

November 20, 2006

To Whom It Concerns:

Attached is the second interim/progress report for IAT-funded assistance to Mexico, to evaluate the largest commercial pine plantation in Mexico for problems with ips bark beetle outbreaks. Specifically, the goals of the project are:

1. Assess pheromone preference of species to determine the most effective combination for survey and management.
2. Determine flight periods for ips beetles and possible changes in flight seasonality.
3. Develop a set of recommendations for managing pine plantations prone to ips bark beetle attack.

Two site visits were initially planned to conduct the field visits, deploy/monitor the pheromone traps, and conduct species identifications. Work completed during the first of these visits, August 26–September 2, 2005, which included an initial assessment of the situation and setup of a pheromone baited trapping array, is noted in our previous trip report. The second visit was completed February 10-18, 2006, and included laboratory time to examine the trap catches, identify species, and facilitate future direction of the study. Because at the conclusion of this second visit a considerable amount of samples still remained to be collected and tallied, and also due to the unexpected number of ips species present, we were unable to complete our analysis of the data and provide final management guidelines. A third trip is recommended now that trapping has been completed and we are told the data has largely been tallied.

This project is a good opportunity for the Forest Service to provide needed assistance and expertise to Mexico, and to strengthen ties between the forest health programs of the two countries. In addition, information gathered on insects common to both countries benefits development of future management strategies. Opportunities for collaboration and experience may be particularly important as we look at the potential of inheriting “across-the-border” forest health problems (including changed behaviors of native pests) due to shifts in global climate patterns and increased international commerce.

CONAFOR has committed a number of people to conduct much of the field and lab work but requests expertise in planning and evaluating the project, and in providing management recommendations to this important plantation project (the only large pine plantation in Mexico). Beth and I thank IAT for lending support to this project.

Sincerely,

*/s/ Brytten Steed*

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## TRIP REPORT ON IPS IN INTENSIVELY MANAGED PINE PLANTATIONS IN JALISCO, MEXICO

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### Background

Large-scale, intensive even-age management of native pine forests using artificial regeneration is relatively new in Mexico. In 1997, Compañía Industrial de Atenquique (C.I. Atenquique) established the first industrial plantations of native pine in the State of Jalisco. C.I. Atenquique, owned by a large pulp and paper company that manages an assortment of pulp mills, paper plants, land concessions, and land holdings throughout Mexico and the southern United States, manages its southern Jalisco land commissions primarily for fiber production. Since 1997, the number of native pine plantations established by the company has steadily increased. C.I. Atenquique plans to manage for a continuous yield of high-quality fiber utilizing intensive forestry management techniques including planting, pruning, thinning, and short rotations. To this end, C.I. Atenquique regenerates harvested areas with *Pinus douglasiana*, principally, and to a lesser extent, with *Pinus pseudostrobus*. Preference of *P. douglasiana* is based on its fast growth, high quality fiber, and resistance to *Dendroctonus* bark beetle attack. Out of the ten or so species of pine native to this area, these two species are considered most desirable for fiber production. Current management plans call for a first-entry weeding and pruning at age 4-6 years, a second-entry thinning and pruning at age 7-8 years, and final harvest at approximately 28 years of age.



In 2004, *Ips* outbreaks occurred in several of the recently thinned and pruned 7-8 year old plantations following their second-entry thinning and pruning. The company responded by promptly removing and burning any *Ips*-infested trees and on-site slash in the outbreak areas. Concerned about the implications of these outbreaks for the company's future intensive management program, C.I. Atenquique asked Comisión Nacional Forestal (CONAFOR) for help developing a monitoring program for *Ips* beetles in their pine plantations. Because relatively little is known about the biologies, semiochemicals, impacts, and management of the various *Ips* species associated with intensively managed pine plantations in Mexico, CONAFOR contacted Forest Health Protection for support in developing an *Ips* management program. At the time, it was suspected that *Pseudips mexicanus* was the species of concern and that management might be obtained through pheromone-based trapping and timing of activities around this species' peak flights.

### Purpose

The International Activities Team (IAT) has provided funding for two trips for Brytten Steed and Beth Willhite to travel to the Mexican state of Jalisco, to assist CONAFOR in developing an Ips management program for young pine plantations in the areas managed by C.I. Atenquique. The primary purposes of the first trip in August 2005 were to gather information about the history of the outbreaks, gain understanding of the goals and management of the plantations, roughly assess the health of the plantation trees, gather beetles for identification, and to establish field trapping sites. Trapping data was obtained to a) further determine the species present, b) test the attractiveness of several pheromone lure compounds to various Ips species and c) track Ips flight patterns over time. The second trip, taken February 2006, included laboratory time to examine the trap catches, identify species, and facilitate future direction of the study.

### Itinerary

Friday, Feb.10	Travel Day
Saturday/Sunday, Feb. 11-12	OFF
Monday-Wednesday, Feb. 13-15	Laboratory work

We began the task of sorting, identifying, and counting the thousands of specimens that were collected at weekly intervals in pheromone traps and then stored in the lab refrigerator since September, 2005.



Sorting samples



Sample bags in lab refrigerator



Sorted specimens in Petri dish

Thursday, Feb. 16

Field day

We visited a Coloradas pine plantation located near trap site #3 and collected additional bark beetle samples in recently cut slash (mostly *P. oocarpa*). Due to low survival rates of the original *P. douglasiana* planting stock, most of this plantation was occupied by naturally regenerated 4- to 6-year-old *P. oocarpa*.



Recently thinned and pruned plantation



Ips beetles were collected from slash

A first thinning and pruning had been done in the plantation ~30 days previous to our visit, but because stocking levels remained too high a second thin and prune was done one week later. We collected *Ips cribricollis*, *I. lecontei*, and *I. caligraphus* from the slash at this site.

We also visited Coloradas trap site #3 to empty the pheromone traps and collect from the nearby roadside logs infested with *Ips cribricollis* and *I. caligraphus*.



Collecting pheromone trap samples

Friday, Feb. 17

Laboratory work

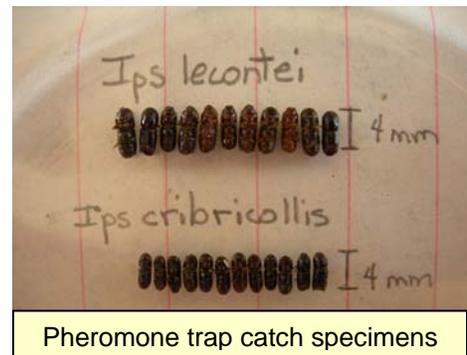
We continued sorting, identifying, and counting the pheromone trap samples.

Saturday, Feb. 18

Travel Day

## Interim Results

**Species Identifications:** During the first visit, we identified four species from the log samples. We sent specimens of these species to Armando Equihua, entomologist at Colegio Politécnico in Mexico City, for species confirmation. Armando has since confirmed our identifications and we agreed that the following species were present: *Ips cribricollis*, *I. lecontei*, *I. integer*, and *I. calligraphus*. During our second visit we identified from slash *Pseudips mexicanus*, and what we suspect is *Ips bonansai*. We sent samples of these to Armando, and are awaiting confirmation of our identification. We also became concerned that some of the *Ips cribricollis* in our samples were larger in size than described by Cibrian and others (1995), and wondered whether these might actually be *I. grandicollis*. In a follow-up examination of his collection, Armando also became concerned that these two species may often be cross-identified due to apparent overlap in the body length trait. The ability to correctly discriminate between *I. cribricollis* and *I. grandicollis* is especially important, having implications for management, because the most of the specimens collected from C.I. Atenquique plantation trees killed by ips beetles following thinning and pruning activities we initially identified as *Ips cribricollis*.

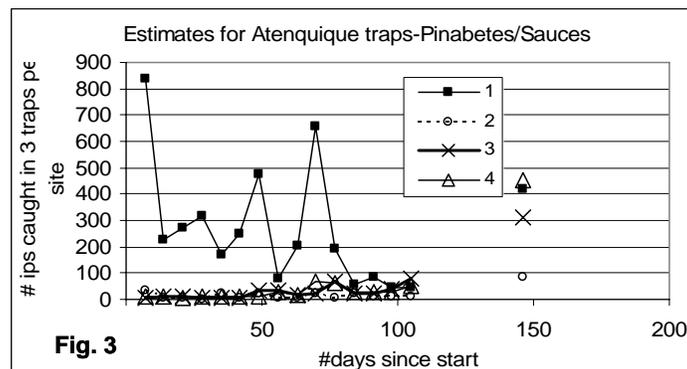
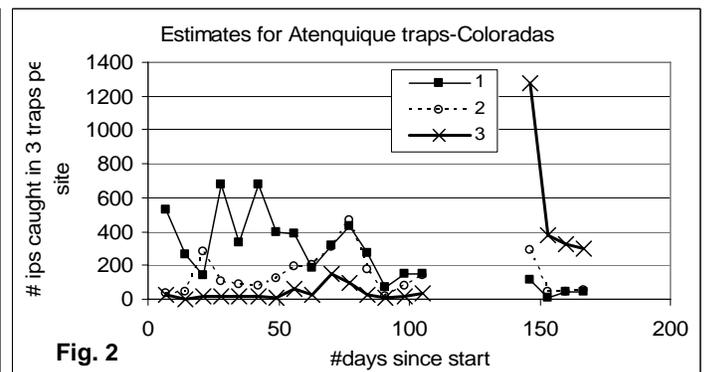
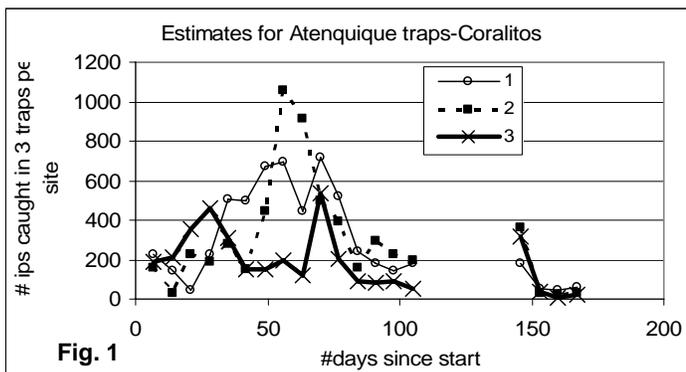


Pheromone trap catch specimens

Because of our concern over discrimination between *I. cribricollis* and *I. grandicollis*, we sent samples of our *I. cribricollis* (in a range of sizes) to Anthony Cognato for genetic verification. Anthony has confirmed that our samples match his verified *Ips cribricollis* samples, and that none of our samples match verified *I. grandicollis* samples (see Cognato, 2000; Cognato and Sperling, 2000; and Cognato and Vogler, 2001). We were also interested in exploring the genetics of *Pseudips mexicanus* as there is reason to suspect that the northern populations may be different from the southern populations (e.g. Canadian versus Mexican). Brytten has sent samples of *P. mexicanus* from Atenquique and from a site near Ogden, UT, and has asked for additional samples from Colorado and Canada. We do not expect comparisons will be conducted until sometime in mid-2007.

Our collections expanded the reported range of *Pseudips mexicanus* and *Ips cribricollis* into Jalisco State (based on range descriptions in Cibrian et al., 1995). Comparison with previously identified host species is a little more difficult as not all slash were identifiable. Largely, collections were made from *Pinus douglasiana* (per our Mexican assistants), although some of the slash pieces, particularly the larger diameter ones, may have been *Pinus oocarpa* or other unidentified pine species that had been growing naturally. Interestingly, Cibrian and others (1995) do not list *Pinus douglasiana* as a host species for any of the 6 ips species found. *Pinus oocarpa* is not listed as a host species for either *Pseudips mexicanus* or *Ips integer*, but is listed for *I. cribricollis*, *I. lecontei*, and *I. calligraphus* (found in *P. oocarpa* slash this trip). *Pinus pseudostrobus*, the other occasionally planted pine species in this plantation, is listed as a host for all of the 6 ips species.

**Seasonality:** During our visit we sorted, identified, and counted specimens in many collection bags, but managed to complete tallies on only a small portion. To identify a possible season when few ips were flying, we decided to quickly estimate the total number of ips in the bags not yet counted. Using this estimated total, it appears that during this trapping period of 8 September-16 December, 2005 and 26 January-16 February, at least one species of ips was present. Likely the high fluctuations in the numbers of ips present over time and the big difference between sites (Figures 1-3) are related to the timing of slash creation in proximity to the trap site. Lower levels around 100 days (and including the period not sampled) occurred during the rainy season (roads were often impassible) and may indicate a lull in Ips flights. Also note that the high numbers at the start of trapping again in January may be due to traps having previously been left out for 41 days rather than the usual 7 days.



Figures 1-3. Seasonal abundance of all ips species from rough 'in bag' estimates for each trapping site in the three plantation stands of Coralitos, Coloradas, and Pinabetes/Sauces.

Of the estimated 31,950 ips caught in these traps, approximately 35%, 13%, and 52% were caught in the ipsenol, ipsdienol, and ipsenol+ipsdienol baited traps, respectively.

### Recommendations

Because of the considerable amount of data that remains to be tallied, the unexpected number of ips species present, and unresolved questions regarding the identification of some of the ips species, we were unable to complete our analysis of the data and provide final management guidelines at the conclusion of this trip. Further follow-up will be necessary to accomplish project goals. A third trip is recommended now that taxonomists have provided assistance with identification, trapping has been completed, and the data has largely been tallied by the Mexican technicians.

Sincerely,

/s/ Brytten Steed

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