

Monitoring Distribution and Flight Periods of California Fivespined Ips in Washington State

Glenn R. Kohler¹, Todd A. Murray² & Elizabeth A. Willhite³

¹ Washington Dept. of Natural Resources, Olympia, WA; ² Washington State University Extension, Stevenson, WA; ³ USDA Forest Service, Sandy, OR



Introduction

- In 2010, an outbreak of California fivespined Ips (CFI), *Ips paraconfusus* Lanier, along the Columbia River Gorge resulted in what appears to be the first recorded detection of this species in Washington⁴. 2014 was the fifth year of CFI outbreaks in the eastern Columbia River Gorge, causing numerous killed and top-killed ponderosa pines each year (Fig. 1). Areas affected include Skamania and Klickitat counties in Washington and Hood River and Wasco counties in Oregon. In 2014, aerial surveys recorded approximately 1,300 acres with an estimated 4,800 ponderosa pines killed in Washington and Oregon, the highest level detected to date (Fig 2). Outbreaks have been driven by consecutive years of fires, storm damage, and drought conditions.
- From 2010-2014, the Washington Department of Natural Resources, Washington State University Extension, and the USDA Forest Service have monitored CFI occurrence and distribution in Washington.
- Objectives** of this study were to:
 - determine the distribution and flight periods of CFI in Washington State
 - compare population levels of CFI to *Ips pini* (Say), another engraver beetle in ponderosa pine, and
 - improve accuracy of aerial detection survey with ground-based information on ponderosa pine damage caused by CFI outbreaks.



Figure 1. Mature ponderosa pines killed by CFI in a residential area of Underwood, Washington.

Materials & Methods

- From 2010 to 2014, Lindgren funnel traps baited separately with pheromone lures to capture CFI and *I. pini* have been placed at 31 locations in 19 Washington counties (Fig. 3). Not all locations were monitored in every year. Traps were placed in ponderosa pine stands where possible using methods similar to a 2008-2010 CFI survey in the Willamette Valley, Oregon². Lures were supplied by Contech Enterprises.
- In most locations, traps were maintained every two weeks from April through October. Lures were changed every 60 days.
- In 2014, traps were placed at 18 locations in 13 counties, including several locations not previously monitored.
- Bark beetle specimens were identified using keys and a reference collection of specimens from this survey determined by Jim LaBonte and Josh Vlach with the Oregon Department of Agriculture.
- Recently killed ponderosa pine trees were examined for causes of mortality at several locations in and around the outbreak area from 2010 to 2014. Larger diameter trees were felled to allow access to the top of the stem.

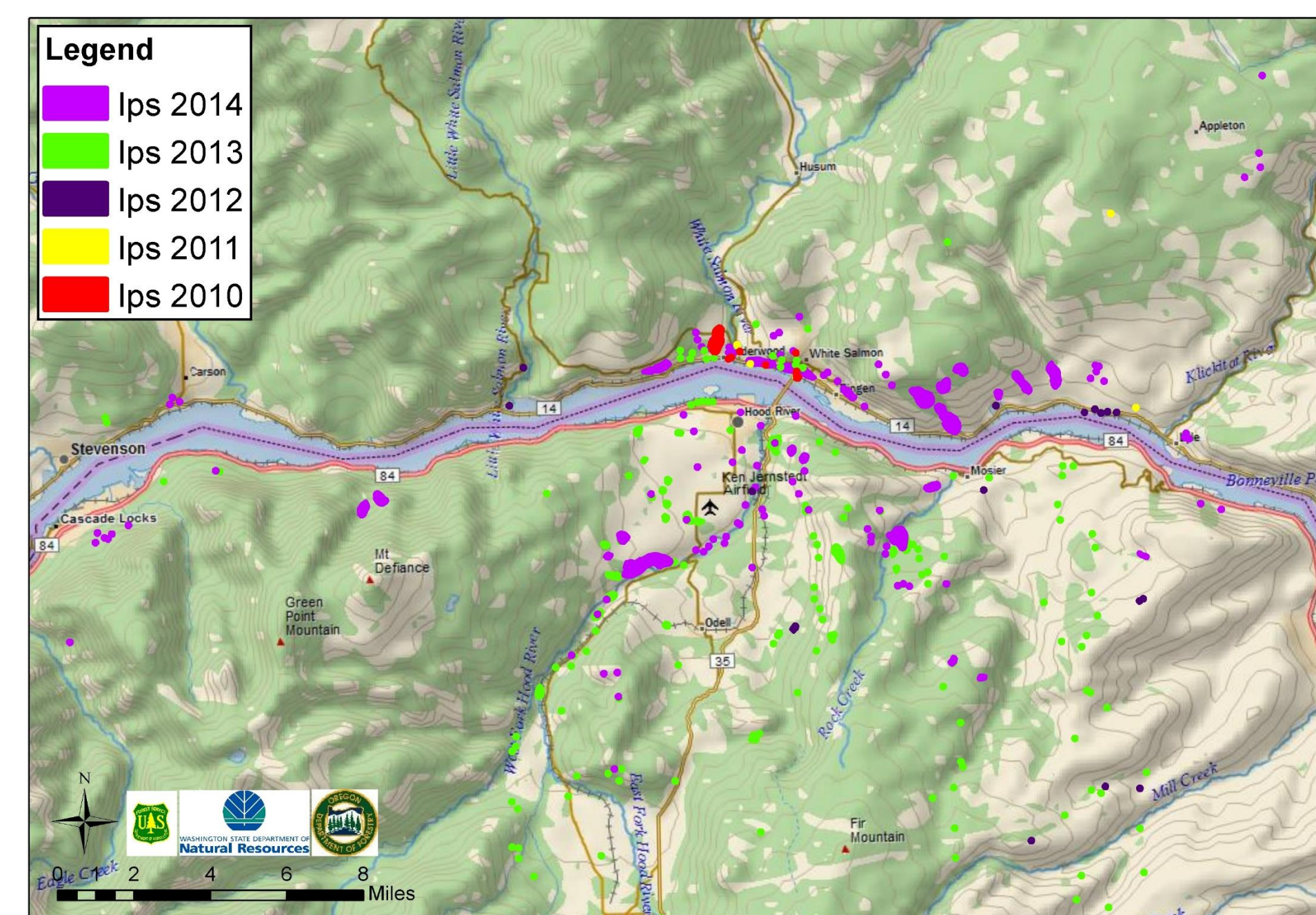


Figure 2. Ponderosa pine mortality caused by CFI recorded in Oregon and Washington aerial surveys, 2010-2014. Map by Aleksandar Dozic, Washington DNR.

Results

- To date, CFI has been detected at 12 locations in 6 Washington counties (Fig. 3). The northern-most detection site is near Joint Base Lewis-McChord in western Washington and the eastern-most detection site is near Goldendale in eastern Washington. The Washington distribution of CFI includes Klickitat, Skamania, Clark, Lewis, Thurston, and Pierce Counties.
- The highest numbers of CFI were collected at locations along the Columbia River (Table 1). Despite high numbers of CFI collected in Clark County, no CFI-caused mortality has been recorded in that area or at any other western Washington location where CFI has been collected (Fig. 3).
- Biweekly collections at two locations with high CFI populations appear to show three flight periods that were consistent over four years with some shift in timing (Fig. 4A,B). The 2011 and 2014 collections at White Salmon also show three flight periods; however, the 2012 and 2013 collections were too low to show any pattern (Fig 4C). The three flights correspond to two annual generations: overwintering adult emergence of the previous-year generation (April-June); first generation brood of the current year (July-August); and second generation brood of the current year seeking overwintering sites (September-October).

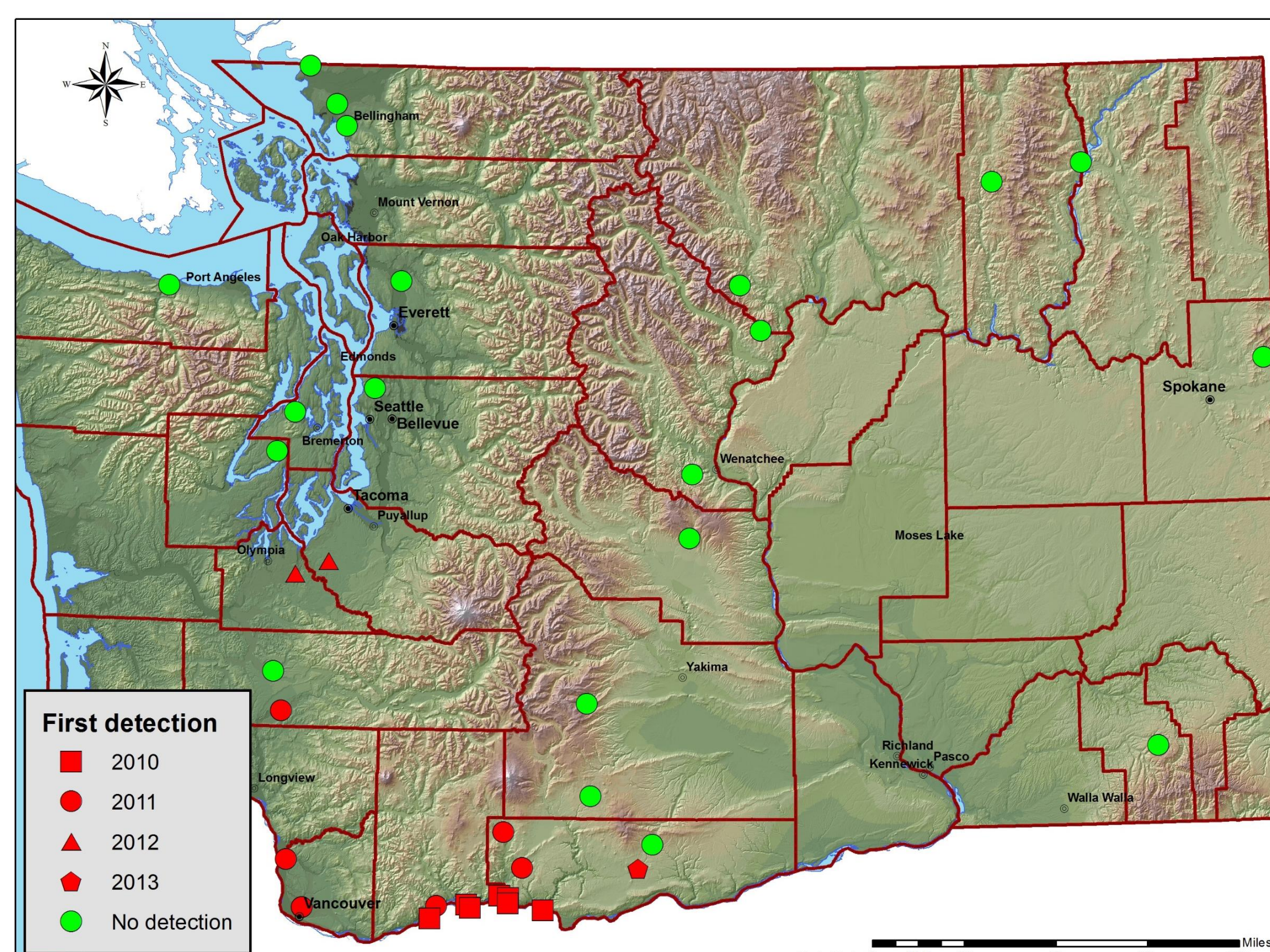


Figure 3. CFI monitoring trap locations in Washington, 2010-2014. Map by Aleksandar Dozic, Washington DNR.

Results continued

- Populations of CFI and *I. pini* do not appear to overlap in high numbers at the same locations (Table 1). At trap locations along the border with Oregon (south Klickitat, Clark, and Skamania counties), CFI collections were significantly higher than *I. pini*. At locations farther north, CFI collections were significantly lower than *I. pini*.
- At least 44 different species of bark and ambrosia beetles were collected during five years of survey, representing 24 genera. Other species of bark beetles that commonly attack ponderosa pine were collected in low numbers. They include *Ips emarginatus*, *Ips integer*, *Pseudips mexicanus*, *Orthotomicus latidens*, *Dendroctonus ponderosae*, *Dendroctonus brevicomis*, and *Dendroctonus valens*.
- Recently killed ponderosa pines in the outbreak areas frequently had red turpentine beetle (*D. valens*) activity at the base of the stem. Bluestain fungi in the wood was almost always associated with CFI galleries. Western pine beetle (*D. brevicomis*) activity was rare in large diameter pines with CFI activity. Outside the outbreak areas, galleries of *I. pini*, *D. brevicomis*, and wood boring beetles were common in recently killed ponderosa pines.
- High numbers (658) of *Ips montanus*, another fivespined pine engraver species that prefers western white pine, were collected at two locations where their host was common (Kitsap and Mason counties). *I. montanus* were preferentially attracted to the CFI lure.

Table 1. Total collections listed by CFI abundance, then by *Ips pini* abundance where CFI was not collected.

County (years surveyed)	CFI	<i>Ips pini</i>
Klickitat County, south (2011-14)	6,498	5
Clark County (2011-14)	2,573	16
Skamania County (2011)	113	0
Klickitat County, north (2011-14)	95	2,517
Pierce County (2011-12)	3	209
Lewis County (2011-12)	3	207
Thurston County (2012)	1	503
Chelan County (2013-14)	0	2,325
Ferry County (2013-14)	0	918
Mason County (2013-14)	0	760
Yakima County (2012-14)	0	481
Okanogan County (2014)	0	354
Kittitas County (2013-14)	0	43
Columbia County (2014)	0	7
Spokane County (2014)	0	4
Kitsap County (2014)	0	3
Clallam County (2013)	0	0
King County (2013-14)	0	0
Snohomish County (2013)	0	0
Whatcom County (2013-14)	0	0

Discussion

- There are likely two generations of CFI in southwest Washington. Two generations were also recorded in a previous CFI survey in western Oregon². Low collections at White Salmon during 2012 and 2013 may have been due to nearby fresh breeding material drawing CFI away from traps.
- Existing range maps for CFI do not include Washington State or the Columbia River Gorge in Oregon, despite frequent and repeated bark beetle collections³. It is unclear if the range of CFI reported here is a range expansion, re-colonization of a previously unknown historical range, or a species that has been previously overlooked in these areas.
- CFI and *Ips pini* were not collected in similar numbers in the same areas. This suggests possible competition for ponderosa pine, the preferred host of both pine engravers.
- CFI typically kills small diameter pines and tops of large diameter pines. Drought conditions, bluestain fungi, and red turpentine beetle attacks are factors that may have contributed to the unusually high number of large diameter ponderosa pines killed in the outbreak areas (Fig. 1).
- Whole crown mortality in mature ponderosa pine is not a signature of *Ips* damage used in the Pacific Northwest Region aerial detection survey (ADS). Information from this study was used to improve accuracy of ADS mortality codes.
- Results of this study have been used to raise awareness of the impacts of CFI and best management strategies in Washington and eastern Oregon. Landowner education has been provided through site visits, workshops, and a Washington State University Extension publication⁴.

References

- Murray, T.A., G.R. Kohler, and E.A. Willhite. 2013. *Ips paraconfusus* Lanier (Coleoptera: Curculionidae): New records of the California fivespined Ips from Washington State and the Columbia River Gorge in Oregon. The Coleopterists Bulletin 67: 28-31.
- Flowers, R.W., and E.A. Willhite. 2010. Distribution and flight periods of the California fivespined ips (*Ips paraconfusus*) in the Willamette Valley of western Oregon. 2010 Forest Health Monitoring Working Group Meeting. Available from: <http://fhm.fs.fed.us/posters/>
- Schultz, D.E., and W.D. Bedard. 1987. California fivespined ips. Forest Insect & Disease Leaflet 102, USDA, Forest Service. Available from: www.fs.fed.us/outernet/r6/nr/fid/fids/fid-102.pdf
- Murray, T.A., G.R. Kohler, and E.A. Willhite. 2012. California fivespined ips – a pine engraver beetle new to Washington State. Washington State University Extension Fact Sheet FS085E.

Acknowledgments

- Funding was provided by the USDA-FS Forest Health Monitoring Program (project #: WCFHM-14-01).
- We thank Jenni Cena (WSDA), Sharon Collman (WSU), Darci Dickinson (USFS), Aleksandar Dozic (WDNR), Jeff Foster (Joint Base Lewis McChord), Mike Johnson (WDNR), Greg & Susan Kelly, Joy Margraff, Connie Mehmel (USFS), Brian Mize (WDNR), Rhidian Morgan, Bill Scheer, Steve Stinson, Bob & Jane Takai, Cliff Thresher (WDNR), and Jim White for maintaining traps. Harrison Brookes, Aleksandar Dozic, and Travis Serdar for lab work. Jim LaBonte and Josh Vlach (Oregon Dept. Agriculture) for specimen identification. And the Underwood Conservation District for landowner assistance.