Technical Challenges and Solutions for Low - Rate Applications

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Why Low – Rate applications?

Following EPA key recommendations on labels:

- <mark>Choosing the right product for your needs</mark>
- Keeping you safe
- Saving money
- Helping the environment

Matching local needs & scenarios:
- Operational costs
- Payload
- Timing and frequency of application
- Target species

✓ **Lower operational costs**
✓ Single brood efficiency
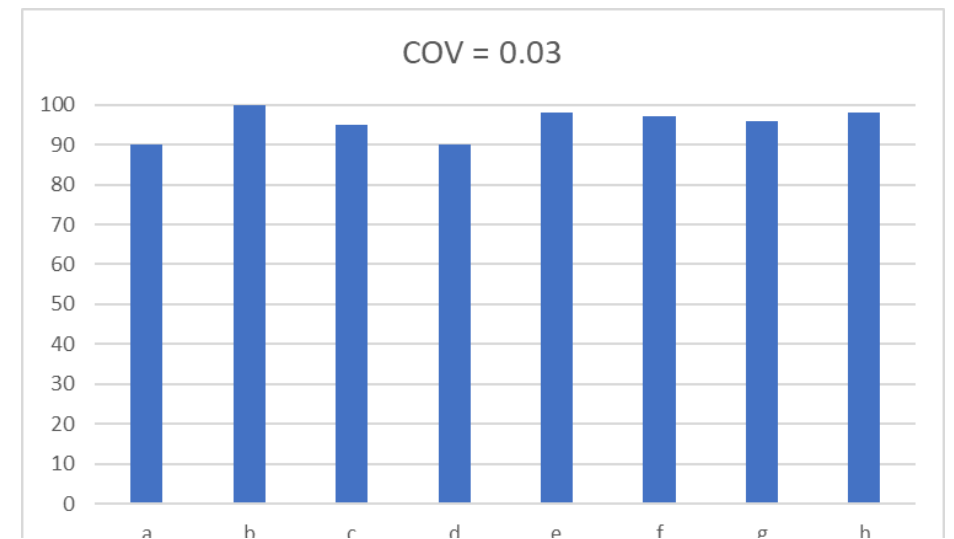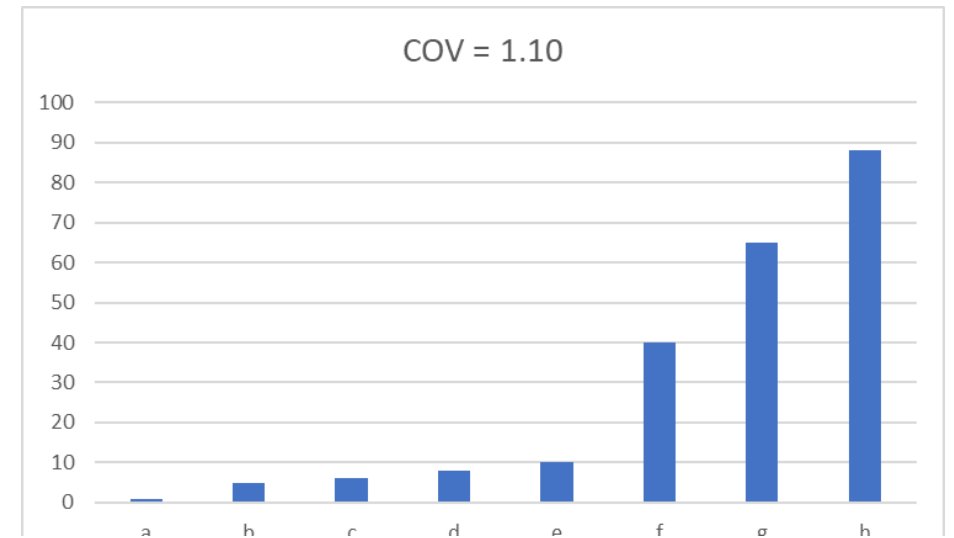✓ Application flexibility
✓ High potency

Reduced Ferry time
- Traditional aerial: Lower fuel costs, contract time, wear and tear on equipment
- Drones: longer application time, efficient battery usage
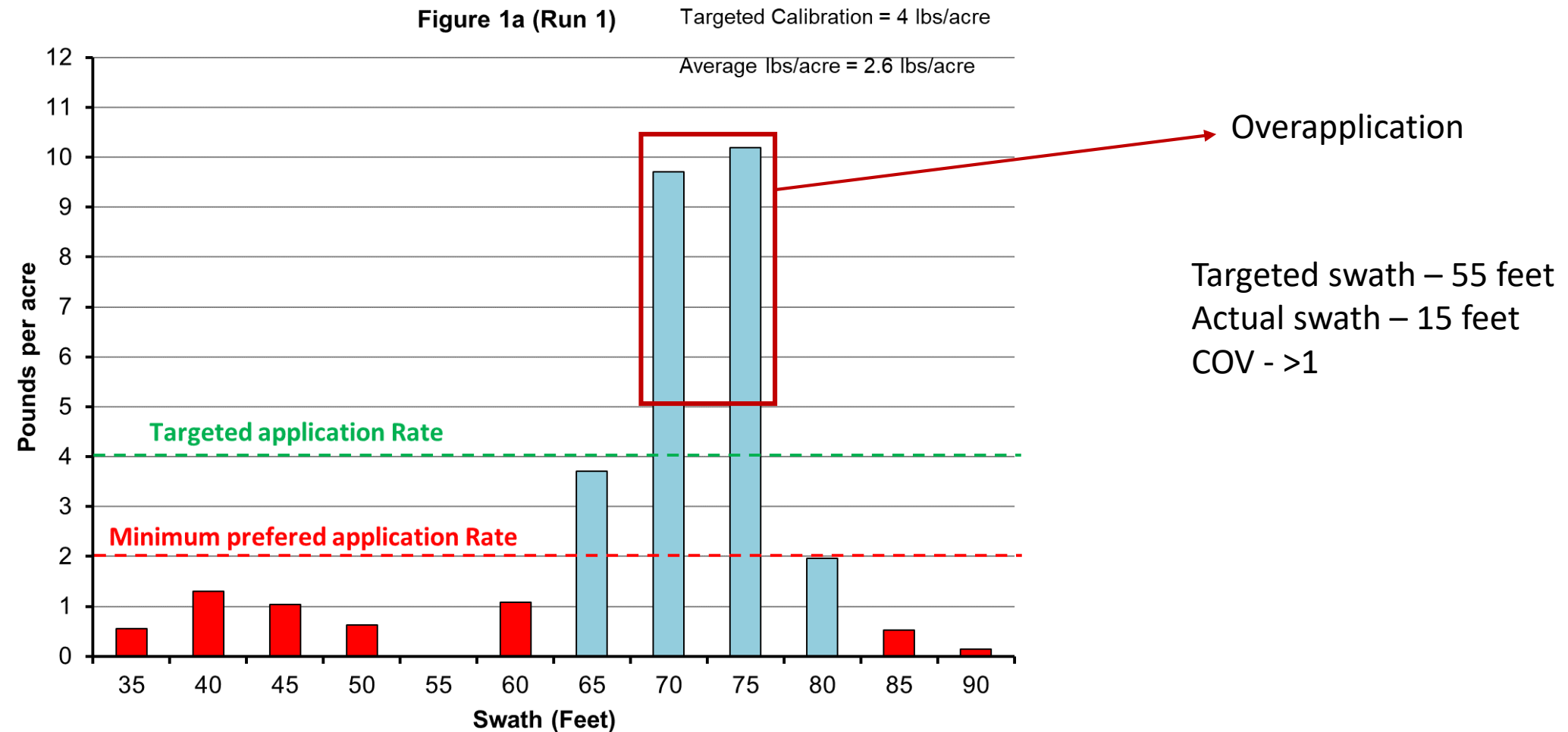
Characterizations

Some important Variables

- Coefficient of variation (COV)
  - Extent of variability in relation to the mean of the population
  - Higher the number greater the variation
  - Lower the number better the evenness
  - Recommended COV = <0.3
- Preferred Minimum Application Rate
  - Minimum amount preferred at any one point in the swath
  - Depends on habitat and species

Uneven distribution

Figure 1a (Run 1)   Targeted Calibration = 4 lbs/acre

Average lbs/acre = 2.6 lbs/acre

Overapplication

Targeted swath – 55 feet
Actual swath – 15 feet
COV - >1

Low-rate application examples

VectoPrime® FG
BIOLOGICAL LARVICIDE
FINE GRANULE

ACTIVE INGREDIENT:
Bacillus thuringiensis, subsp. *israelensis*, strain AM 65-52
fermentation solids, spores, and insecticidal toxins 6.07%
(S)-methoprene 0.10%
OTHER INGREDIENTS 93.83%
TOTAL 100.00%

Potency: 400 International Toxic Units (ITU) per mg or 0.182 billion
ITU per pound

The percent active ingredient does not indicate product performance
and potency measurements are not federally standardized.

EPA Reg. No.73049-501
EPA Est. No. 33762-IA-001   List No. 05725

INDEX:
1.0   First Aid
2.0   Precautionary Statements
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APPLICATION DIRECTIONS

VectoPrime® FG Biological Larvicide is an insecticide for use against mosquito larvae.

Mosquito Habitats	Application Rate Range*
(Such as the following examples):	
Irrigation ditches, roadside ditches, flood water, standing ponds, livestock watering ponds and troughs, woodland pools, snow melt pools, pastures, catch basins, storm water retention areas, tidal water, salt marshes and rice fields	1.25 - 20.0 lbs/acre*

In addition, standing water containing mosquito larvae, in fields growing crops such as (but not limited to) alfalfa, almonds, asparagus, corn, cotton, dates, grapes, peaches, sugar cane and walnuts may be treated at the recommended rates.

* Post-flood Applications
Use 1.25 - 4.0 lbs/acre against 1st - 4th instar mosquito larvae. Use 4.0 - 10.0 lbs/acre when water is heavily polluted (e.g. sewage lagoons, animal waste lagoons), algae are abundant, and/or local experience suggests the need for higher rates. Re-treat as needed based on local conditions.

* Pre-flood Applications
VectoPrime FG can be applied prior to flooding of mosquito larval habitats. Use 10-20 lbs/acre when up to 7 days pre-flood capacity is needed. Use 20 lbs/acre when a 7-14 day pre-flood application is needed. Retreat as needed. Consult your local Valent BioSciences representative for further advice on pre-flood applications with VectoPrime FG.
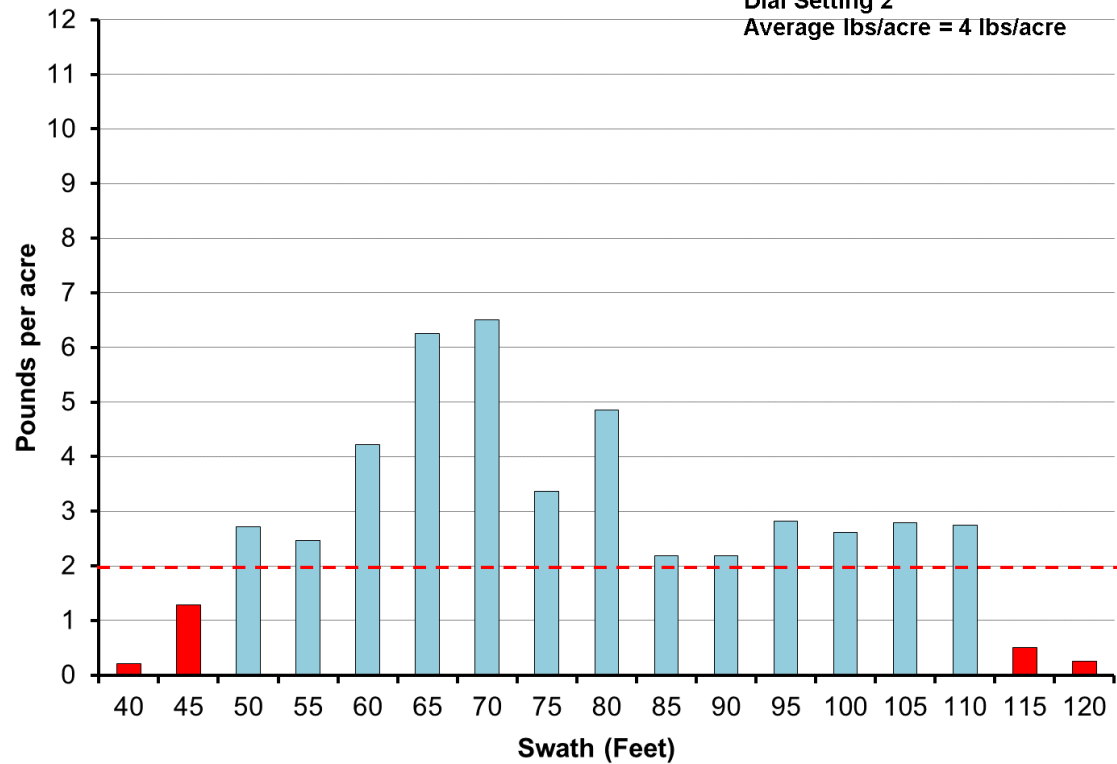
Almost half compared to some traditional products
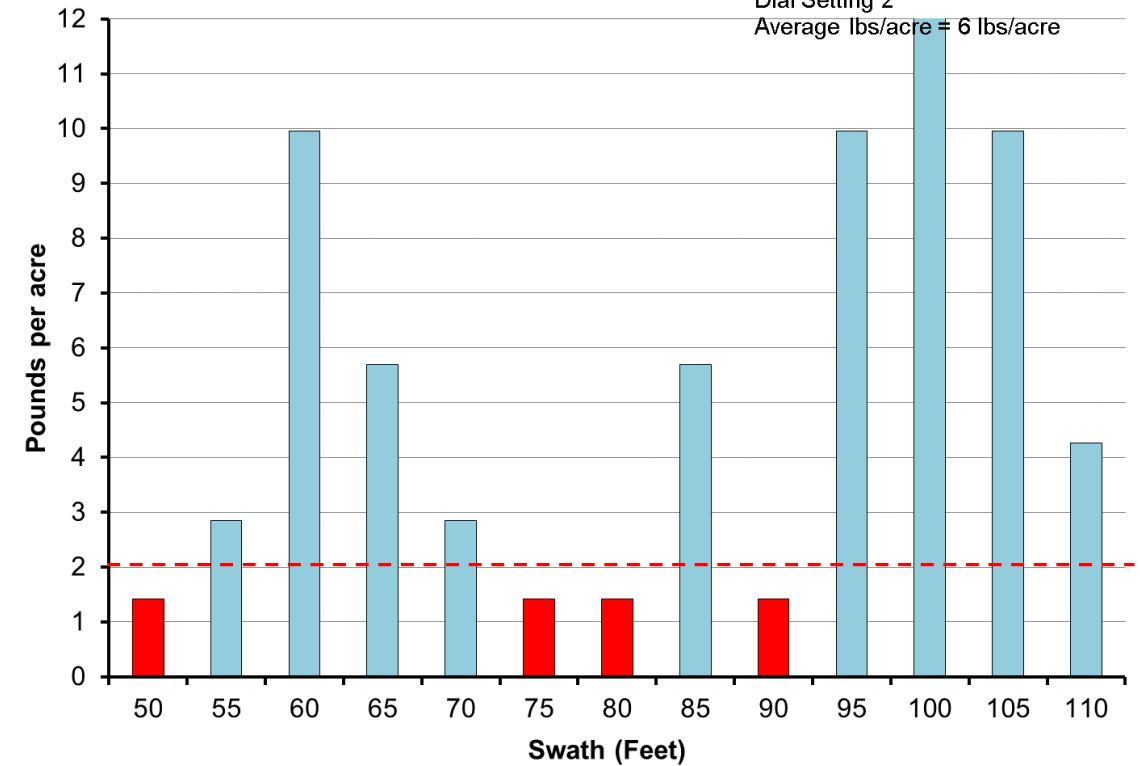
Collection Container - Tote
VS Bucket

Tote VS Bucket

Figure 3a (Tote-Run 3)
Targeted Calibration = 5 lbs/acre
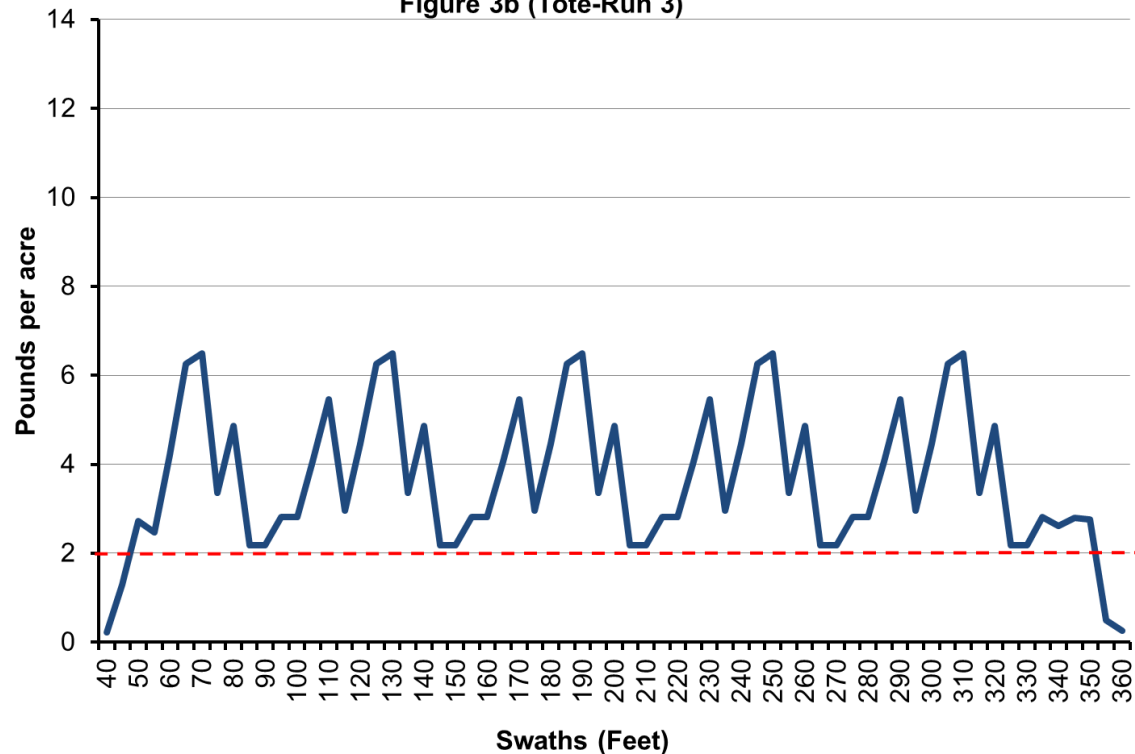Dial Setting 2"
Average lbs/acre = 4 lbs/acre

Figure 7a (Bucket-Run 3)
Targeted Calibration = 5 lbs/acre
Dial Setting 2"
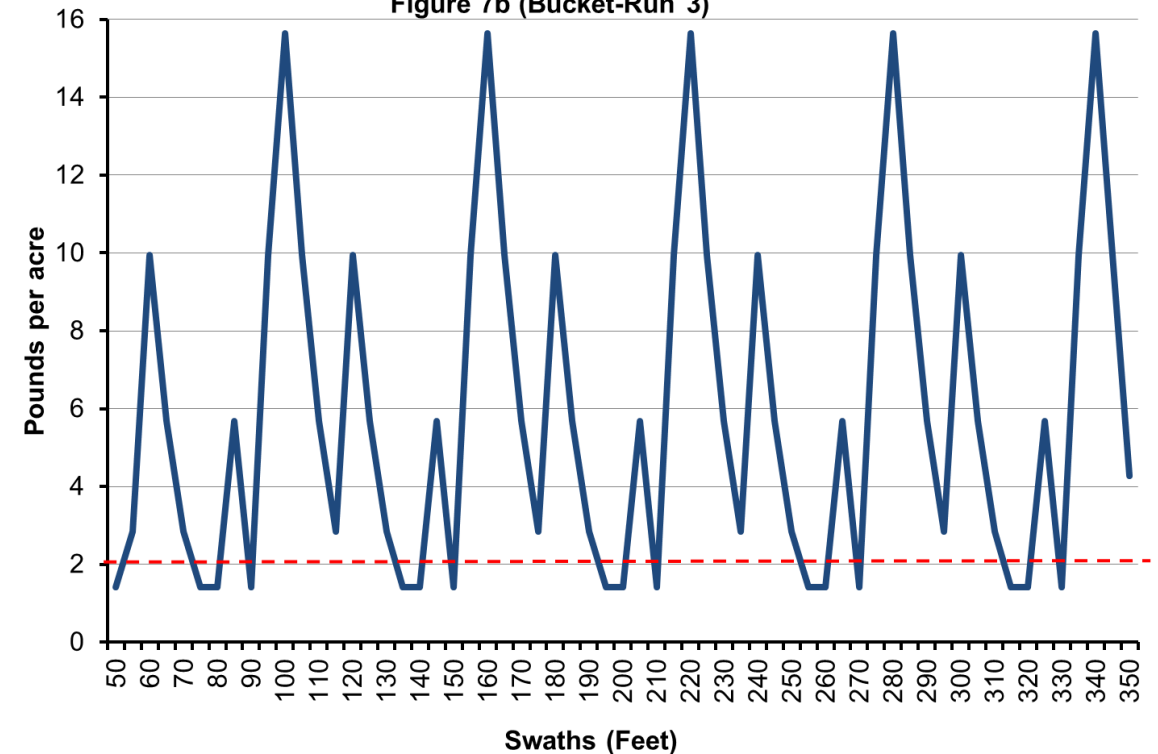Average lbs/acre = 6 lbs/acre

COV = 0.3

COV = 0.7

Predicted Swath – Tote VS Bucket

Predicted deposit based on a 60 ft. swath
Figure 3b (Tote-Run 3)

Predicted deposit based on a 60 ft. swath
Figure 7b (Bucket-Run 3)
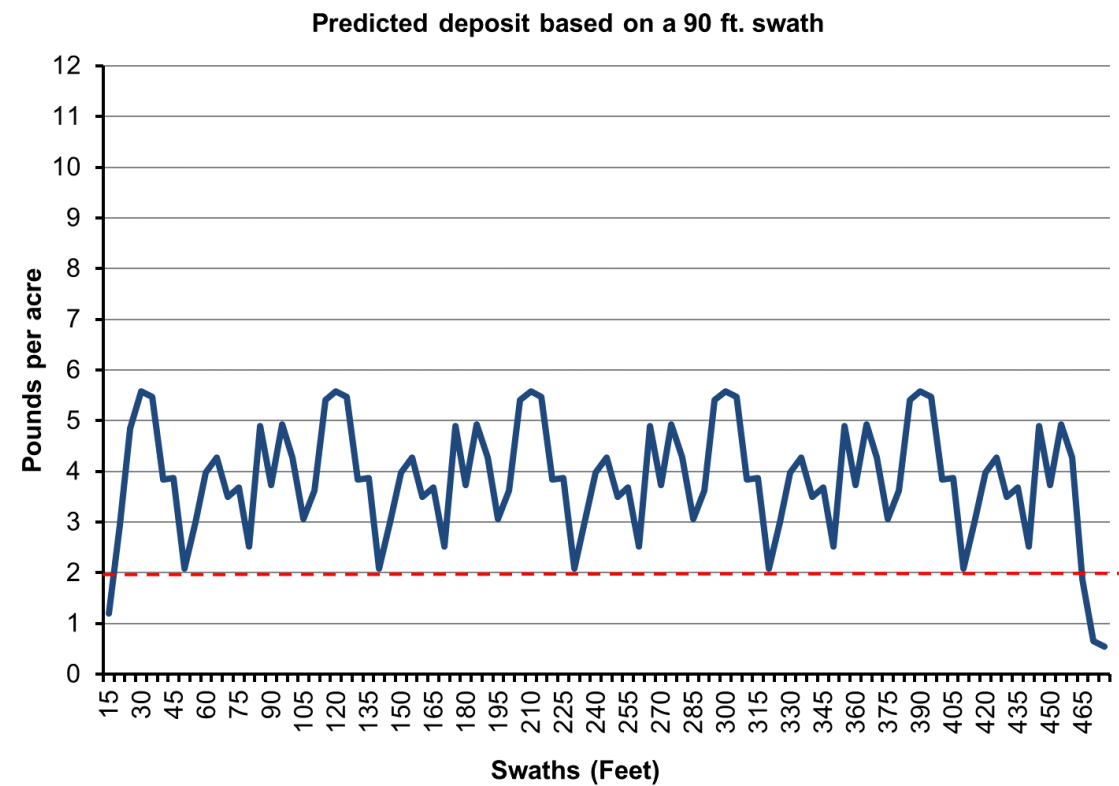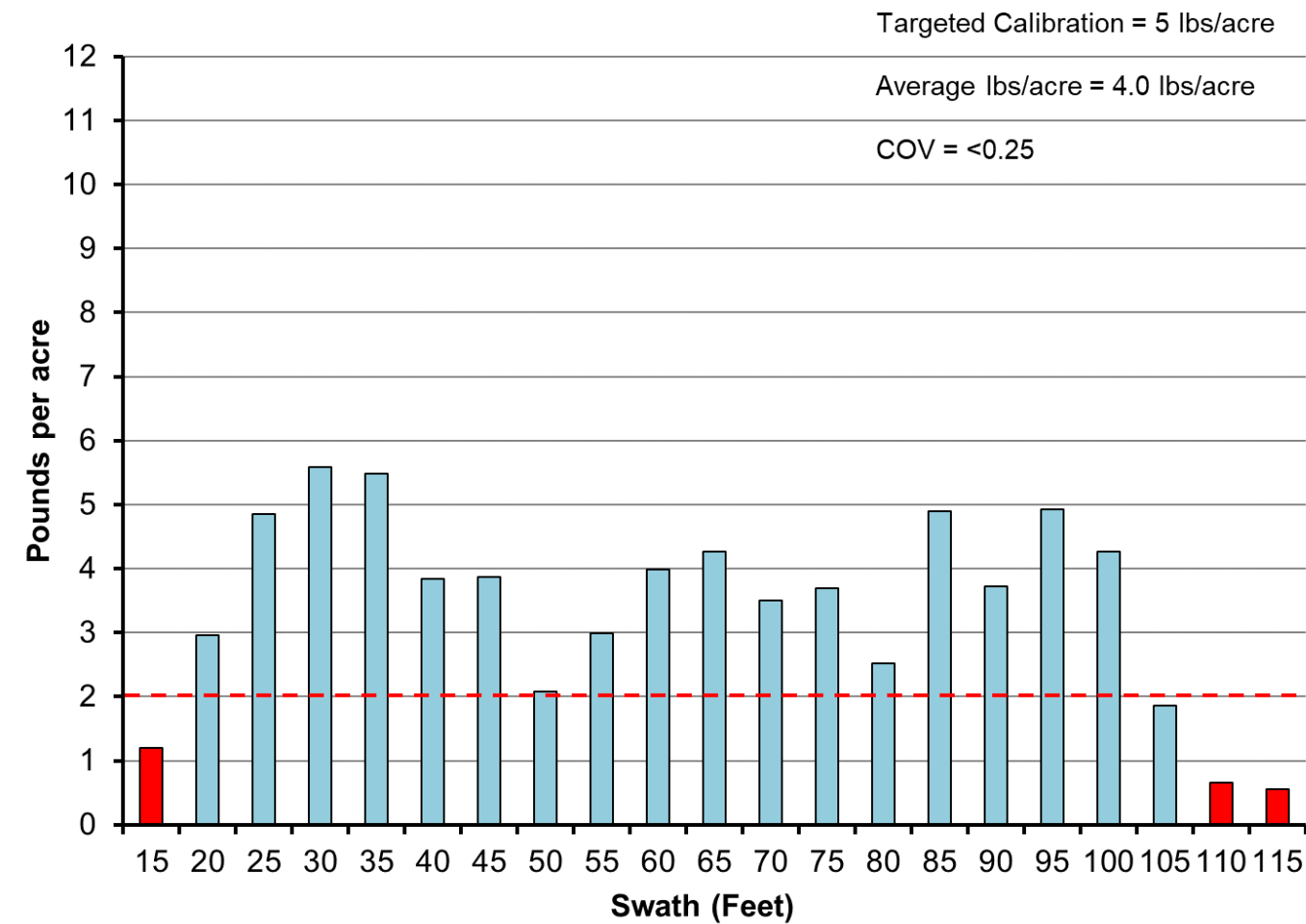
Low-rate challenges – Case 1

Fixed wing aircraft

- Issue:
  - Uneven application
- Solution
  - Custom roller installed
- Results
  - Swath width improved
  - Even distribution across the swath

4 lbs/acre VectoPrime® FG with an optimal swath width of **90 feet**.

Data from Case 1

Targeted Calibration = 5 lbs/acre

Average lbs/acre = 4.0 lbs/acre

COV = <0.25

Predicted deposit based on a 90 ft. swath
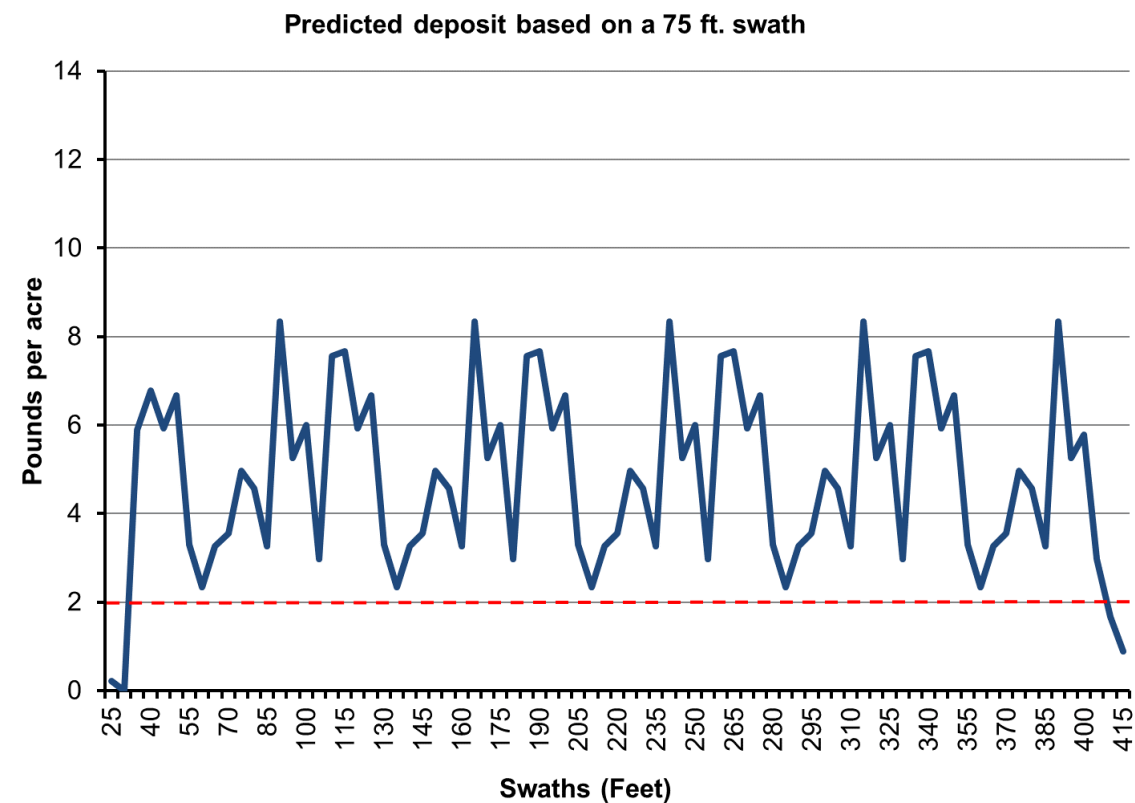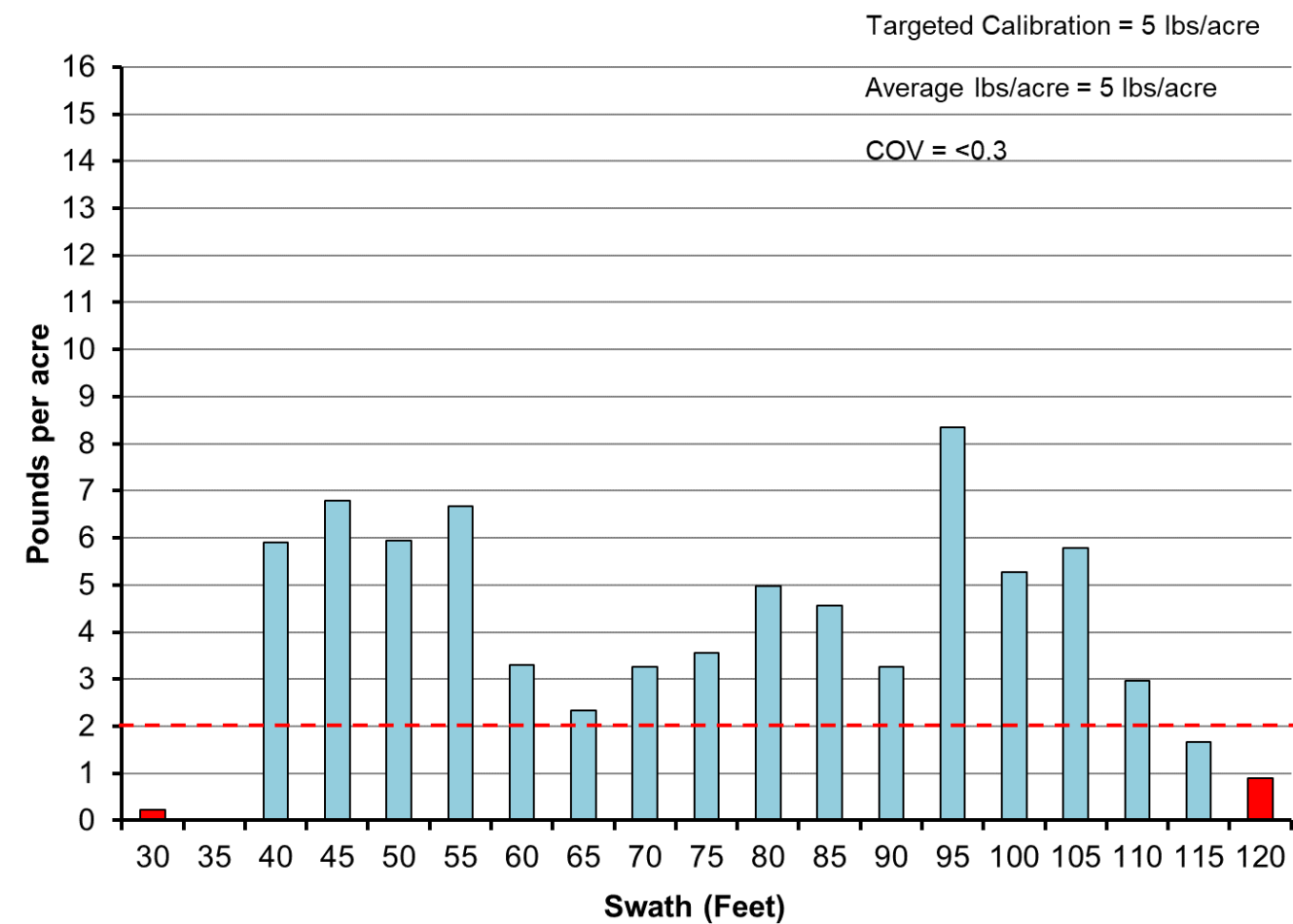
Low-rate challenges – Case 2

Rotary wing aircraft

- Issue:
  - Uneven application

- Solution
  - Testing different hopper openings
  - Boom for even distribution

- Results
  - Swath width improved
  - Even distribution across the swath

Application at **5 lbs/acre** with an optimal swath width of **75 feet**

Data from Case 2

Targeted Calibration = 5 lbs/acre

Average lbs/acre = 5 lbs/acre

COV = <0.3

Predicted deposit based on a 75 ft. swath

Key Considerations

- Characterize equipment
  - Tote's are better

- Low-rate applications
  - Future
  - Efficient when evenly distributed
  - Existing equipment can be easily configured or modified

Acknowledgements

- All the districts who let us be part of their characterization team