

# Oregon Grasshopper and Mormon Cricket Survey Summary for 2014

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# Oregon Grasshopper and Mormon Cricket Survey Summary for 2014

## Introduction

The 2014 Oregon grasshopper survey season, conducted by the Oregon Department of Agriculture (ODA) in cooperation with the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) Plant Protection and Quarantine (PPQ) office, showed that the Oregon grasshopper population rebounded slightly from its pattern of decline since 2011. Surveying began on 13 May and completed on 22 August. Nymphal survey takes place early in the season and is used to locate potential outbreak areas for the current year. Adult survey (this year 7 July - 22 August) is used by ODA and APHIS to make predictions for the following season, estimating economic levels as 8 or more grasshoppers per square yard. In 2014, a total of **1,767** sites were visited. Of the total stops **914** were during the period for nymphal grasshopper survey and **853** during the adult period (Table 1). Approximately 1.03 million acres across 19 counties in eastern Oregon were estimated to be economically infested (Fig. 1, Table 1). Four of these 19 counties (Crook, Deschutes, Hood River, Multnomah) had only one location above the threshold, and fifteen of these counties had greater than 10,000 economically infested acres (Fig. 2; Appendix 1).

Table 1. Oregon Grasshopper Survey Statistics from 2005 through 2014. Economic infestation  $\geq 8$  grasshoppers / yd<sup>2</sup>.

Year	Number Counties Infested	Acres of Econ. Infest.	Grasshopper Sites Surveyed				Samples w/Econ Density	Mean GH / yd <sup>2*</sup>	Number of GH Surveyors
			Total	Nymph	Adult	Treatment			
2014	19	1,031,673	1,767	914	853	0	333	29	2.5
2013	15	869,857	1,489	462	935	92	280	50	2.5
2012	17	1,178,872	1,135	387	748	34	526	34	2.5
2011	18	2,888,455	3,139	1880	914	345	1093	20	6
2010	12	1,910,222	1,905	795	750	360	488	21	6
2009	11	151,974	998	491	507		108	18	4
2008	12	1,129,820	2,722	1116	1606		360	29	6
2007	13	798,358	1,585	706	870		298	18	6 (+2)
2006	14	97,399	1,368	750	618		100	16	6
2005	9	64,751	859	306	423		115	15	5

\*Mean of economically infested samples

Survey resources have been reduced since 2011 (Sites Surveyed, No. of Surveyors, Table 1). When this year's areas of economic density are adjusted for sampling effort the population resurgence from 2013 to 2014 is affirmed (Table 2, Fig. 3).

Table 2. A comparison of grasshopper (GH) infestation densities (/ yd<sup>2</sup>) adjusted for effort.

Year	Percent of Total Surveyed Acres			Estimated Acres Surveyed			
	Economic	non-Econ	No GH	Total	Economic	non-Econ	No GH
2014	23.1	38.6	38.2	4,459,387	1,031,674	1,722,069	1,705,647
2013	14.3	38.6	47.1	6,093,999	869,857	2,352,182	2,871,960
2012	33.7	46.8	19.6	3,503,235	1,178,872	1,639,468	684,895
2011	38.9	43.4	17.7	7,422,908	2,888,455	3,220,585	1,313,868

This does not mean the resurgence is evident across all regions. Lake and Harney Counties had areas with the highest densities and collectively showed the largest increase in economically infested acreage estimates. As will be seen below, other areas like Klamath Marsh continued the pattern of population decline. Areas of high density are consistent with the historical pattern (Fig. 4).

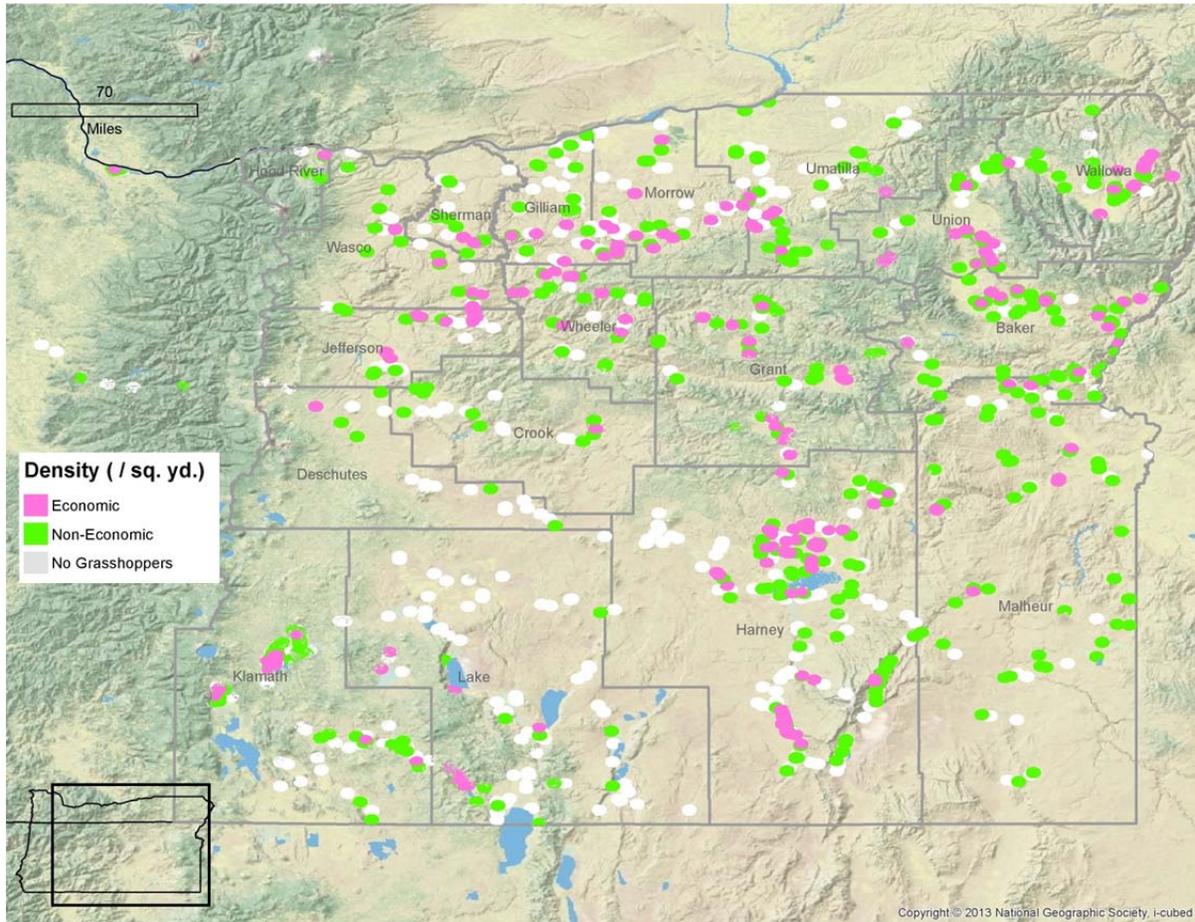


Fig. 1. 2014 estimated areas surveyed showing three levels of infestation.

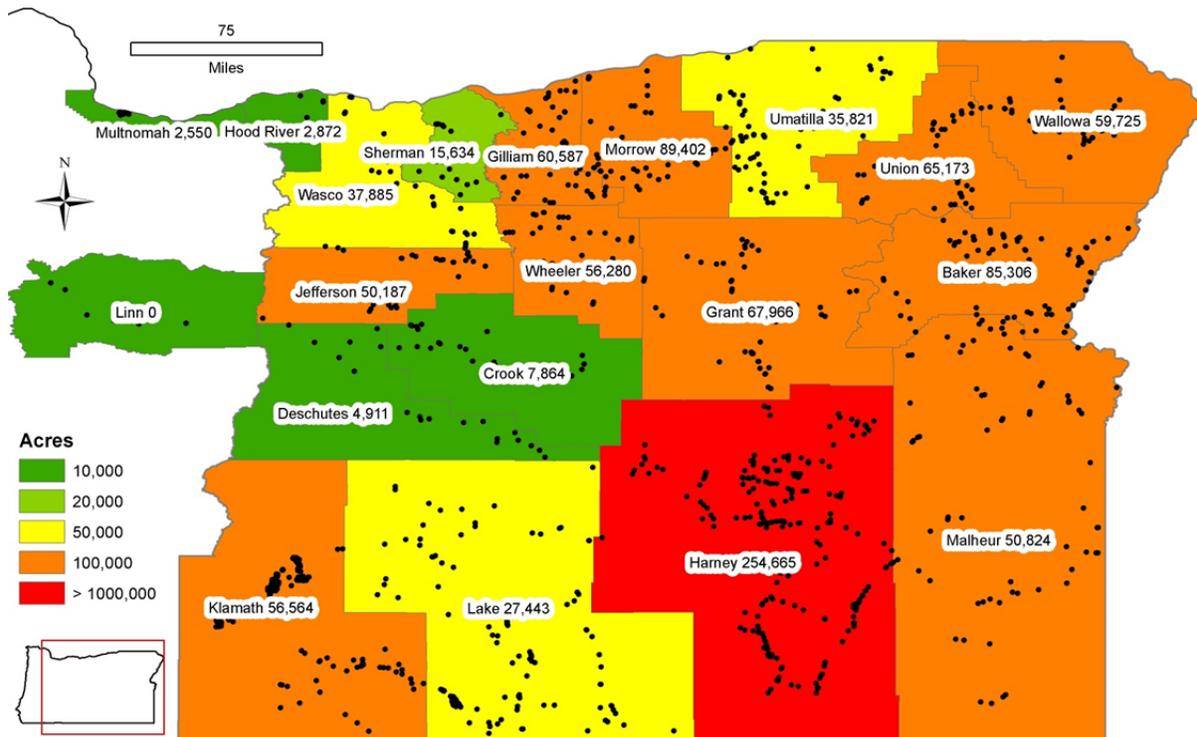


Fig. 2. 2014 survey locations superimposed on Oregon counties ranked by economically infested acreage.

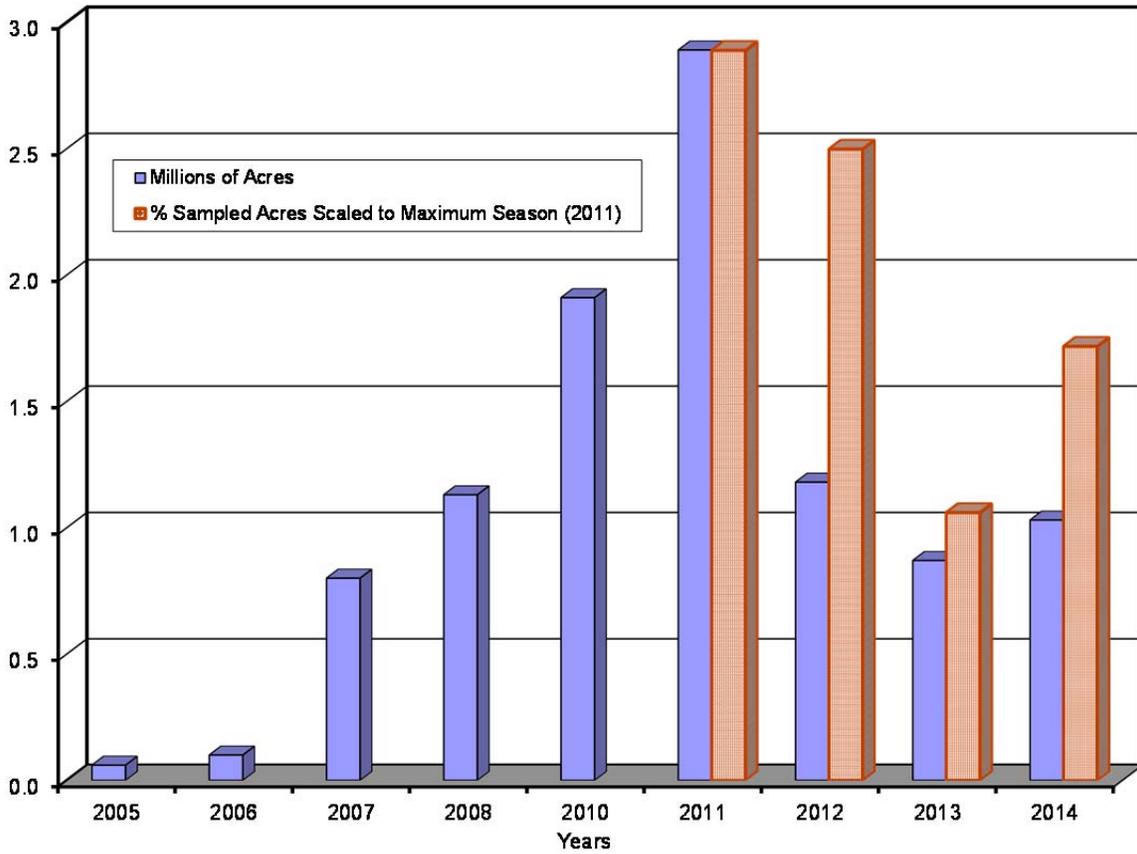


Fig. 3. Millions of acres economically infested with grasshoppers in Oregon during the recent past. Brown bars indicate 2011 - 2014 values adjusted for sampling effort (% of annual acreage sampled scaled to the economic acres surveyed in 2011).

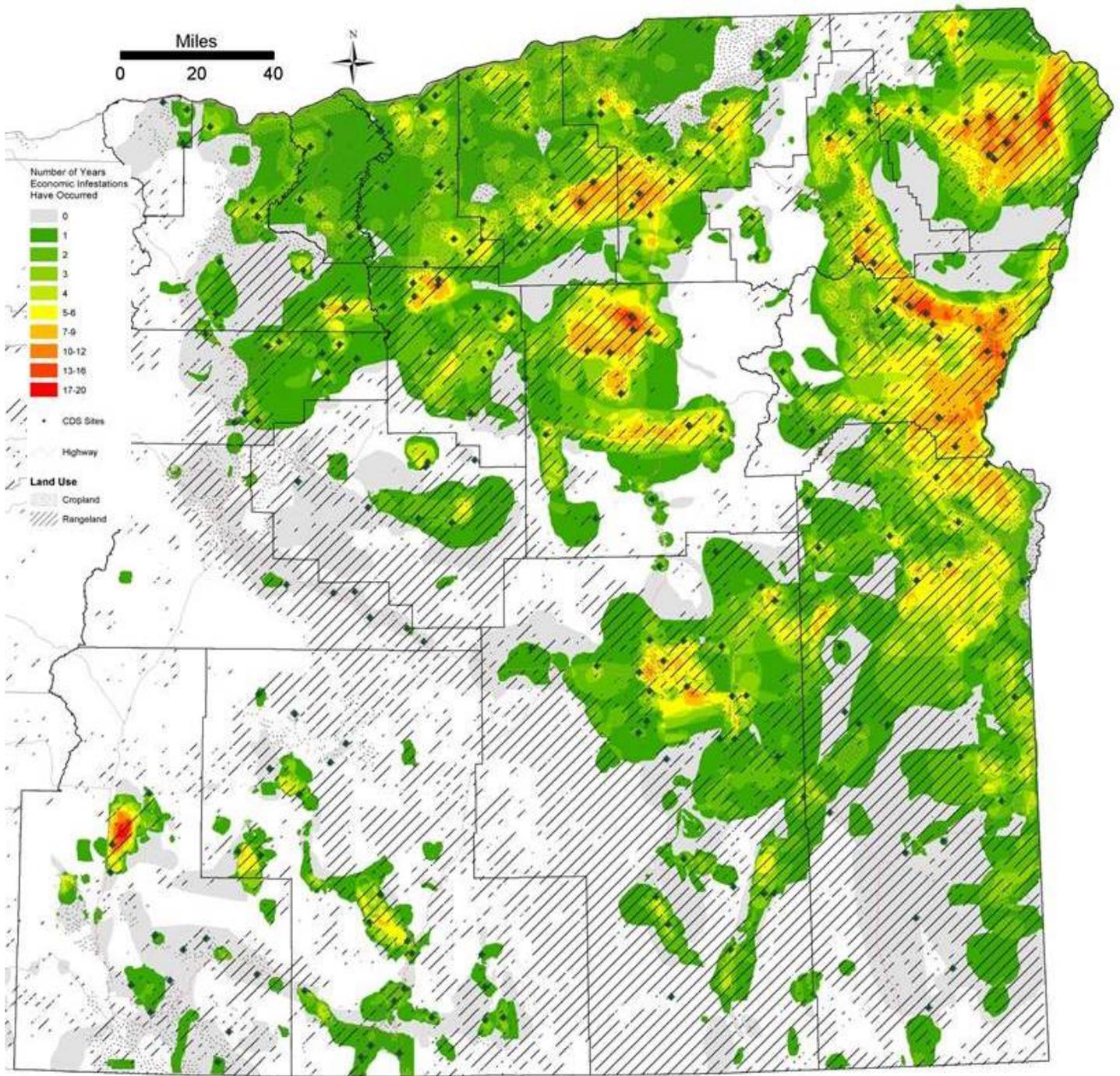


Fig. 4. Economic infestations of grasshoppers in eastern Oregon 1953 – 2014.

## Areas of Special Mention

### Fort Klamath Basin.

Historically outbreaks have plagued the area around Fort Klamath. In 2010 a few of the basin's private landowners made treatments. Since that time we have detected a slow density increase in the grasshopper population at various locations. Densities in 2013 had suggested potential problems for 2014 and we found that these areas again developed high densities (Fig. 5). ODA is not aware of any suppression efforts having occurred this year, but densities should be closely monitored by land managers in 2015 for indications that suppression may be needed.

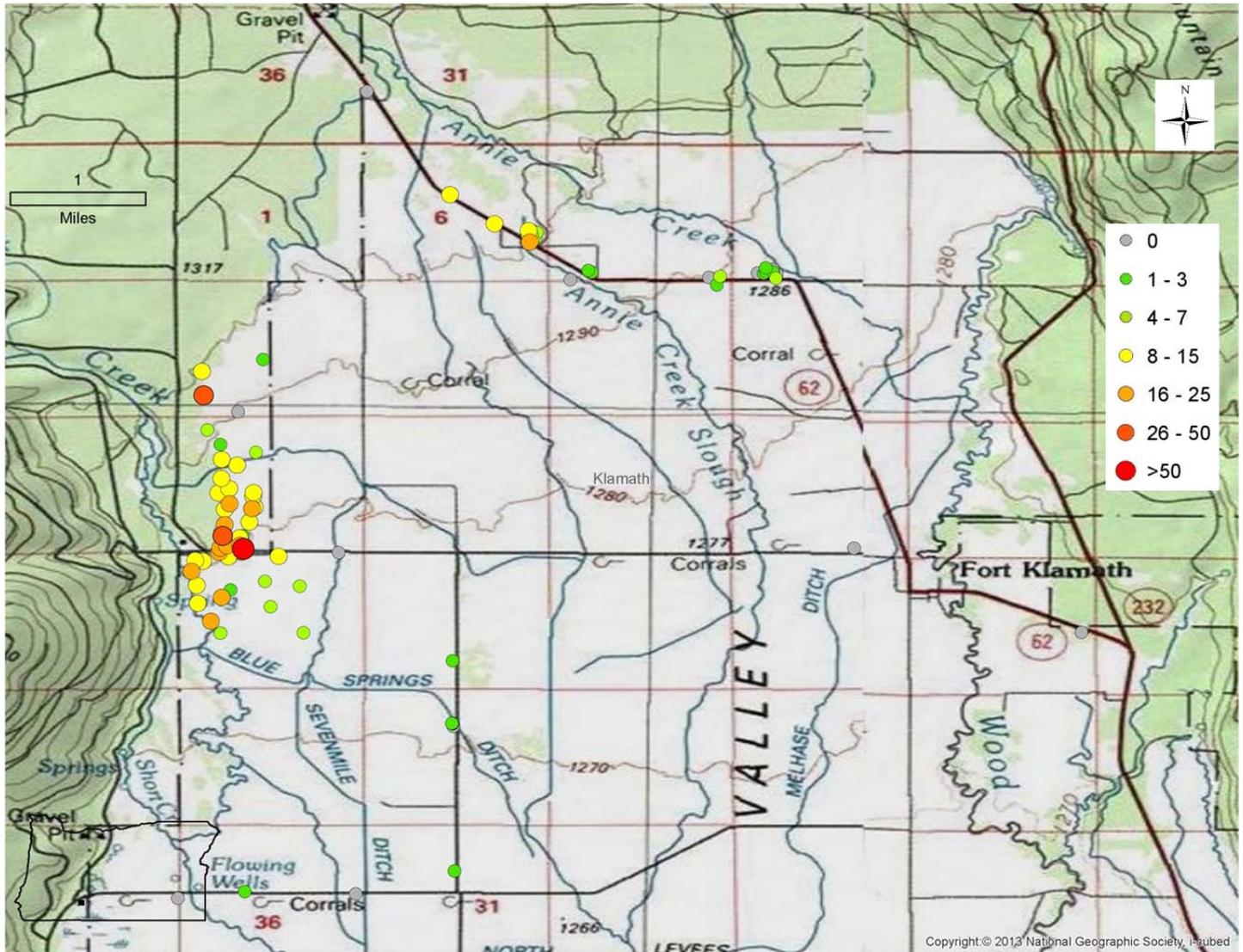


Fig. 5. Survey locations and classified grasshopper densities in the Fort Klamath basin.

### Klamath Marsh (National Wildlife Refuge, KMNWR).

We continue to focus a great deal of our survey resources on the clear-winged grasshopper, *Camnula pellucida*, population at the Klamath Marsh (Klamath County). We again made weekly survey visits to the Marsh throughout the season and for the first time in several years found very low grasshopper densities (Fig. 6). These low densities maintained until the end of the season when significant densities of primarily adult, but also some late instars, were found. These were observed in the southwestern area for the KMNWR, though this couldn't be fully explored because of an active fire on the Refuge. Early in 2015 adjacent land managers should watch this area closely.

We participated in no suppression program at the Klamath Marsh this year, and to our knowledge there were not any treatments made by surrounding private land managers.

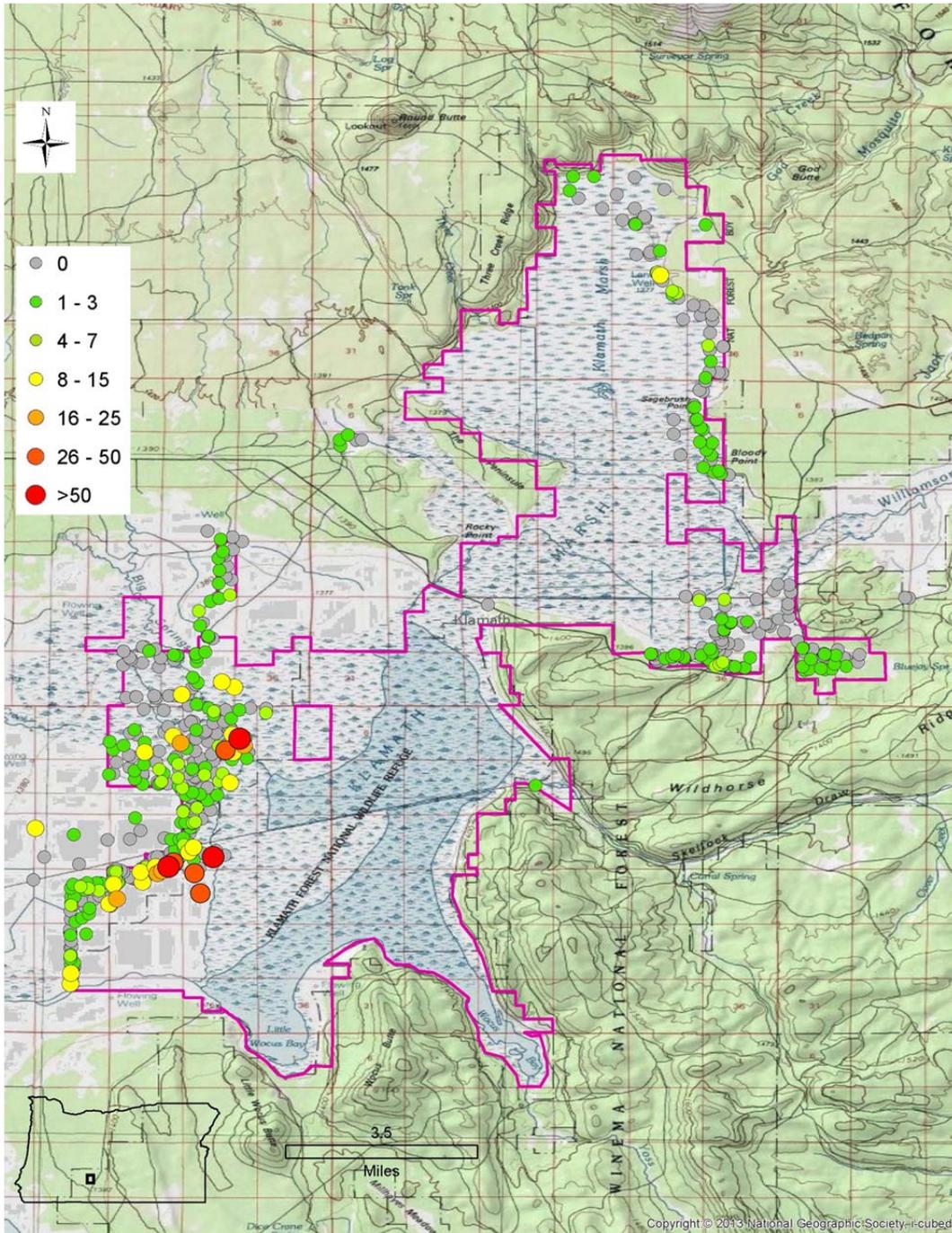


Fig. 6. 2014 grasshopper survey for the Klamath Marsh (1:130,000).



### North of Malheur National Wildlife Refuge.

In the region north of the Malheur National Wildlife Refuge several land owners and managers reported extremely high densities of grasshopper populations (Fig. 8). We had reports of various land managers applying treatments to address issues on their own land. However, for landowners in this region it would be wise to coordinate during the 2014-2015 winter and prepare for economic densities on a large geographic scale in 2015. Close monitoring of the 2015 spring hatch will be crucial.

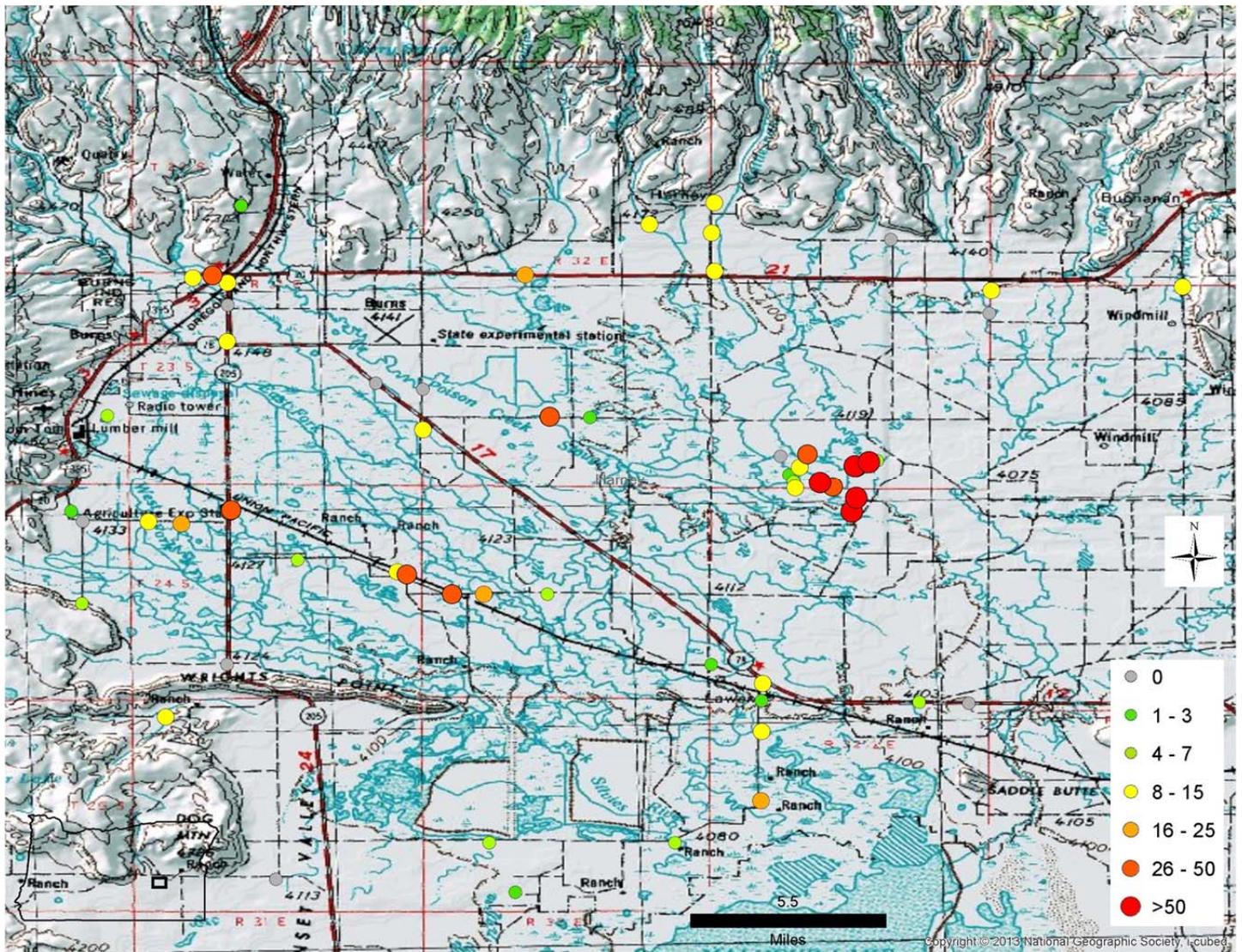


Fig. 8. Grasshopper 2014 densities (GH / yd<sup>2</sup>) in the region north of the Malheur National Wildlife Refuge.

## Portland International Airport.

After successfully treating a problematic grasshopper population at the Portland International Airport (PDX) using Dimilin in 2009 the Port of Portland continues to enjoy effects of that suppression. The grasshopper outbreak was attracting birds to the airport grounds which created a dangerous situation for aircraft. Grasshopper 2014 densities while showing a slight increase from the previous year continue to be well under the 'economic' level (except one location, Fig. 9) for rangeland or pasture concerns. However, given operational concerns related to aircraft the management the decision was made to make a treatment during July (3-14). Applications of Dimilin were spatially staggered across PDX adding up to ~900 yd<sup>2</sup> treated.

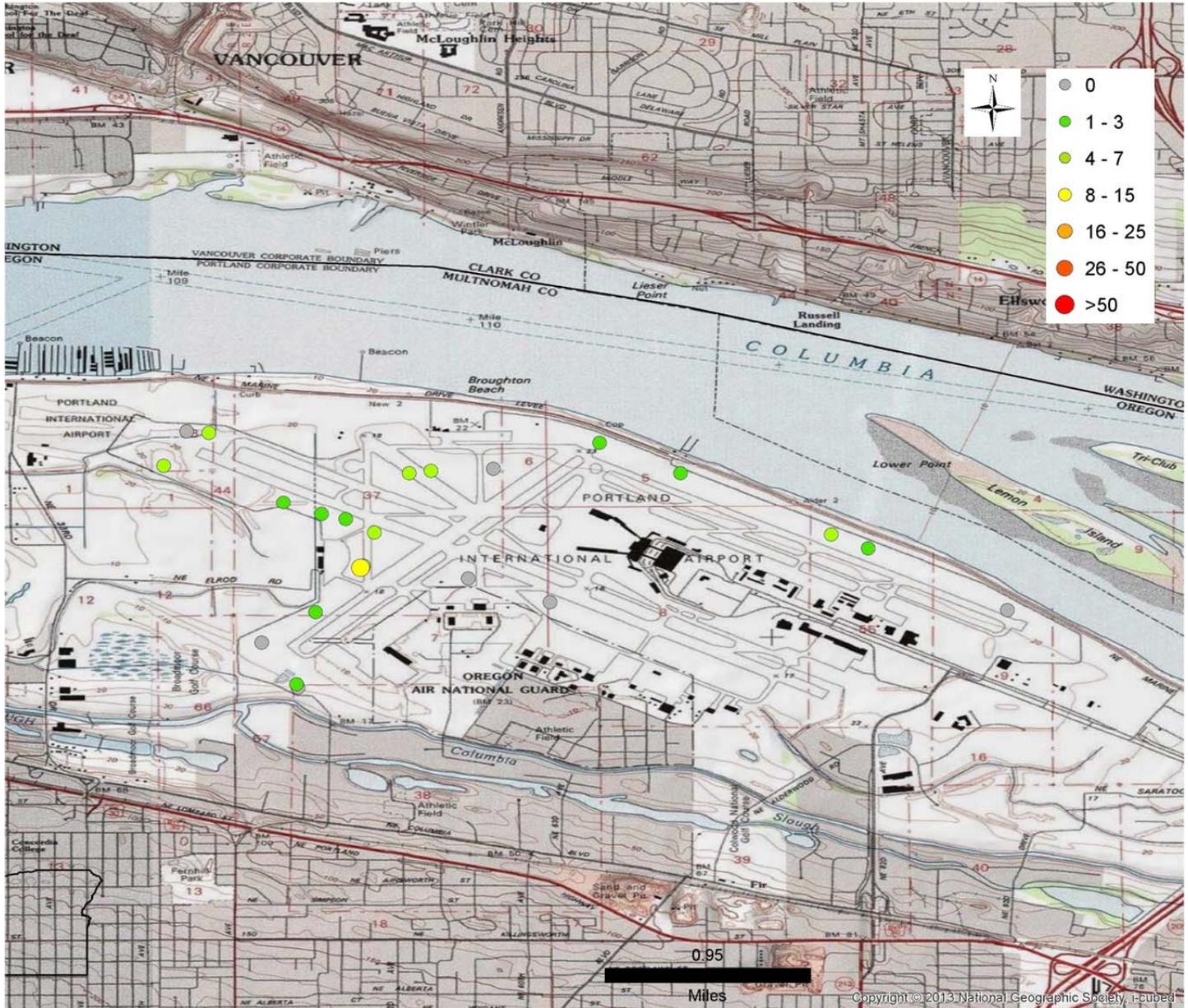


Fig. 9. Grasshopper density estimates at the Portland International Airport. Only one location reached a density considered 'economic' for range and pasture land.

## Tribal Lands

The grasshopper survey intersected tribal holdings at a few locations (~63,235 ac; 25,294 ha): along the Columbia River, and the Burns, Umatilla and Warm Springs Reservations (Fig. 10). Most survey acreage had either no grasshoppers found or densities below the economic threshold (Table 3).

Table 3. 2014 grasshopper survey areas intersecting with tribal lands.

	Economic		Non-Economic		No Grasshoppers	
	Acres	Hectares	Acres	Hectares	Acres	Hectares
Burns Reservation	490	196	6	3	0	0
Columbia River	157	63	0	0	0	0
Umatilla Reservation	0	0	30,486	12,195	15,448	6,179
Warm Springs Reservation	0	0	12,116	4,847	4,531	1,812
<b>TOTALS</b>	<b>647</b>	<b>259</b>	<b>42,609</b>	<b>17,044</b>	<b>19,979</b>	<b>7,992</b>

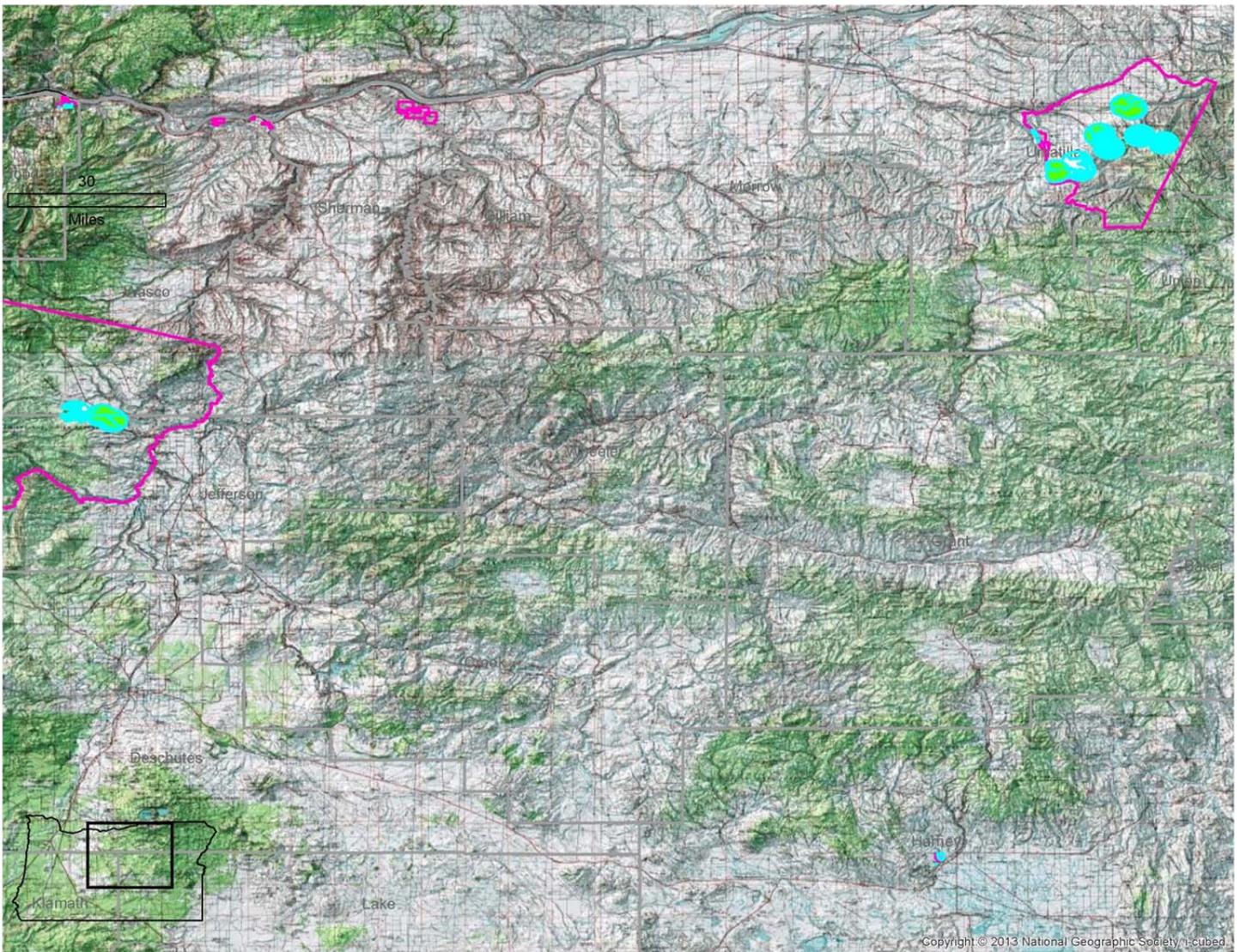


Fig. 10. 2014 grasshopper survey areas (light blue boundaries) intersecting tribal lands (dark pink boundaries).

Economic densities were found in two locations (Fig. 11): on the Burns Indian Reservation northwest of Burns (Harney County) and east of Hood River along the Columbia River (Hood River County).

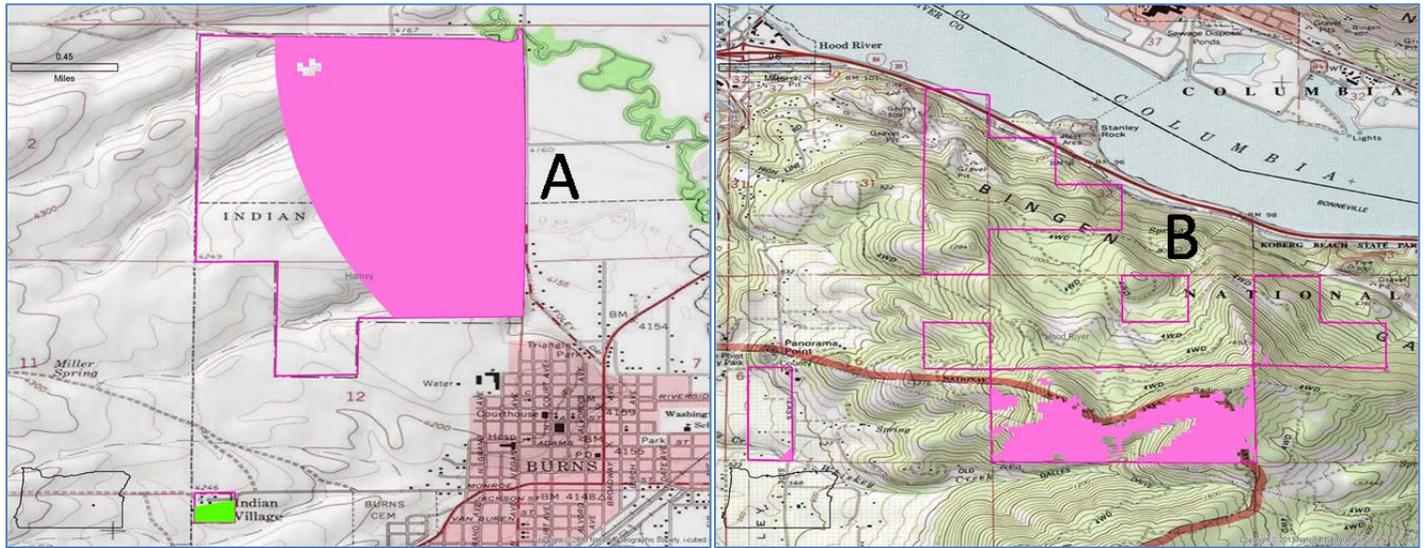


Fig. 11. Grasshopper survey areas of economic density intersecting tribal land A) on the Burns Reservation northwest of Burns, Harney County, and B) along the Columbia River east of Hood River, Hood River County. Economic density:  $\geq 8$  grasshoppers per square yard.

## Mormon Crickets

For the last few years Mormon Crickets have been on the decline. We did encounter the crickets at a few locations in north-central Oregon this year (Fig. 12). These populations were at relatively low density.

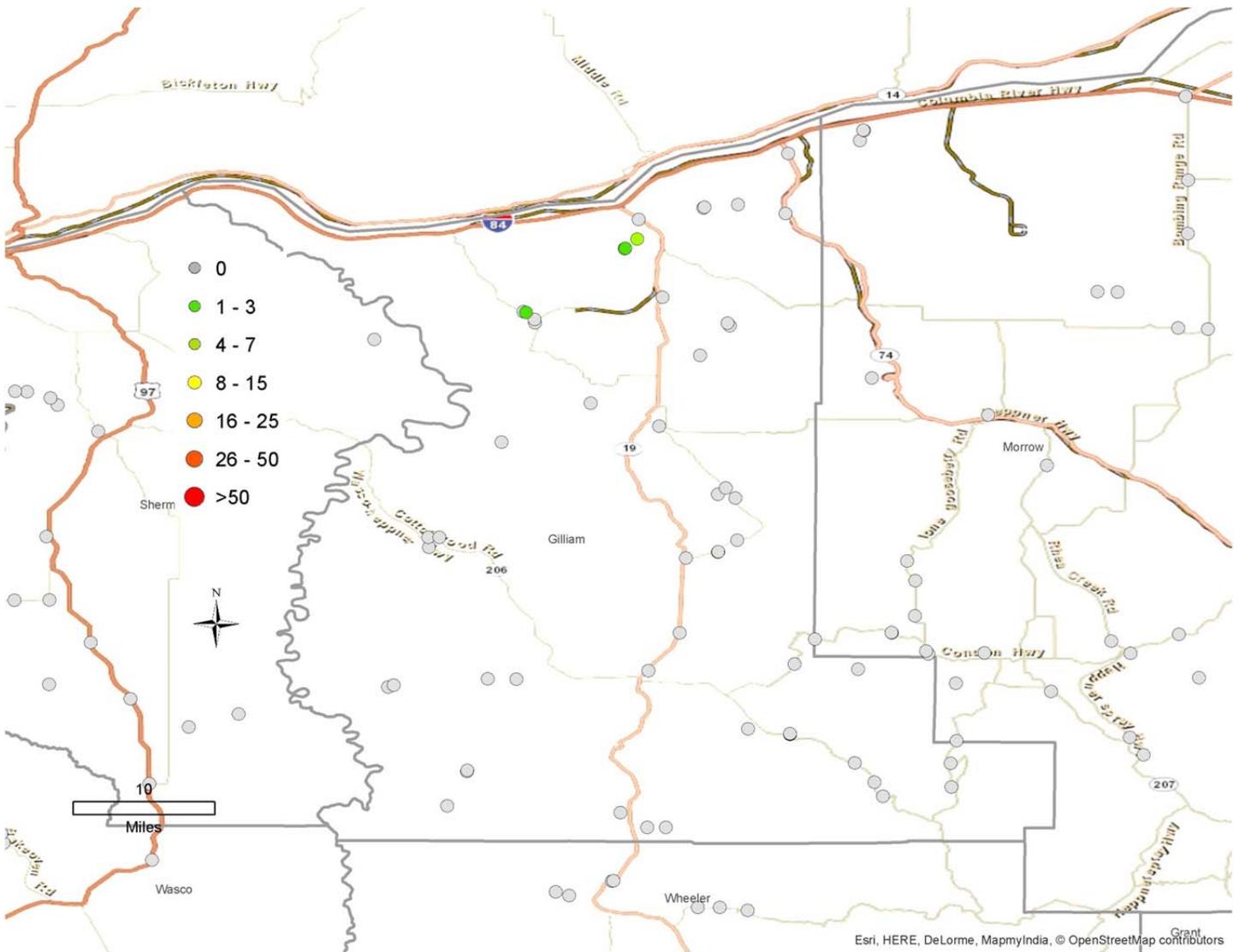


Fig. 12. Three locations where Mormon crickets (*Anabrus* sp.) were observed in north-central Oregon.

## Summary

Though we found a slight increase in the economically infested acreage during 2014 it remains well below grasshopper densities found at the peak of outbreak in 2011. Pockets of high density were found scattered across the eastern counties. The much larger areas of economic density found in Harney and Lake Counties drove the overall acreage increase. We cannot accurately predict where grasshopper outbreaks will occur because they depend greatly on many factors at the time of hatch and early development, variables that cannot be accurately forecast. However, we consider it likely, in spite of the slight increase in grasshopper acreage this year (Fig. 3), that overall the pattern of density will remain low into 2015.

We encourage land managers, especially those in areas where high or building populations persist, particularly those in Harney and Lake Counties, to be proactive in early 2015 if they are concerned about grasshopper impacts to crops and rangeland. Control is most effective on young grasshoppers. Contact us or your local Extension Office for advice, assistance, or to report grasshopper populations.

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Oregon's grasshopper and Mormon cricket survey program:

<http://www.oregon.gov/ODA/programs/IPPM/SuppressionEradication/Pages/SuppressionEradication.aspx>

Rangeland Grasshopper and Mormon cricket program:

Go to [http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth/sa\\_domestic\\_pests\\_and\\_diseases/sa\\_pests\\_and\\_diseases/](http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/planthealth/sa_domestic_pests_and_diseases/sa_pests_and_diseases/) then click on [Grasshopper / Mormon cricket](#)

ARS resource page for grasshopper and Mormon Cricket:

<http://www.sidney.ars.usda.gov/grasshopper/>

Appendix 1. Estimate of the acreage with economic levels of grasshopper infestation ( $\geq 8$  grasshoppers / yd<sup>2</sup>) based on the 2014 survey.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Baker	Alder Creek-Pritchard Creek	0	0				85,306	25,530	59,777	0
	Baldock Slough-Powder River	19,740	7,896	8.3	91.7	0				
	Big Creek	687	275	64.2	35.8	0				
	Big Creek-Burnt River	0	0							
	Birch Creek-Snake River	0	0							
	Burnt River	7,789	3,116	56.7	43.3	0				
	Camp Creek	0	0							
	Clarks Creek-Burnt River	0	0							
	Eagle Creek	1,447	579	0.0	100.0	0				
	Indian Creek-Snake River	0	0							
	Love Creek-Powder River	10,285	4,114	31.7	68.3	0				
	Lower Powder River	4,180	1,672	47.1	52.9	0				
	Middle Willow Creek	9	4	96.8	3.2	0				
	North Fork Burnt River	1,791	716	60.4	39.6	0				
	North Powder River	0	0							
	Pine Creek	15,020	6,008	16.5	83.5	0				
	Rock Creek-Powder River	1,597	639	0.0	100.0	0				
	Rock Creek-Snake River	3,804	1,522	70.8	29.2	0				
	Ruckles Creek-Powder River	18,084	7,234	41.3	58.7	0				
	South Fork Burnt River	0	0							
Sutton Creek-Powder River	0	0								
Upper Willow Creek	0	0								
Wolf Creek-Powder River	873	349	9.5	90.5	0					
Crook	Camp Creek	0	0				7,864	627	7,237	0
	Chimney Rock-Crooked River	0	0							
	Horse Heaven Creek-Crooked River	0	0							
	Lower Beaver Creek	704	282	5.2	94.8	0				
	Lower Crooked Valley-Crooked River	0	0							
	Lower Dry River	0	0							
	Lower Ochoco Creek	0	0							
	Lower South Fork Crooked River	0	0							
	Mayfield Pond-Central Oregon Canal	0	0							
	Paulina Creek	6,960	2,784	8.5	91.5	0				
	Prineville Reservoir-Crooked River	0	0							
	Soldiers Cap	0	0							
	Upper Dry River	0	0							
	Upper Ochoco Creek	0	0							
	Upper South Fork Crooked River	0	0							
	Watson Creek-Crooked River	200	80	0.0	100.0	0				

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Deschutes	Deep Canyon	14	6	0.0	100.0	0	4,911	623	4,288	0
	Juniper Butte-Crooked River	0	0							
	Lower Crooked Valley-Crooked River	0	0							
	Mayfield Pond-Central Oregon Canal	0	0							
	McKenzie Canyon-Deschutes River	706	282	0.0	100.0	0				
	Soldiers Cap	0	0							
	Squaw Creek	4,191	1,676	14.9	85.1	0				
	Upper Dry River	0	0							
	Upper Metolius River	0	0							
	Upper South Fork Crooked River	0	0							
Gilliam	Butte Creek	800	320	0.0	100.0	0	60,587	962	59,625	0
	Clarno Rapids-John Day River	0	0							
	Eightmile Canyon	765	306	0.0	100.0	0				
	Ferry Canyon-John Day River	9,620	3,848	0.0	100.0	0				
	John Day River	0	0							
	Lower Lake Umatilla	0	0							
	Lower Rock Creek	8,808	3,523	1.3	98.7	0				
	Lower Willow Creek	0	0							
	Scott Canyon-John Day River	3,893	1,557	0.0	100.0	0				
	Thirtymile Creek	20,255	8,102	1.4	98.6	0				
Grant	Upper Rock Creek	16,445	6,578	3.4	96.6	0	67,966	3,322	64,644	0
	Bear Creek	6,107	2,443	3.2	96.8	0				
	Beech Creek	248	99	57.2	42.8	0				
	Big Creek-Middle Fork John Day River	330	132	0.0	100.0	0				
	Bridge Creek-Middle Fork John Day River	0	0							
	Canyon Creek	0	0							
	Cottonwood Creek	17,504	7,001	1.8	98.2	0				
	Eight Mile Creek-Middle Fork John Day River	3,764	1,505	1.4	98.6	0				
	Fields Creek-John Day River	0	0							
	Grub Creek-John Day River	981	392	0.0	100.0	0				
Headwaters Silvies River	7,523	3,009	5.6	94.4	0					
John Day River-Johnson Creek	0	0								
Kahler Creek-John Day River	0	0								
Laycock Creek-John Day River	0	0								
Long Creek	8,335	3,334	0.7	99.3	0					
Lower North Fork John Day River	450	180	0.0	100.0	0					
Lower South Fork John Day River	0	0								
Reynolds Creek-John Day River	14,132	5,653	0.0	100.0	0					

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Grant, continued.										
Harney	Upper Middle John Day	0	0							
	Upper Silvies River	8,593	3,437	24.9	75.1	0				
	Alvord Lake	0	0				254,665	68,965	185,699	0
	Big Alvord Creek	0	0							
	Buckaroo Lake	0	0							
	Chain Lakes-Sunset Valley	466	186	8.2	91.8	0				
	Claw Creek	0	0							
	Crane Creek	0	0							
	Griffin Creek-Upper Malheur River	6,469	2,588	20.4	79.6	0				
	Harney Lake-Malheur Lake	11,632	4,653	61.7	38.3	0				
	Headwaters Malheur River	0	0							
	Home Creek-Garrison Lake	28,788	11,515	15.9	84.1	0				
	Jackass Creek	0	0							
	Kiger Creek-Diamond Canal	189	76	6.5	93.5	0				
	Little Tank Creek-Big Tank Creek	0	0							
	Lower Donner und Blitzen River	6,093	2,437	56.0	44.0	0				
	Lower Silver Creek	18,821	7,529	52.0	48.0	0				
	Lower Silvies River	57,511	23,005	3.4	96.6	0				
	Malheur Gap	0	0							
	Malheur Slough	17,808	7,123	15.9	84.1	0				
	Middle Donner und Blitzen River	12,442	4,977	98.0	2.0	0				
	Middle Silver Creek	0	0							
	Middle Silvies River	1,140	456	81.5	18.5	0				
	North Basin	47,721	19,089	5.3	94.7	0				
	Otis Creek	0	0							
	Pine Creek	0	0							
	Quail Creek	0	0							
	Riddle Creek	0	0							
	Sage Hen Creek	3,745	1,498	1.1	98.9	0				
	Shallow Lake-Slickey Lake	0	0							
	Skull Creek	6,082	2,433	0.0	100.0	0				
	Squaw Lake-Capehart Lake	0	0							
	Stinkingwater Creek	9,275	3,710	59.1	40.9	0				
Summit Creek-Storehouse Canyon	10,573	4,229	72.1	27.9	0					
Upper Donner und Blitzen River	3,349	1,340	100.0	0.0	0					
Upper Silver Creek	0	0								

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Harney, continued.										
	Upper Silvies River	2,664	1,066	48.3	51.7	0				
	Upper South Fork Malheur River	0	0							
	Walls Lake Reservoir	9,895	3,958	44.3	55.7	0				
	Warm Springs Reservoir-Upper Malheur River	0	0							
	Wheatgrass Lake	0	0							
Hood River	East Fork Hood River	0	0				2,872	216	2,656	0
	Hood River	2,085	834	8.8	91.2	0				
	Mosier Creek-Columbia River	787	315	4.2	95.8	0				
Jefferson	Antelope Creek	411	164	0.0	100.0	0	50,187	7,253	42,933	0
	Hay Creek	5,703	2,281	0.0	100.0	0				
	Headwaters McKenzie River	0	0							
	Juniper Butte-Crooked River	0	0							
	Lower Crooked Valley-Crooked River	0	0							
	Lower Trout Creek	6,996	2,798	0.6	99.4	0				
	Mill Creek	0	0							
	Mud Springs Creek	0	0							
	Muddy Creek-John Day River	7,407	2,963	2.0	98.0	0				
	Potter Canyon-Deschutes River	0	0							
	Shitike Creek-Deschutes River	0	0							
	Squaw Creek	0	0							
	Upper Metolius River	0	0							
	Upper Trout Creek	15,502	6,201	0.1	99.9	0				
	Willow Creek	14,167	5,667	49.7	50.3	0				
Klamath	Big Springs Creek-Klamath Marsh	4,069	1,627	0.7	99.3	0	56,564	13,233	43,331	0
	Crater Lake-Williamson River	15,275	6,110	36.4	63.6	0				
	Fishhole Creek	2,452	981	65.6	34.4	0				
	Gerber Reservoir-Miller Creek	0	0							
	Hog Creek-Williamson River	0	0							
	Jack Creek-Williamson River	13,018	5,207	24.0	76.0	0				
	Jackson Creek-Williamson River	0	0							
	Lake Ewauna-Klamath River	0	0							
	Langell Valley-Lost River	0	0							
	Long Lake Valley-Upper Klamath Lake	48	19	3.5	96.5	0				
	Lower Sycan River	82	33	0.0	100.0	0				
	Mills Creek-Lost River	0	0							
	North Fork Sprague River	0	0							

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Klamath, continued.										
	Rock Creek-Buck Creek	0	0							
	Rock Creek-Lost River	0	0							
	South Fork Sprague River	5,073	2,029	44.2	55.8	0				
	Sprague River	6,381	2,552	0.0	100.0	0				
	Swan Lake Valley	0	0							
	Wood River	10,167	4,067	6.5	93.5	0				
	Yonna Valley-Lost River	0	0							
Lake	Alkali Lake	0	0				27,443	5,809	21,288	346
	Anna River-Summer Lake	3,306	1,322	26.6	62.9	10.5				
	Buck Creek	0	0							
	Buckaroo Lake	0	0							
	Campbell Lake	0	0							
	Christmas Lake Valley	0	0							
	Coleman Creek	0	0							
	Crooked Creek	572	229	0.0	100.0	0				
	Crump Lake	0	0							
	Deep Creek	0	0							
	Drews Creek	11,781	4,712	16.2	83.8	0				
	Dry Creek-Fort Rock Valley	0	0							
	Dry Creek-Frontal Goose Lake	0	0							
	Duncan Creek-Silver Lake	0	0							
	Fire Lake	0	0							
	Goose Lake	0	0							
	Guano Creek-Guano Lake	0	0							
	Hidden Lake	0	0							
	Honey Creek	0	0							
	Lower Chewaucan River	5,950	2,380	15.2	84.8	0				
	Pine Lake-Devils Garden	0	0							
	Post Lake	0	0							
	Rabbit Creek	0	0							
	Rock Creek-Buck Creek	0	0							
	Sage Hen Creek	0	0							
	Sagehen Waterhole	0	0							
	Sand Canyon-Lake Abert	669	268	82.2	17.8	0				
	Silver Creek	2,222	889	55.7	44.3	0				
	South Fork Sprague River	3	1	100.0	0.0	0				
	Sycan River at Sycan Marsh	2,939	1,176	11.1	88.9	0				

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Lake, continued.										
	Thomas Creek	0	0							
	Thorn Lake	0	0							
	Tired Horse Lake	0	0							
	Twentymile Creek	0	0							
	Upper South Fork Crooked River	0	0							
	Wheatgrass Lake	0	0							
	Willow Creek-Frontal Goose Lake	0	0							
Linn	Hamilton Creek-South Santiam River	0	0				0	0	0	0
	Headwaters McKenzie River	0	0							
	Muddy Creek-Willamette River	0	0							
	South Santiam River	0	0							
	South Santiam River-Foster Reservoir	0	0							
	Upper Metolius River	0	0							
	Wiley Creek	0	0							
Malheur	Birch Creek-Snake River	0	0				50,824	28,797	22,027	0
	Burnt River	0	0							
	Camp Creek	0	0							
	Clover Creek	0	0							
	Cottonwood Creek	0	0							
	Cow Creek	0	0							
	Crowley Creek	8,017	3,207	16.1	83.9	0				
	Dry Creek	0	0							
	Dry Creek-Jordan Creek	0	0							
	Hog Creek-Lower Malheur River	0	0							
	Hunter Creek-Lower Malheur River	0	0							
	Jackson Creek-Owyhee River	0	0							
	Johnston Gulch Reservoir-Lower Malheur River	0	0							
	Jordan Creek-Sheep Spring Creek	0	0							
	Juniper Basin Creek-Upper Malheur River	8,883	3,553	75.1	24.9	0				
	Little Malheur River	0	0							
	Little Sandy Reservoir-Lower Malheur River	5,737	2,295	77.1	22.9	0				
	Locket Gulch-Snake River	0	0							
	Lower Bully Creek	4,664	1,865	46.0	54.0	0				
	Lower Cow Creek	0	0							
	Lower Crooked Creek	0	0							
	Lower North Fork Malheur River	506	202	25.9	74.1	0				
	Lower Succor Creek	0	0							
	Lower Willow Creek	3,369	1,348	86.5	13.5	0				

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Malheur, continued.										
	Middle Willow Creek	5,491	2,196	70.9	29.1	0				
	North Alkali Creek-Snake River	0	0							
	Oregon Canyon Creek	0	0							
	Quail Creek	0	0							
	Rattlesnake Creek	0	0							
	Ryegrass Creek-Owyhee River	0	0							
	Sand Hollow Creek	4,726	1,890	98.5	1.5	0				
	Sand Hollow Creek-Owyhee River	0	0							
	Skull Creek-Owyhee River	0	0							
	Three Fingers Gulch-Owyhee River	0	0							
	Upper Bully Creek	0	0							
	Upper Cow Creek	0	0							
	Upper Crooked Creek	0	0							
	Upper South Fork Malheur River	0	0							
	Upper Succor Creek	0	0							
	Upper Willow Creek	9,431	3,772	28.3	71.7	0				
Morrow	Eightmile Canyon	6,277	2,511	0.0	100.0	0	89,402	5,683	83,719	0
	Juniper Canyon	8,016	3,206	70.3	29.7	0				
	Lower Butter Creek	6,025	2,410	0.0	100.0	0				
	Lower Lake Umatilla	0	0							
	Lower Rock Creek	7,147	2,859	0.0	100.0	0				
	Lower Willow Creek	0	0							
	Middle Lake Umatilla	5	2	100.0	0.0	0				
	Middle Willow Creek	2,414	965	0.0	100.0	0				
	Rhea Creek	26,795	10,718	0.0	100.0	0				
	Sand Hollow	0	0							
	Sixmile Canyon	0	0							
	Upper Butter Creek	13,749	5,500	0.3	99.7	0				
	Upper Lake Umatilla	0	0							
	Upper Rock Creek	10,975	4,390	0.0	100.0	0				
	Upper Willow Creek	7,998	3,199	0.0	100.0	0				
Multnomah	Hayden Island-Columbia River	3	1	0.0	0.0	100	2,550	0	0	2,550
	Willamette River-Frontal Columbia River	2,547	1,019	0.0	0.0	100				
Sherman	Buck Hollow Creek	6,814	2,726	0.0	100.0	0	15,634	0	15,634	0
	Cedar Island-Deschutes River	0	0							
	Ferry Canyon-John Day River	5,801	2,320	0.0	100.0	0				
	Grass Valley Canyon	0	0							
	John Day River	0	0							

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Sherman, continued.										
	Pine Hollow	3,019	1,208	0.0	100.0	0				
	Scott Canyon-John Day River	0	0							
	Spanish Hollow-Columbia River	0	0							
Umatilla	Alkali Canyon-Umatilla River	0	0				35,821	141	35,680	0
	Beaver Creek-Grande Ronde River	0	0	0.0	100.0	0				
	Birch Creek	4,172	1,669	0.0	100.0	0				
	Cold Springs Canyon	0	0							
	Five Points Creek-Grande Ronde River	14	6	0.0	100.0	0				
	Hunt Ditch-Umatilla River	0	0							
	Lower Camas Creek	5,416	2,166	1.8	98.2	0				
	Lower Lake Wallula	0	0							
	Lower Walla Walla River	0	0							
	McKay Creek	0	0							
	Meacham Creek	748	299	6.0	94.0	0				
	Middle Walla Walla River	0	0							
	Mission Creek-Umatilla River	0	0							
	Pine Creek	0	0							
	Stage Gulch	0	0							
	Upper Butter Creek	25,471	10,188	0.0	100.0	0				
	Upper Camas Creek	0	0							
	Upper Walla Walla River	0	0							
	Wildhorse Creek	0	0							
Union	Beaver Creek-Grande Ronde River	0	0				65,173	1,109	64,064	0
	Cabin Creek-Grande Ronde River	120	48	0.0	100.0	0				
	Five Points Creek-Grande Ronde River	1	0	0.0	100.0	0				
	Indian Creek-Grande Ronde River	3,008	1,203	0.0	100.0	0				
	Ladd Creek	10,685	4,274	4.8	95.2	0				
	Lower Catherine Creek	4,912	1,965	0.0	100.0	0				
	Lower Wallowa River	395	158	0.0	100.0	0				
	Meacham Creek	31	12	0.0	100.0	0				
	Meadow Creek	0	0							
	Minam River	980	392	2.4	97.6	0				
	North Powder River	0	0							
	Upper Catherine Creek	20,744	8,298	0.4	99.6	0				
	Upper Grande Ronde River	2,045	818	21.3	78.7	0				
	Willow Creek	4,764	1,905	0.0	100.0	0				
	Wolf Creek-Powder River	17,489	6,995	0.3	99.7	0				

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Wallowa	Bear Creek	0	0				59,725	4,328	55,397	0
	Chesnimnus Creek	11,746	4,698	3.4	96.6	0				
	Lostine River	0	0							
	Lower Big Sheep Creek	19,723	7,889	6.7	93.3	0				
	Lower Grande Ronde River	0	0							
	Lower Imnaha River	1,698	679	3.0	97.0	0				
	Lower Joseph Creek	0	0							
	Lower Wallowa River	2,092	837	17.5	82.5	0				
	Middle Imnaha River	3,424	1,369	59.6	40.4	0				
	Middle Wallowa River	0	0							
	Minam River	493	197	4.4	95.6	0				
	Mud Creek-Grande Ronde River	0	0							
	Upper Big Sheep Creek	75	30	100.0	0.0	0				
	Upper Joseph Creek	14,806	5,922	0.1	99.9	0				
	Upper Wallowa River	5,668	2,267	0.7	99.3	0				
Wasco	Antelope Creek	15,676	6,270	0.4	99.6	0	37,885	1,205	36,681	0
	Bakeoven Creek	7,501	3,000	0.0	100.0	0				
	Buck Hollow Creek	536	214	0.0	100.0	0				
	Cedar Island-Deschutes River	0	0							
	Clarno Rapids-John Day River	3,561	1,424	9.9	90.1	0				
	Eightmile Creek	0	0							
	Fifteenmile Creek	0	0							
	Hood River	0	0							
	Mill Creek	0	0							
	Mill Creek-Columbia River	0	0							
	Mosier Creek-Columbia River	315	126	0.0	100.0	0				
	Muddy Creek-John Day River	2,347	939	6.5	93.5	0				
	Pine Hollow	0	0							
	Shitike Creek-Deschutes River	0	0							
	Tygh Creek	0	0							
	Upper Trout Creek	13	5	0.0	100.0	0				
	Warm Springs River	0	0							
White Horse Rapids-Deschutes River	4,784	1,914	3.4	96.6	0					
White River	3,153	1,261	14.9	85.1	0					

Appendix 1, continued.

County	Watershed	Economically Infested		Ownership as a Percentage of Area			Acreage Totals			
		Acres	Hectares	Public	Private	Undet.	County	Public	Private	Undet.
Wheeler	Bridge Creek	0	0				56,280	7,620	48,661	0
	Butte Creek	19,045	7,618	0.0	100.0	0				
	Clarno Rapids-John Day River	2,229	892	48.3	51.7	0				
	John Day River-Johnson Creek	0	0							
	Kahler Creek-John Day River	13,953	5,581	8.4	91.6	0				
	Mountain Creek	25	10	0.0	100.0	0				
	Muddy Creek-John Day River	9,583	3,833	31.0	69.0	0				
	Service Creek-John Day River	7,761	3,104	30.9	69.1	0				
	Thirtymile Creek	3,685	1,474	0.0	100.0	0				
<b>TOTALS</b>		<b>1,031,659</b>		<b>17.0</b>	<b>82.7</b>	<b>0.3</b>	<b>1,031,659</b>	<b>175,422</b>	<b>853,341</b>	<b>2,896</b>