

Distribution & Flight Periods of the California Fivespined Ips (*Ips paraconfusus*) in the Willamette Valley of Western Oregon



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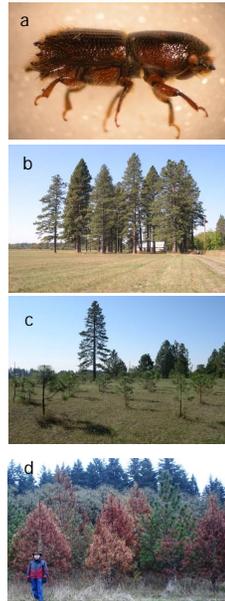
Abstract

This study represents a first attempt to use systematic pheromone-trapping to examine the distribution & flight periods of the California fivespined Ips (*Ips paraconfusus*) in the Willamette Valley of western Oregon. Pheromone-baited funnel traps were used to assess populations at 11 sites along a latitudinal (north-south) gradient. *Ips paraconfusus* were detected at all sites, suggesting that this species is present throughout the range of the Willamette Valley ponderosa pine ecotype. This distribution is consistent with anecdotal observations & the extent of previous range maps. Two peak flight periods were observed in 2008, while three peak flights were detected in 2009, indicating at least two generations per year. Relative abundance did not appear to be correlated with Valley location, but is likely the result of localized site & stand conditions. Flight periodicity was generally similar between years and sites, although southern and mid-Valley sites did peak earlier during the last generation. Additional studies are planned in 2010 to assess *Ips paraconfusus* as well as examine the suite of potentially damaging bark beetles associated with this pine ecotype. Current findings are assisting to refine management strategies for the ever-expanding amount of Willamette Valley ponderosa pine.

Introduction

- Ips paraconfusus* occurs west of the Cascade Mountain and Sierra Nevada crests from northern Oregon to southern California (Schultz & Bedard 1987), and has been recognized as a significant pest of several pine species since the mid-1940's (Fig. 1a).
- It is of concern in the Willamette Valley of western Oregon due to its potential impacts upon "Valley" pine, an ecotype of ponderosa pine endemic to the area. While it was very common over a century ago, tree harvesting, agricultural conversions and urbanization have severely reduced its distribution (Fig. 1b). Due to concern this ecotype would be lost, a cooperative effort has preserved it in a genetic conservancy/seed orchard in St. Paul, OR.
- Over the past decade, it has been increasingly utilized for reforestation & afforestation as it is well-adapted to westside soils and conditions, often thriving on sites that are poorly suited for Douglas-fir or other conifer species (Barsotti 2004). In recent years, an estimated 500,000 seedlings (1,500 acres) have been planted annually in western Oregon (Fig. 1c).
- These recently established, more intensely managed stands, are frequently located in close proximity to older/remnant stands, where slash from thinning operations or winter storms often goes unmanaged. As such, *Ips paraconfusus* in the Willamette Valley is a significant challenge for forest managers as preventative actions on their lands may be undone by negligence or ill-timed/improper activities in adjacent areas.
- The first reported damage by *Ips paraconfusus* on newly established W. Valley ponderosa pine was in 1999 (Overhulser 2000). Additional outbreaks have occurred each year since, leading to localized mortality at several sites (Fig. 1d). Future damage is expected to increase as populations respond to greater host availability; however, refining management strategies for the Willamette Valley has been hindered due to a lack of basic knowledge regarding the distribution & flight periods of this bark beetle.

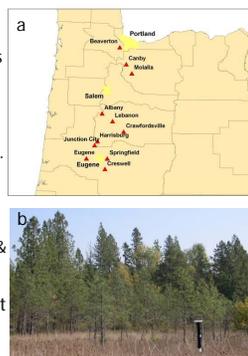
Figure 1. (a) *Ips paraconfusus* adult, (b) Remnant stand of Willamette Valley ponderosa pine, (c) Recently established "Valley" ponderosa pine plantation, (d) Localized damage due to outbreak of *Ips paraconfusus*.



Materials & Methods

- Lindgren funnel traps were placed at 11 sites along a latitudinal (north-south) gradient in the Willamette Valley in 2008 & 2009 (Fig 2a). Older/remnant stands were represented as well as more recent plantings. While sites varied in overall stand structure, they were generally similar in elevation, area, tree diversity & proximity to other pine stands.
- Traps baited with *Ips paraconfusus* lure (ipsdienol [+97%-(+)], ipsenol [racemic], cis-verbenol [83%-(+)] were placed at each site and monitored every 1-2 weeks from May-Oct. 2008 & April-Oct. 2009 (Fig. 2b). Pheromone lures were changed every 50 days consistent with manufacturer recommendations (Contech, Inc. & Synergy Semiochemical Corp.).
- Trap captures were sorted, counted, & summarized at 2 week intervals due to varying sampling frequencies. Total & average captures per week were summarized for each site & general area over each trapping period to examine the relative trends.
- Statistical analyses have not yet been performed on this data set, but will be completed at the study completion. All results that follow should thus be viewed as preliminary.

Figure 2. (a) Trap sites in the Willamette Valley, OR (b) Lindgren funnel trap with pheromone lure.



Results

- Over 39,000 *Ips paraconfusus* were collected during 2008 & 2009, and were abundant at all 11 locations. Individual collection sites showed high variability within & between years in terms of relative abundance (as assessed by trap captures), with no correlation to latitudinal gradient apparent (Fig. 3a).
- Captures of *Ips paraconfusus* showed 2 main flight periods in 2008, while earlier trapping detected 3 main flight periods in 2009. These were observed during the early part of May, July, and October, with the relative peaks of the latter 2 periods generally similar between years (Fig. 3b).
- When sites were grouped into general Valley areas, no substantial differences in flight periodicity were detected relative to latitude; however, southern and mid-Valley sites did appear to peak slightly earlier during the last main flight period.

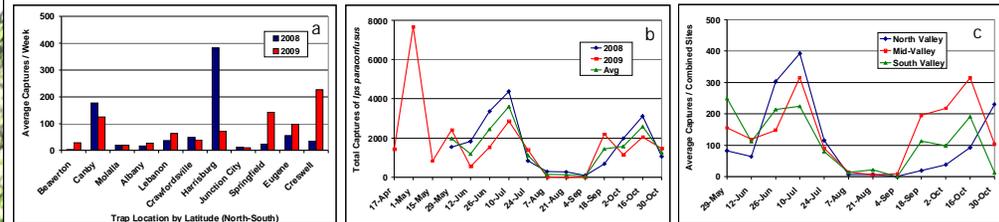


Figure 3. (a) Average *I. paraconfusus* captures per week by site (arranged by north-south location), (b) Total captures of *I. paraconfusus* at all sites by year, (c) Average *I. paraconfusus* captures for sites grouped by general area.

Discussion & Further Study

- Ips paraconfusus* appears to be the greatest threat to newly established stands of the Willamette Valley ponderosa pine ecotype (Flowers 2007). Preliminary results suggest that this species is distributed throughout the Willamette Valley, and are consistent with the extent depicted in historic range maps for Oregon (Struble & Hall 1955; Schultz & Bedard 1987). These findings also suggest at least three main flight periods, consistent with anecdotal reports (Overhulser 2000).
- Relative abundance of *Ips paraconfusus* did not appear to vary by latitudinal gradient (or Valley location), and is likely the result of localized site & stand conditions. Trap captures were highest in older/remnant stands in the mid-Valley in 2008, while in 2009, they were most abundant at younger stands in the south-Valley. Consistent with general observations for other *Ips* spp., localized population dynamics are often driven more by abundant host material, resulting from ill-timed slash production or winter storm breakage & blowdown, than particular climatic factors.
- Flight periodicity of *Ips paraconfusus* in the Valley was generally similar between years & across the latitudinal gradient. This may be due to the relatively similar climatic conditions that occur between sites, resulting from Valley geography. Preliminary assessments of climatic variables indicate moderate differences in average mean temperatures & other variables among sites, and these may explain the earlier peaks in the mid- and south-Valley during the last generation.
- Additional studies are planned this year, and will include continued assessment of *Ips paraconfusus* as well as expanded trapping of other potentially damaging bark beetles. A number of additional bark and ambrosia beetle species were collected in 2009, and this will be included in future reporting. Current findings are assisting to refine management strategies in the Willamette Valley and will provide a valuable baseline of bark beetles associated with this pine ecotype.

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