (53,605 acres).

Christmas tree methodology in detail:

- Method 1: DFL formula based on 2012 Census of Agriculture Acres of Christmas Trees by County
- Original Method 2: Oregon Agriculture and Fisheries Statistics were used to create an average statewide worker estimate from surveys conducted in 2005, 2007, 2008, and 2010. These workers were then allocated to counties assuming an equal ratio of workers per county.
 - The Oregon Agricultural and Fisheries Statistics have been replaced by the Oregon Statistical Bulletin, and this new source no longer covers fisheries (outside of aquaculture trout) or Christmas Trees.
- Revised Method 2: 2015 Christmas Tree Survey was repeated (last completed in 2010). This survey provides statewide estimates of number of trees cut and sold, the number of trees planted, and total number of acres growing trees. It also provides acres of growing trees and number of trees sold for the 9 counties with the largest Christmas tree production. However, it does not provide an estimate of statewide hired workers. Therefore, we can no longer use an allocation method of total workers. However, this data source was used to allocate acres to all counties.
- Final estimates original: The two estimates of workers per county were averaged.
- Final estimates revised: The two estimates of acres by county were averaged and then used in the DFL calculation.

1b. Total greenhouse, nursery, and floriculture workers

The following two methods were used to estimate total workers for the greenhouse, nursery, and floriculture sector. These two county estimates of workers were then averaged.

- Method 1: Calculate a 5-year average (2012-2016) of nursery greenhouse workers (NAICS 1114) by county (UI Data workers employed 3 quarters or less annually). Data provided by the Oregon Employment Department.
- Method 2: Use a statewide estimate of labor from the Oregon Nursery and Greenhouse Survey, and proportionally allocate the state employment to counties based on the 5-year averages from the UI Data. This survey was discontinued after 2010 due to budget cuts.¹
- Revised Method 2: Replace the source for statewide estimates of labor with the 2014 Census of Horticultural Specialties, which provides statewide estimates of total workers and workers who worked 150 days or less for businesses that have at least 10,000 or more of sales from floriculture, nursery, and other specialty products. Follow original methodology.
 - Estimated 22,859 hired workers; 12,904 workers worked 150 days or less statewide, this report adopted the definition of seasonal and migrant labor as working 150 days or less.

1c. Total specialty forest products workers

Total workers were estimated using the average of 5 years (2012-2016) of forest nurseries and gathering of forest products employment included in the NAICS code 113210 by county (UI Data workers employed 3 quarters or less annually). This data was provided by the Oregon Employment Department.

1d. Total reforestation and related activities workers

Three methods were used to estimate the statewide number of migrant and seasonal farmworkers involved in reforestation efforts in Oregon. This methodology represents some divergence from the previous method (the previous method could not be exactly replicated). The final statewide estimate is derived by averaging all three methods.

¹ Personal communication with Dave Losh, Oregon State Statistician, USDA-NASS, January 25, 2018.

- Method 1: Examine all confidential business records for businesses classified under NAICS 115310, support activities for forestry, for the year 2016. This data source provided monthly employment numbers for each business. Efforts were made to identify businesses that might employ seasonal workers. The following criteria were used:
 - Remove all businesses where the average monthly employment and the maximum monthly employment diverged by 10% or less.
 - Sum the difference of maximum employees – minimum employees across all remaining businesses.

=5,850 workers

The above assumptions eliminate firms that experience small fluctuations in employment over the year, which may reflect normal labor in and out migration rather than seasonality of the business.

- Method 2: Assume 100,000 acres² are reforested annually; assume that an average worker takes 3.8 hours to replant an acre of fir, cedar, hemlock, and other similar trees in Oregon. In an eight-hour day, a worker can replant 2.1 acres and will work 22.14 days. No new estimates of total acres replanted or average replanting time per acre could be found, so this method produces a static estimate of 2,145 workers with the following demand for labor calculation:

$$\frac{100,000 \text{ acres} * 3.8 \text{ hours/acre}}{22.14 \text{ days} * 8 \text{ hours/day}} = 2,145 \text{ workers}$$

- Method 3: Assume 100,000 acres are replanted annually; an average worker can replant one acre in an eight-hour day³ and the average season lasts 22.14 days. This produces a static estimate of 4,516 workers with the following demand for labor calculation:

$$\frac{100,000 \text{ acres} * 8 \text{ hours/acre}}{22.14 \text{ days} * 8 \text{ hours/days}} = 4,516 \text{ workers}$$

- Final estimate = (5850+2145+2516)/3= 4170 total workers – before Step 2 is applied.

Step 2. Reduce the total number of workers by industry

The work in Step 1 assumes each seasonal job is filled by a different worker. Yet some people will work in more than one job as a migrant or seasonal worker. This report, following the previous methodology, assumes that workers will fill multiple jobs at different rates by industry, indicated with a “duplication rate.” Dr. Larson derived these rates for the 2013 report by analyzing health clinic patient data in 2012. Dividing the total number of workers in each category with the rates in Table A2 reduces the number of workers to partially account for the likelihood that a seasonal or migrant worker may be working in multiple jobs. The duplication rates from the 2013 report were used for this report.

² This estimate came from a 2012 article by Brian Rooney at the Oregon Employment Department, “Oregon’s Forestry and Logging Industry: from Planting to Harvest” which quoted the Oregon Forest Resources Institute estimate that 40 million trees are replanted annually in Oregon typically at the rate of 400 seedlings per acre. As of the publication of this report, the Oregon Forest Resources Institute is still using this same estimate of replanting.

³ This estimate of one worker replanting one acre per day came from Monte Bell at the US Forest Service in a 2002 phone call with Dr. Larson and this calculation was used in both of the prior reports.

Table A2: Duplication Rates

Geography	Category	Rate
State	Field Agriculture	2.068
State	Reforestation	1.148
State	Nursery/Greenhouse	1.057

Step 3. Designate total workers as either migrant or seasonal workers

The 2013 report used data from 11 health clinics and youth enrollment data from the Migrant Education Program to estimate what percent of total workers are migrants compared to seasonal employment of non-migrants. This analysis produced a statewide average of 33.5% migrant workers and 66.5% seasonal workers. A large enough sample of health clinic data was available in two counties to produce unique percentages: Washington County uses a 20.1% migrant and 79.9% seasonal split and Yamhill county uses a 21.3% migrant and 78.7% seasonal split. It was outside the scope of work for this report to collect health clinic records; therefore these percentages were applied again in this report. However, after Step 4 was completed, the statewide average was also applied to Washington and Yamhill counties since using smaller percentages seemed to underestimate the number of migrant workers.

Step 4. Reconcile the number of migrant workers with the estimate of migrant labor from the 2012 Census of Agriculture

Since the last study was published in 2013, the Census of Agriculture, a national survey conducted every five years by the United States Department of Agriculture, added a question about the use of migrant labor on farms (the question was added on the 2012 Census). Responding to the Census of Agriculture is constitutionally mandated and the census has an exhaustive method for reaching farm establishments.⁴ While mandatory, fewer resources for farm outreach meant that the 2012 Census had only an 80.1% response rate nationally. The Census of Agriculture uses the following definitions:

Farm: "any place from which \$1,000 or more of agricultural products were produced and sold, or normally would have been sold, during the census year." This includes any plant crops grown in the field or in a greenhouse, livestock including aquaculture, nursery products, and floriculture products.

Migrant farm workers are defined as: "a farm worker whose employment required travel that prevented the worker from returning to his/her permanent place of residence the same day."

The Census of Agriculture asks farm business operators to report the number of migrant farmworkers employed on the farm either as hired labor or contract labor.

The Larson approach and the Census of Agriculture use different definitions and methods to establish an estimate of migrant workers. However, as the majority of workers are crop workers, and the two methods use the same data year, 2012, it is reasonable to assume that the Larson method of estimating workers by crop and the actual reported workers for crops and all agricultural businesses should be comparable. In fact, The Census of Agriculture estimates could be larger than the estimates derived by the process explained in Steps 1A-1D for the following reason:

⁴ The 2012 Census of Agriculture methodology and details for county coverage in Oregon can be found here: https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_2_County_Level/Oregon/orappa.pdf.

- The Census of Agriculture covers all farm establishments, this includes livestock production and all crops, including hay, grass seed, and other omitted crops.

However, the Census of Agriculture estimates may be smaller for the following reasons:

- The assumptions about labor needs per crop are too high, potentially because we assume all acres require the same amount of labor without considering farm size, or because we do not account for the use of full-time labor.
- The assumption that 33.5% of all workers are migrant workers is too high.
- Farm operators responding to the 2012 Census of Agriculture are underestimating the number of migrant workers on their farm.
- Farms that use migrant labor are less likely to respond to the Census of Agriculture.

4a. Compare derived number of total migrant crop workers to 2012 Census of Agriculture count of migrant labor

A comparison of the two data sets showed substantial differences in the number of migrant workers across Oregon's counties. For 18 counties, the derived number of migrant workers was more than 10 percent higher than the Census of Agriculture estimate, while the opposite was true in 10 counties. In the remaining 8 counties, the two estimates were within 10 percent of each other. This comparison led to adding step 4b to reconcile for undercounting in the Larson method and to adding step 4c to reconcile over counting in the Larson method. The overall goal was to bring the Larson method and the Census of Agriculture estimates closer to one another.

4b. Use 2012 Census of Agriculture estimates as a minimum number of migrants

The Census of Agriculture estimates of migrant workers were assumed to be a minimum number. This number was adopted for the 14 counties where the derived number was less than the Census of Agriculture number. These counties are identified with an asterisk in Table 1 in the main body of the report. This increased the total number of migrant workers by 2,033 in 13 counties and by 5,694 in Wasco county. It is unknown why the migrant labor numbers differ so dramatically for Wasco county.

4c. Identify counties with derived estimates substantially higher than Census estimates

The total number of crop workers were the largest component of most county estimates (in six counties, nursery and greenhouse labor was the largest and, in one county, forest gathering was the largest). Focusing on the crop portion of the estimates, I calculated the most influential crop, or the single crop among the 55 labor intensive crops that accounted for the largest number of workers, in each county. Eleven counties had two or fewer estimated migrant workers in crop production, therefore their influential crops were excluded. Among the remaining 25 counties, the following crops were the most influential by count of counties: blueberries (5 counties), grapes (4), Christmas trees (3), potatoes, onions, cranberries, sweet cherries and pears (2 each), and garlic (in one county). Focusing on the counties that showed the largest deviation among the two sets of estimates suggested that the current DFL assumptions for grapes and potatoes merited closer examination.

I did not have access to the exact data sources used to calculate these estimates in the last report, but I did find updated production estimates⁵ for both crops with detailed labor information. Based on these

⁵ Grape production data was taken from Oregon producer information contained in "Evaluating the Potential for Precision Mechanization in U.S. Wine Grape Production" by Dean A. McCorkle and colleagues at Texas A&M University. Potato production data was taken from "Potato Cost of Production for Idaho 2017 with Comparisons to 2016" by Ben Eborn, Agricultural Economist at the University of Idaho, published in January, 2017.

sources, Step 1A was revised for both crops. The new labor demand estimates reduced the total number of workers and increased alignment between the hand labor calculation and the Census of Agriculture estimate. This decreased the total number of migrant workers by 1,296 migrant workers in potatoes and 3,270 migrant workers in grapes. After these two revisions, the number of migrant workers statewide was less than the estimate of migrant workers in the Census of Agriculture and no further revisions were made.

4d. Use new migrant totals to derive total workers and seasonal workers

The new number of migrant workers was divided by .335 to derive a new estimate of total workers, and 66.5% of this total were assumed to be seasonal workers in order to maintain the previous assumption about migrant and seasonal workers. In the absence of a county level data sources, these assumptions must be applied evenly across the entire state; however it is likely there is substantial variation among counties.

Updating the Established Methodology to Estimate Households, Non-Farmworkers, Children

This section describes the steps taken to estimate the number of non-farmworkers accompanying migrant and seasonal workers, as well as the number of migrant and seasonal youth under the age of 20. Table A3 summarizes the estimation component, lists the data source or sources used in the 2013 estimates. As a summary, Table A3 does not fully describe all data sources used by Dr. Larson in the previous enumeration studies. This table omits data sources Larson considered using but ultimately did not use and does not fully describe data sources that were not updated in this study. Interested readers are encouraged to reference the previous reports for more detailed descriptions of the study methodologies used in prior estimations.

Table A3: Method and data sources for estimating households, non-farmworkers, children

Component	2013 Data Source	2018 Data Source
Step 5: Estimate 4 population parameters: A. % Accompanied Workers; B. Total MSFW household size of accompanied households; C. Average # of farmworkers per accompanied households. D. Average # of non-farmworkers per accompanied household		
5A. % Accompanied Workers	Patient databases from 9 health centers or farmworker clinics = 75.8%	Retained
5B. Total accompanied MSFW household size	Patient databases from 9 health centers or farmworker clinics = 4.09 people/household	Retained
5C. Avg. # of farmworkers per accompanied household	U.S. Department of Labor National Agricultural Workers Survey (NAWS) 2005 – 2009 = 2.05 farmworkers/household	U.S. Department of Labor National Agricultural Workers Survey (NAWS) 2014 = but prefer not to use this update.
5D. Avg. # of non-farmworkers per accompanied household	Total accompanied household size – avg. # of farmworkers per household = avg. # of non-farmworkers per household	
Step 6: Derive the total number of non-farmworkers living in households with MSFW		
3 mathematical equations that incorporate the 4 estimated population parameters		
<i>Equation 1:</i> Determine the total number of farmworkers living in accompanied households		
<i>Equation 2:</i> Determine the total number of accompanied migrant farmworker households		
<i>Equation 3:</i> Determine the total number of non-farmworkers accompanying MSFWs		

Step 7: Estimate the number of migrant and seasonal youth and children by age		
Total # of children and youth in migrant and seasonal households	Oregon Office of Education, Migrant Education enrollment in three programs, Multnomah County Health Clinic patient data.	Oregon Office of Education, Migrant Education eligible count ages 0-21, for the year 2014-2015, reallocated to ages 0-19.
Age distribution of children and youth	Assume 2.4 children/household, take % distribution of ages, and apply to new total	Use estimated total population; do not assume an average # of children per household

Step 5: Estimate four population parameters

5a. % of accompanied migrant and seasonal workers

The 2013 report used data from 8 health clinics to estimate the percent of migrant and seasonal farmworkers who travel for employment (either alone or accompanied by family). These sources produced a statewide estimate that 75.8% of all migrant and seasonal farmworker households include family members. It was beyond the scope of this report to collect health clinic records and update these percentages.

The 2013 report mentions that the NAWS survey also provided an estimate that was not used as it was not wholly specific to Oregon and older than the other data sources. A report of findings from the National Agricultural Workers Survey (NAWS), using 2013 and 2014 data, notes that in the US, 65% of migrant workers are unaccompanied compared to 33% of settled farmworkers (Hernandez, Gabbard, and Carroll, 2016, page 8). The report also notes that 59% of all migrant US farmworker parents live apart from minor children; a much higher percentage than the 19% of settled farmworker parents living away from children.

5b. Total MSFW accompanied household size

The 2013 report used data from 6 health clinics, the Oregon Child Development Coalition, and the Oregon Human Development Coalition to estimate the average household size for MSFW. These data sources provided a statewide average of 4.09 people per household. More detailed data produced two county specific averages: 4.32 people per MSFW household in Washington County and 4.57 people per MSFW household in Yamhill County.

5c. Average number of farmworkers per accompanied household

The U.S. Department of Labor surveys farmworkers annually. The latest data are available for the year 2014 and can be separated into 6 regions of the country. Oregon is in region 5 with Washington, Idaho, Nevada, Utah, Colorado, Wyoming, and Montana. This national survey collected 476 responses from region 5 and 2,823 responses nationally. Among region 5, 70 respondents identified as migrants, 211 respondents identified as seasonal, and 11 as indigenous farmworkers. In previous reports, this data was used to estimate how many farmworkers are present in each household. In the 2013 report, this was 2.05 farmworkers per household for migrant and seasonal farmworkers based on averages across the 2005 through 2009 data. In the 2014 data, the estimates had decreased to 1.69 farmworkers per family in migrant farmworker households and 1.24 farmworkers per family in seasonal farmworker households.

Correctly specifying the farmworkers in each household is critical to determining the total number of accompanied migrant and seasonal households. The lower values in the 2016 data, combined with the carried over assumption that 75.8% of all migrant and seasonal farmworkers are accompanied, greatly increased the total number of households. This in turn increased the number of non-farmworkers

accompanying MSFW and the number of children and youth. Without enough information to update the percent of accompanied migrant and seasonal farmworkers, these lower values of farmworkers per household were not used and the default values from the 2013 report are used instead.

5d. Average number of non-farmworkers per accompanied household

The previous three population parameters were used to derive the average number of non-farmworkers per accompanied household with the following equation.

$$\text{Total accompanied household size} - \text{avg \# of farmworkers per household} = \text{avg \# of non-farmworkers per household}$$

Step 6: Derive the total number of non-farmworkers living in households with MSFW

The following three calculations were used to estimate the total number of non-farmworkers accompanying farmworkers. These estimates were calculated separately for migrant and seasonal farmworker households to account for the different average number of farmworkers per household (hh) found in 4e above. The following examples (Equations 1-3) use the current data for migrant farmworkers.

Equation 1: Determine the total number of farmworkers living in accompanied households

$$\begin{aligned} & \text{Total migrant farmworkers (28,940)} * \% \text{ Accompanied farmworkers (0.758)} \\ & = \text{Total accompanied migrant farmworkers (21,936)} \end{aligned}$$

Equation 2: Determine the total number of accompanied migrant farmworker households

$$\frac{\text{Accompanied workers (21,936)}}{\text{Avg. farmworkers per hh (2.05)}} = \text{Total accompanied farmworker hh (10,700)}$$

Equation 3: Determine the total number of non-farmworkers accompanying migrant and seasonal farmworkers

$$\begin{aligned} & \text{Total accompanied farmworker hh (10,700)} * \text{Non – farmworkers per hh (2.04)} \\ & = \text{Total Non – farmworkers accompanying migrant workers (21,829)} \end{aligned}$$

Step 7: Estimate the number of migrant and seasonal youth and children by age

The method to estimate the number of children and youth accompanying migrant and seasonal farmworkers was adapted from the previous reports as described below.

- *Larson Method: First determine the total number of children and youth*

Four sources of data, one clinic and three programs within the Oregon Child Development Coalition, were used to estimate the number of people under the age of 20 living in MSFW households in the 2013 report. Some of these children and youth may be farmworkers themselves which means that this population overlaps with estimates of non-farmworkers in MSFW households and estimates of MSFW. These data sources were used to create an average number of children and youth per accompanied household of 2.4 people. This average was used for both migrant and seasonal households.

- *Larson Method: Second, allocate youth to age groups*

The Migrant Education Program enrollment data and the Multnomah County Health Clinic data were used to allocate the total number of children and youth to 6 age groups. Table A4 replicates these percentages and applies the assumption of 2.4 children and youth in accompanied MSFW households to produce estimates.

Table A4: Estimated number of migrant youth and children, 2013 report methodology

Method 1: Reapply past percentages				
Age Groups	Migrant Percent	Number of		Number of Seasonal Children and Youth
		Children and Youth	Seasonal Percent	
< 1	2.2%	566	2.2%	1124
1 to 4	17.9%	4,608	17.9%	9147
5 to 12	51.6%	13,283	51.6%	26368
13 to 14	10.4%	2,677	10.4%	5315
15 to 18	16.3%	4,196	16.3%	8330
19	1.6%	412	1.6%	818
Total	100.0%	25,743	100.0%	51,101

- *Revised Method: Oregon Department of Education Migrant Education Program Eligibility*

The Oregon Department of Education must maintain a list of eligible migrant students and migrant students served in compliance with the No Child Left Behind Act, Title 1, Part C. The state does so through the administration of the Migrant Education Program (MEP). Routine program evaluations are conducted which release the total number of eligible migrant students, as well as a breakdown by age and grade. Table A5 shows this publicly available data from the most recent 2014-15/2015-16 school year and indicates that the number of eligible students has increased since 2011-2012 school year.

The 2013 report mentions using this data from three different migrant youth programs to estimate the percent of migrants by age, but does not mention why the total number was not considered. The estimates in Table A5 are lower than the 25,149 estimated migrant children and youth in the 2013 report. Interestingly, while the total number of migrant students increases, the percent in each age/grade remains remarkably stable; only the number of children in the youngest and oldest categories change enough to adjust their overall share of the population.

Table A5: Data from the Migrant Education Program (MEP), Oregon Department of Education

Grade	Number of Eligible Migrant Students			
	2011-12	2012-13	2013-14	2014-15
0-2	871	948	894	1,233
3-5	2,880	2,980	2,913	2,692
K	1,439	1,405	1,421	1,348
1	1,350	1,408	1,437	1,434
2	1,333	1,382	1,419	1,424
3	1,283	1,296	1,385	1,429
4	1,187	1,275	1,334	1,376
5	1,189	1,146	1,282	1,340
6	1,121	1,129	1,153	1,216
7	1,078	1,091	1,151	1,150
8	1,092	1,027	1,071	1,179
9	937	1,068	1,040	1,105
10	929	866	1,061	1,067
11	866	842	882	1,004
12	780	875	891	923
UG	82	54	19	61
OSY	1,281	1,389	1,434	1,206
Total	19,698	20,181	20,787	21,187

Table A6 uses the number of eligible migrant student data from the MEP for the 2014-2015 school year. To allocate children and youth to the same age categories as used in prior report, I assume students are evenly distributed across grades by age (i.e., 50% of 12 year olds are in 6th grade and 50% are in 7th grade). The final estimate of 20,954 children is lower than the 21,187 in Table A5, as it removes the UG category (unassigned grade) and two-thirds of the OSY category (out-of-school youth) total that reflects 20 and 21-year-olds.

Table A6: Migrant youth and child estimates, Method 2

Age Groups	Percent	Number
< 1	3%	617
1 to 4	12%	2420
5 to 12	53%	11030
13 to 14	11%	2307
15 to 18	19%	3891
19	3%	689
Total	100%	20,954

Discussion of methods used to estimate children and youth

Undoubtedly, both estimation methods are incomplete. The advantage to substituting MEP data is that this data is annually updated by another agency using a consistent methodology. However, there is no comparable program that tracks or counts the number of children and youth living with seasonal farmworkers.

Table A7 provides a comparison of children and youth estimates from the 2013 report and the two considered estimates (Method 1 and Method 2) in the 2018 report. The final two columns in Table A7 illustrate the necessary changes to underlying assumptions in the 2013 report in order to achieve a lower estimate of 20,954 children and youth. First, this lower number of youth can be achieved by

assuming accompanied migrant households have 1.9 children instead of 2.4. The estimate of 2.4 is based on data from the Multnomah County health clinic and program data from three programs run by the Oregon Child Development Coalition.

A lower number of children and youth could also be attained by reducing the percent of migrants who are accompanied by family members from 75.8% to 61.7%. Nationally, only 35% of all migrant farmworkers are accompanied by their families. Given the large difference between 75.8% and 35%, Oregon’s migrant farmworkers may be substantially different than the average national migrant farmworker. Establishing data partnerships with health clinics across the state could improve the understanding of migrant farmworkers and their family members.

Table A7: Comparison of multiple population estimates across two estimates of youth

Comparing Migrant Children and Youth Estimates Across Methods

	2013 Report	2018 Report Method 2		
		2018 Report Method 1	Adjust Children/HH	Adjust %HH Accompanied
% Accompanied HH	75.8%	75.8%	75.8%	61.7%
Farmworkers per HH	2.05	2.05	2.05	2.05
Total Accompanied HH	10,479	10,726	10,726	8,731
Children per HH	2.40	2.40	1.95	2.40
Total Children and Youth	25,149	25,743	20,954	20,954

Updating the Established Methodology for Estimating the Presence of Indigenous People

Table A8: Data Source for estimating the presence of Indigenous People

Component	2013 Data Source	2018 Data Source
Presence of Indigenous Populations	Oregon Judicial Department – requests for Indigenous languages 2011 and 2012	Oregon Judicial Department – requests for Indigenous languages 2016

This report is unable to produce a statewide estimate of Indigenous workers. Yet, it is critical to understand the presence and needs of Indigenous workers separately from all migrant and seasonal farmworkers due to the extra hurdles these populations may face navigating health care systems. However, there are even fewer data sources available and at best this report is only able to provide one indicator of the presence of Indigenous populations in Oregon: language requests recorded by the Oregon Judicial Department. In 2012, there were 96 requests for 15 different languages; the total number of requests more than quadrupled to 451 in 2017. In 2017, 12 Oregon counties submitted language requests; an increase from six counties in 2012 and 10 counties in 2011. Future reports could seek new data sources and partnerships to improve estimates of this important population.

Recommendations for Future Estimates

In my professional opinion, the Oregon Health Authority (OHA) should adopt the following approach in future efforts to estimate the size of the migrant and seasonal farmworker population in Oregon.

To estimate the number of migrant farmworkers, family members, and children:

1. For workers: Use the Census of Agriculture counts of migrant workers by county as a defensible estimate of migrant labor that includes a more comprehensive scope of agricultural production by including all crops and livestock. Processing and fisheries employment are still not covered.
2. For children and youth: Use the annual estimate of migrant children eligible under Oregon's Migrant Education Program. This set of estimates has a robust methodology and includes a statewide effort to do outreach to migrant families. Choose to retain these estimates in the provided 17 categories or reallocate to fewer age brackets.
3. For household size and non-farmworkers: Concentrate research efforts on understanding changes to the percent of accompanied workers and the number of people per accompanied household by creating a data sharing agreement with a network of health providers across the state. Use known household information from a sample of the population that is accessing healthcare services to create a potential range for the rest of the population.

To estimate the number of seasonal farmworkers, family members, and children:

1. For workers: Use one of the following two data sources to estimate the number of workers:
 - a. The number of workers who work 150 days or less by county (Census of Agriculture)
 - b. The number of workers who work less than three quarters by a series of NAICS codes by county (Oregon Employment Department Unemployment Insurance Program Data)
Consider adding the code for food processing – it was unclear why this was not done in earlier reports.
2. For children and youth: Compare the children per migrant farmworker and the distribution of children by age to the average number of children per family in the state and the distribution of children by age using the latest population data from the American Community Survey. Average these two values or decide which value is most likely to represent seasonal workers: migrant populations or the general population.
3. For household size and non-farmworkers: Derive an average number of migrant accompanied households using the health clinic data in point 3 above. Compare this average to the % of people who live in families with children at the state level using the latest population data from the American Community Survey. Average these two values or decide which value is most likely to represent seasonal workers: migrant populations or the general population.

The approach recommended above reduces the number of assumptions made by the Oregon Health Authority and produces some consistency in the way we think about migrant populations. It is impossible to produce 100% accurate results. Having compared the DFL approach (Larson Method) to the Census of Agriculture numbers, I believe there are too many variables that will continue to change in the DFL method complicating efforts to update these values. Furthermore, the DFL approach is difficult to understand and communicate to stakeholders.

These recommendations also more efficiently allocate the OHA's resources and increases the ability for this study to be updated by program staff. The most time-consuming components of this new estimation will be developing partnerships with health clinics, managing a data transfer from these clinics to OHA, and eliciting feedback from partnering and non-partnering clinics on the overall averages the data produce. Furthermore, OHA could utilize or strengthen its relationships with the Oregon Department of Education's Migrant Education Program to better understand the limitations of their

estimates and to look for mutual opportunities to improve the estimate of the number of migrant children in Oregon.

In the current political environment, any efforts to use a government agency to collect information about this population will be compromised by a lack of trust as to how the information will be used. If the 2017 Census of Agriculture estimates have a substantially lower response rate than the 2012 Census of Agriculture, this recommendation may need to be reconsidered.



Oregon Health Authority

PUBLIC HEALTH DIVISION
Health Policy and Analytics Division

You can get this document in other languages, large print, braille or a format you prefer. Contact Health Policy and Analytics Division at 503-373-1791 or email marc.overbeck@state.or.us. We accept all relay calls or you can dial 711.