**Preliminary Comparisons of CAPS and Farm Bill funding for Exotic Wood Borer / Bark Beetle Surveys**

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**Introduction:**

When looking at funding levels for CAPS and Farm Bill funded Exotic Wood Borer / Bark Beetle (EWBB) surveys, there appears to be a 3-fold increase in funding for states funded through the Farm Bill. The goal of the limited analysis is to explore the differences in the numbers of targets, sites, visits, etc., to better understand whether or not the differences in funding levels per survey are reflective of a difference in effort, are a better reflection of the true cost of conducting the survey, are caused by another reason, or are an artificial comparison. Are states applying for EWBB survey funding through the Farm Bill receiving funds that better represent the costs of running the survey?

**Goal:**

Do a preliminary analysis to examine differences in CAPS and Farm Bill EWBB surveys.

**Methods:**

1. In early March, 2016, the spreadsheet of all planned surveys was downloaded from the CAPS/PPQ/Farm Bill Survey Summaries.
2. PPQ surveys were removed.
3. Data for EWBB surveys were selected.
4. Only data from 2014 and 2015 were included in analysis, as 2016 Farm Bill EWBB surveys were not present in the dataset at that time.
5. Data were first sorted by funding source, state, and year. Within a funding source, state, and year, the total number of targets was determined, as was the mean number of sites / traps (called sites throughout this document), and the mean number of visits. Next, the number of targets \* sites \* visits was determined for each data line. The CAPS survey funding data (federal, state share, and total) was included from the planned surveys spreadsheet. For Farm Bill surveys, the awarded funds as described in the FY14 and FY15 spending plans were used. The federal funding awarded per target \* site \* visit was calculated.
6. This resulted in a single line of data that summarized each EWBB survey by state, year, and funding source. All lines of CAPS and Farm Bill data were included in the analysis. States that conducted EWBB surveys in both years, from both funding sources, were represented multiple times in the analysis, but states that only drew from one funding source, or did not participate in both years were represented less. Summary statistics (mean, median, mode, max, min, variance, and standard error) were determined for the number of targets, sites, visits, federal survey dollars, and federal survey dollars per target \* site \* visit.
7. Data were also summarized by target. The percentage of CAPS and Farm Bill surveys including a specific target was determined for each target. A list of targets included in both surveys was developed, as was a list of pests included in CAPS surveys, but not included in Farm Bill surveys.

**Results & Preliminary Discussion:**

The dataset was weighted towards CAPS EWBB surveys. Across both years, there were 39 EWBB surveys funded through CAPS, but only 5 funded through Farm Bill. One state was awarded FY15 funds through the Farm Bill to conduct an EWBB survey, but the data did not exist in the survey summary spreadsheet for FY15, so that state was excluded from the analysis. Only four states funded their EWBB surveys through the Farm Bill, and of those four, only one, California, also funded its surveys through CAPS. California was the only state to apply for funding through both sources in both years. As California was heavily represented in the Farm Bill data, there was the possibility that any summary statistics would be highly influenced by California’s data. As such, the analyses were conducted with California data included, and excluded. It should be noted, however, that there is low replication of states with Farm Bill as a source for EWBB funding; as such there is little to no statistical power and only the most general conclusions may be drawn. This is why there was no effort to conduct a more sophisticated analysis of data.

Table 1: Comparisons of survey funding between CAPS and Farm Bill EWBB Surveys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Total Federal Funding for Survey w/ CA** | | **Total Federal Funding for Survey w/o CA** | |
| *CAPS* | *Farm Bill* | *CAPS* | *Farm Bill* |
| *Min* | $4,196 | $23,335 | $4,196 | $23,335 |
| *Max* | $115,250 | $150,000 | $89,964 | $40,000 |
| *Mean(±SEM)* | $26,356 ± $4,339 | $72,636 ± $26,932 | $21,551 ± $2,906 | $29,393 ± $5,322 |
| *Median* | $16,150 | $40,000 | $15,720 | $24,843 |
| *Mode* | $29,006 | --- | $29,006 | --- |

This indicates that the federal funding received to conduct a EWBB survey through the Farm Bill was about 3 times what was received through the CAPS program when all states with EWBB surveys are included. When the funding for California is removed from the comparison, the funding for the surveys with CAPS or Farm Bill as a funding source are remarkably consistent. Funding for California surveys was highest regardless of funding source. In short, the appearance of a difference in funding dollars between CAPS and Farm Bill is an artifact of fewer states receiving EWBB funds through the Farm Bill, and overrepresentation of costs associated with survey in California in the Farm Bill summaries.

Table 2: Comparisons of number of pest targets between CAPS and Farm Bill EWBB Surveys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Total # Targets Included in Survey w/ CA** | | **Total # Targets Included in Survey w/o CA** | |
| *CAPS* | *Farm Bill* | *CAPS* | *Farm Bill* |
| *Min* | 3 | 7 | 3 | 7 |
| *Max* | 29 | 15 | 17 | 9 |
| *Mean(±SEM)* | 9 ± 0.74 | 10.4 ± 1.4 | 8.3 ± 0.5 | 8.3 ± 0.7 |
| *Median* | 9 | 9 | 8 | 9 |
| *Mode* | 9 | 9 | 9 | 9 |

In general, regardless of funding source, states surveyed for about 9 targets per survey.

Table 3: Comparisons of number of sites between CAPS and Farm Bill EWBB Surveys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Total # Sites Included in Survey w/ CA** | | **Total # Sites Included in Survey w/o CA** | |
| *CAPS* | *Farm Bill* | *CAPS* | *Farm Bill* |
| *Min* | 5 | 8 | 5 | 8 |
| *Max* | 330 | 80 | 330 | 20 |
| *Mean(±SEM)* | 36.6 ± 11.1 | 38.8 ± 16.4 | 34.3 ± 11.6 | 12.3 ± 3.8 |
| *Median* | 15 | 20 | 15 | 9 |
| *Mode* | 10 | --- | 10 | --- |

Sites included for survey vary widely by state, and this variation is better represented within the CAPS funded surveys.

Table 4: Comparisons of number of visits between CAPS and Farm Bill EWBB Surveys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Total # Visits Included in Survey w/ CA** | | **Total # Visits Included in Survey w/o CA** | |
| *CAPS* | *Farm Bill* | *CAPS* | *Farm Bill* |
| *Min* | 1 | 3 | 1 | 3 |
| *Max* | 150 | 12 | 150 | 12 |
| *Mean(±SEM)* | 19.9 ± 5.6 | 8.4 ± 1.7 | 20.2 ± 5.9 | 7.3 ± 2.6 |
| *Median* | 9 | 8 | 9 | 7 |
| *Mode* | 8 | 12 | 8 | --- |

In general, there appear to be slightly more visits to each site as captured in CAPS studies. Again, this is likely an artifact of the low representation of Farm Bill EWBB surveys.

Table 5: Comparisons of cost per target \* site \*visit between CAPS and Farm Bill EWBB Surveys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Cost / Target \* Site \*Visit w/ CA** | | **Cost / Target \* Site \*Visit w/o CA** | |
| *CAPS* | *Farm Bill* | *CAPS* | *Farm Bill* |
| *Min* | $0.18 | $8.68 | $0.18 | $41.15 |
| *Max* | $325.89 | $59.53 | $325.89 | $59.53 |
| *Mean(±SEM)* | $34.82 ± $10.44 | $ 35.13± $9.14 | $36.45 ± $10.96 | $48.90 ± $5.50 |
| *Median* | $16.26 | $41.15 | $16.52 | $46.01 |
| *Mode* | $10.08 | --- | $10.08 | --- |

The costs per target \* site \* visit were remarkably similar between the CAPS and Farm Bill funded EWBB surveys. CAPS funded surveys may trend towards slightly lower costs, but these are being skewed this direction by states with extremely low survey costs. It is possible that these costs for the survey do not capture all of the real costs.

Table 6: Targets Occurring in Both CAPS and Farm Bill EWBB Surveys

|  |  |
| --- | --- |
| **Scientific Name** | **Common Name** |
| |  | | --- | | *Agrilus auroguttatus* | | *Agrilus biguttatus* | | *Chlorophorus strobilicola* | | *Hylurgops palliatus* | | *Monochamus sutor* | | *Monochamus urussovii* | | *Pityogenes chalcographus* | | *Tomicus minor* | | *Agrilus planipennis* | | *Hylurgus ligniperda* | | *Platypus quercivorus* | | *Tetropium castaneum* | | *Tetropium fuscum* | | *Xyleborus glabratus* | | *Hylobius abietis* | | *Orthotomicus erosus* | | *Tomicus piniperda* | | *Trypodendron domesticum* | | *Tomicus destruens* | | *Ips sexdentatus* | | *Ips typographus* | | *Monochamus alternatus* | | |  | | --- | | Goldspotted Oak Borer | | Oak Splendour Beetle | | Slender-Banded Pinecone Longhorn Beetle | | Lesser Spruce Shoot Beetle | | Small White-marmorated Longhorned Beetle | | Black Fir Sawyer | | Sixtoothed Spruce Bark Beetle | | Lesser Pine Shoot Beetle | | Emerald Ash Borer | | Redhaired Pine Bark Beetle | | Oak Ambrosia Beetle | | Black Spruce Beetle | | Brown Spruce Longhorned Beetle | | Redbay Ambrosia Beetle | | Large Pine Weevil | | Mediterranean Pine Engraver | | Pine Shoot Beetle | | European Hardwood Ambrosia Beetle | | Pine Shoot Beetle | | Sixtoothed Bark Beetle | | European Spruce Bark Beetle | | Japanese Pine Sawyer | |

Table 7: Targets Occurring in CAPS but not Farm Bill-funded EWBB Surveys, and the Percentage of States with a CAPS-funded EWBB Survey Including the Target

|  |  |  |
| --- | --- | --- |
| **Scientific Name** | **Common Name** | **% CAPS Survey Including the Target Pest** |
| |  | | --- | | *Aeolesthes sarta* | | *Agrilus sulcicollis* | | ***Anoplophora chinensis*** | | ***Anoplophora glabripennis*** | | *Anoplophora malasiaca* | | *Callidiellum rufipenne* | | *Chlorophorus annularis* | | *Cnestus mutilatus* | | *Dendroctonus micans* | | *Ips subelongatus* | | *Massicus raddei* | | *Megaplatypus mutatus* | | *Pityophthorus juglandis* | | *Scolytus intricatus* | | ***Sirex noctilio*** | | *Trichoferus campestris* | | |  | | --- | | City Longhorned Beetle | | Jewel Beetle | | **Citrus Longhorned Beetle** | | **Asian Longhorned Beetle** | | White-spotted Longicorn Beetle | | Japanese Cedar Longhorned Beetle | | Bamboo Borer | | Camphor Shot Borer | | Great Spruce Bark Beetle | | Scolytid Beetle | | Mountain Oak Longhorned Beetle | | Ambrosia Beetle | | Walnut Twig Beetle | | European Oak Bark Beetle | | **Sirex Woodwasp** | | Velvet Longhorned Beetle | | |  | | --- | | 3% | | 3% | | **23%** | | **31%** | | 5% | | 3% | | 8% | | 3% | | 3% | | 3% | | 8% | | 5% | | 3% | | 8% | | **26%** | | 10% | |

In general it is difficult to make comparisons regarding survey costs between states. Each state has its own way of distributing costs across surveys, and its own labor, travel, etc. costs. The CAPS surveys in particular may underrepresent the costs of survey as some costs may be distributed to infrastructure funding, or shared state funding (although this occurred infrequently in the dataset.) This summary data set is also tricky to work with as it: 1) reflects the planned surveys and not what was completed; 2) does not reflect the money spent, but the money awarded; 3) not all of the data may be entered in the same way by all states. There are some numbers that I question, but with one exception, I did not exclude any of the data from the data set. I did exclude some visit and target \* site \*visit data from the 2014 Alabama CAPS survey, as the dataset indicated that there would be 1,980 visits to the sites, and I did not think that this was within the realm of possibility. Alabama also had the highest listed number of sites at 330 – I retained this data in the dataset, but question what it actually represents.

Although it is difficult to make a detailed analysis of this dataset due to concerns about data integrity as well as low replication, some broad conclusions can be drawn. Namely: 1) appearance of increased funding through the Farm Bill for EWBB surveys is an artifact of much of the FY14 and FY15 EWBB Farm Bill survey dollars funding survey in California; 2) the numbers and species of targets, sites, visits, and costs per target \* site \*visit are remarkably consistent between CAPS and Farm Bill funding; 3) there is no increase in dollars awarded by funding the EWBB survey through the Farm Bill; and 4) there is no decrease in dollars awarded by funding the EWBB survey through the Farm Bill.