Risk Based Sampling: Foundations for Precision Safeguarding

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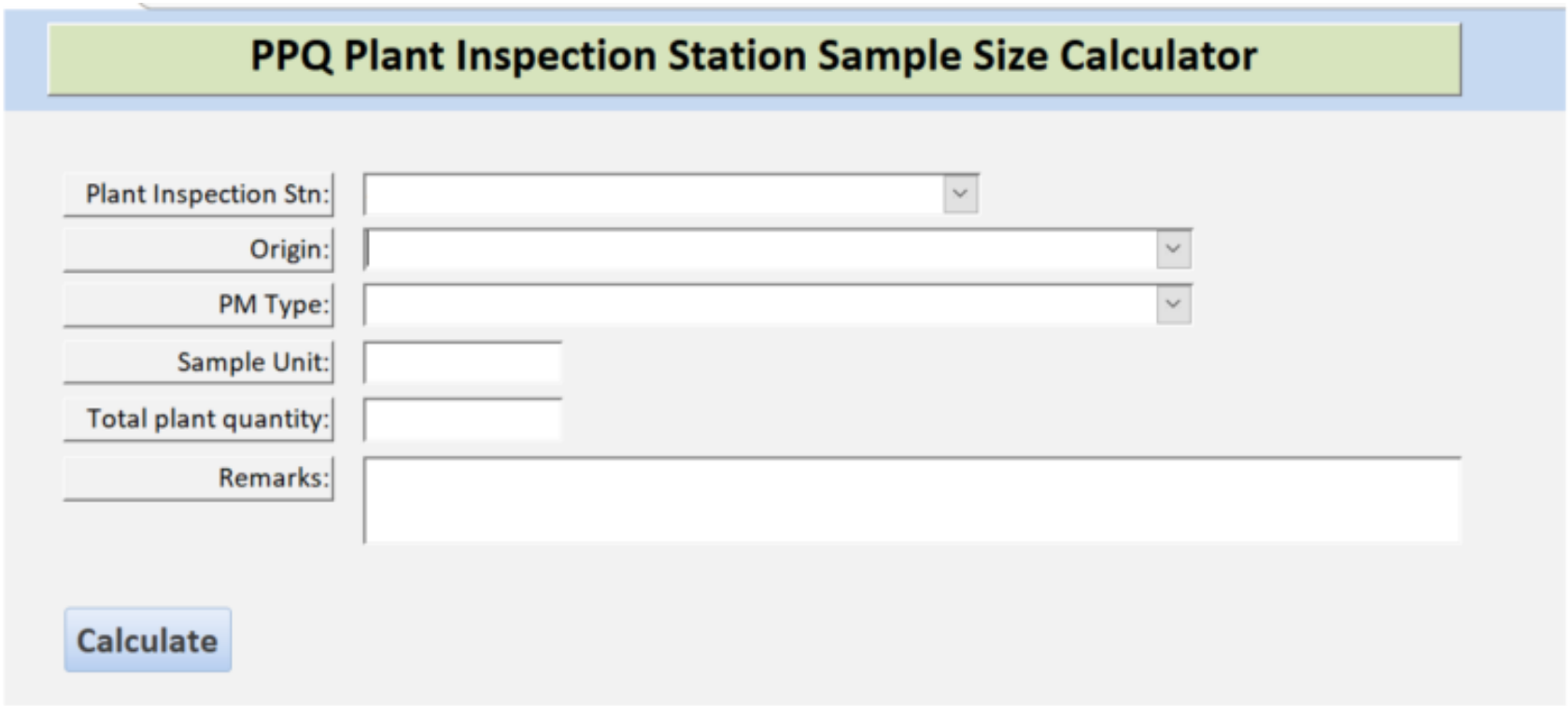
Outline

- Current sampling at Plant Inspection Stations
- Building the foundation
- Review of challenges
- Making adjustments
- Next steps

RBS calculator version 2 (V2)



RBS calculator (V2)

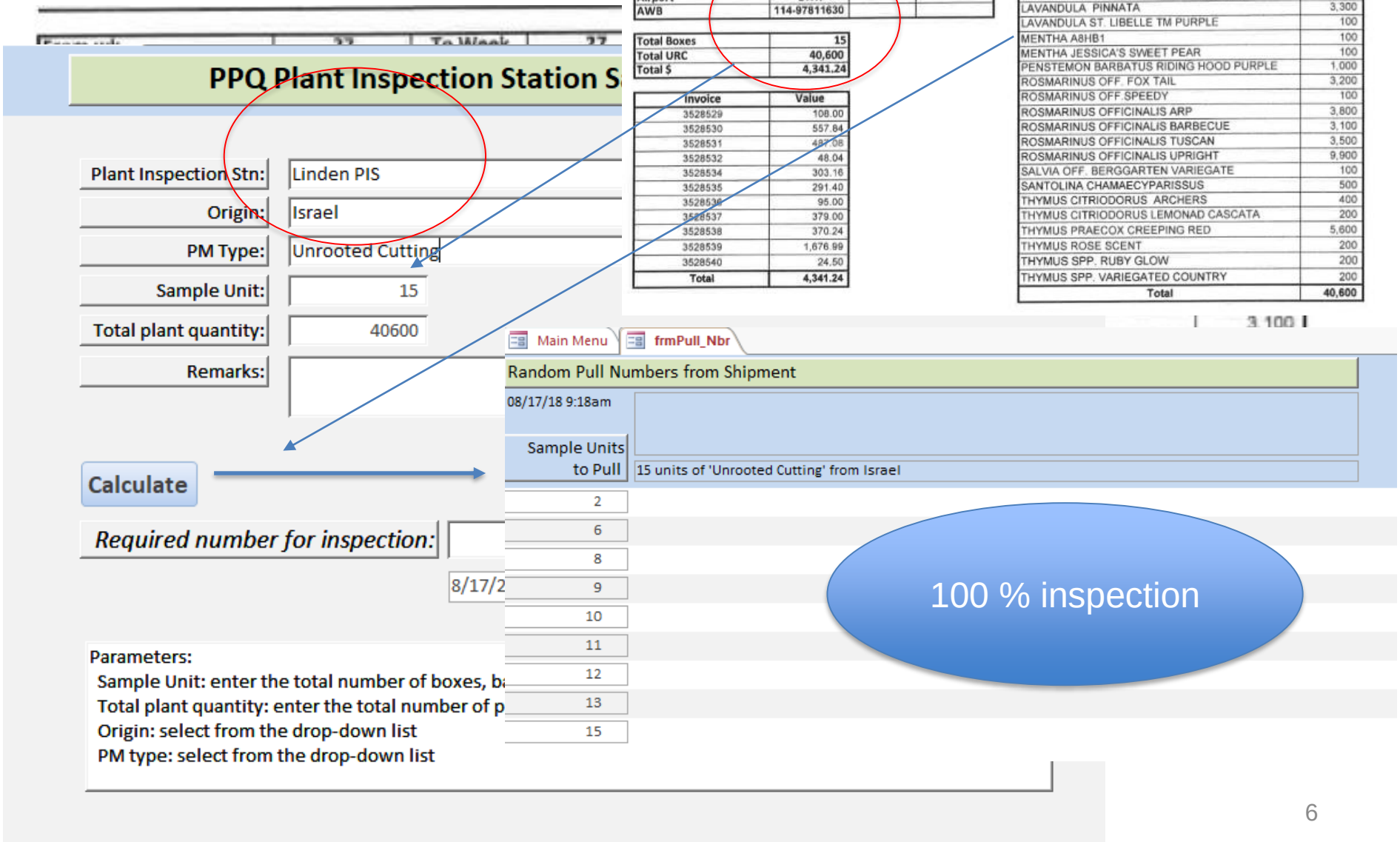
Official rollout: **Sept. 30, 2018**

- Sampling adjusted based on risk ratings
- Risk ratings based on propagative material type & origin combinations (PM – Origin)
- Ratings derived from inspection data collected from PIS
- Four rating categories; plus tissue culture
- Operationally manageable & feasible

Using V2 for sampling

- Determine PM type(s) in consignment
- Determine if PM type is singled, mingled or commingled
- Determine the Sample Unit(s) for best distribution
- Determine Origin
- Enter data into V2
- Calculate & identify the sample units to inspect
- Inspect 100%

Using V2 for sampling



Risk Based Sampling:

Statistically sound sampling which enables inspection activities to be directed according to level of risk.

Purpose: *To optimize the use of resources for inspection and potentially create incentives for lower risk importations.-*

How did we get here?

Building the foundation

- 2012: Initial discussions on RBS program development

- 2014: PPQ changes from percentage sampling to hypergeometric sampling at Plant Inspection Stations
    - *Standard rate of sampling*
    - *Statistically robust*
    - *Established a baseline of data*
    - *Increased consistency with the level of detection*
    - *Improvement over the old method*

Building the foundation

- 2015: PPQ completes one year of conducting 100 percent of its PIS inspections using hypergeometric sampling
- 2017: PPQ analyzes data from hypergeometric sampling to determine pest action rates associated with propagative
- 2018: PPQ implements adjustments based on assigned ratings

Building the Foundation: sampling design

Percentage sampling

(Previous method)

- Fixed sample size
- Risk constant only when lot size is constant
- Not technically defendable

Baseline sampling

(Initial RBS method)

- Sample size varies with lot size
- Fixed risk
- Technically defendable & transparent

Risk-based sampling

(Adjusted RBS)

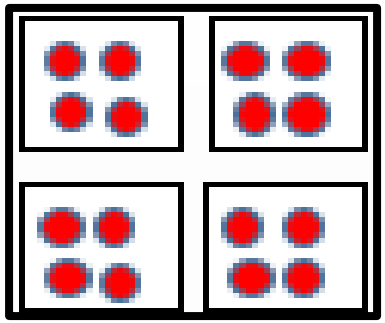
- Sample size varies with lot size and risk
- Fixed risk (assigned to data combination)
- Technically defendable & transparent

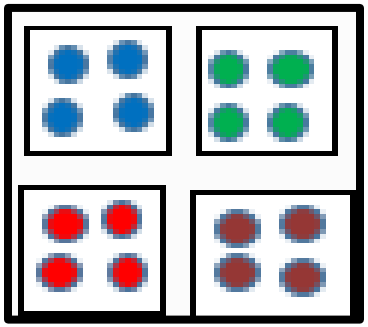
Building the foundation: program design

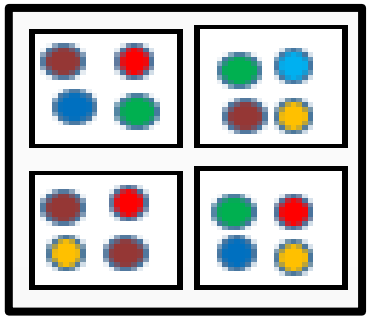
- Support and collaboration
- RBS working group
  - Core: Coordination, communication, representation
  - PIS: Program development – propagative materials
  - CBP: Program development: -- ag cargo pathway
  - Analysis: Supporting with data and analysis
- Communication, training, feedback
- Problem-solving

Review of challenges

- Cargo combinations







Review of challenges

- Cargo combinations
- Packaging varies

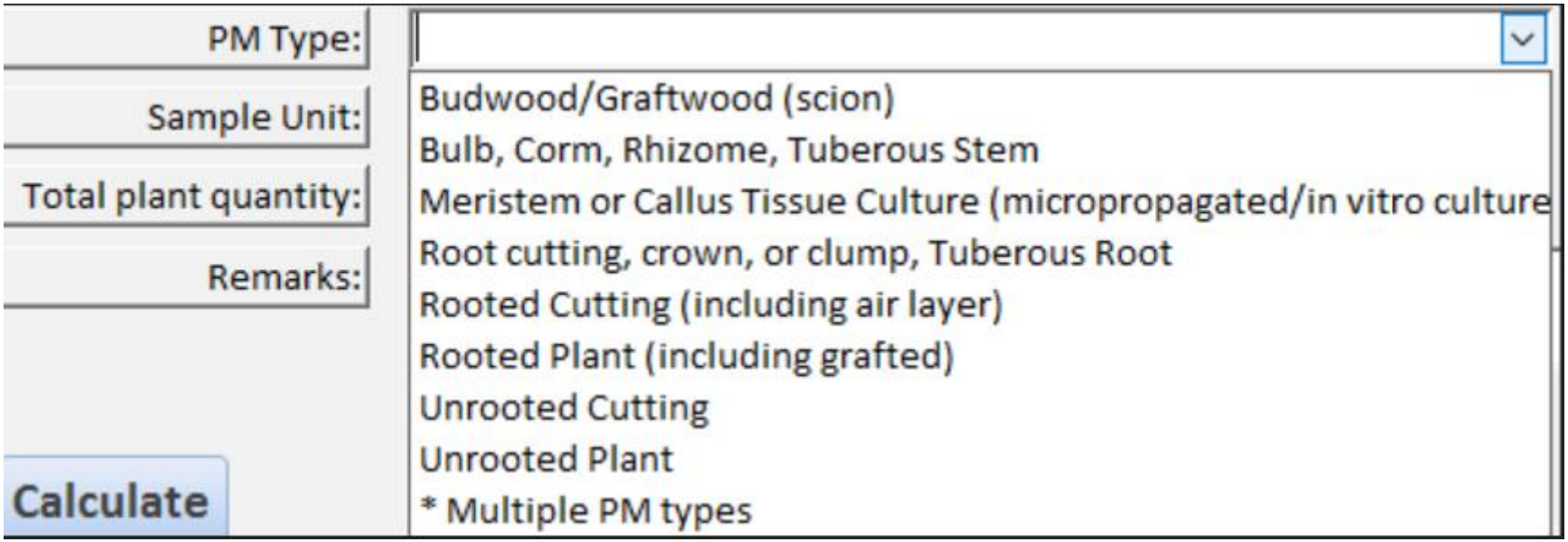
Review of challenges:

- Cargo combinations
- Packaging varies
- Lack of automated systems
- Resources are limited
- Facilities
- Operational feasibility

Making adjustments

Propagative Material Types

- Singled PM type – choose from drop down for entire consignment
- Mingled PM type – separate by PM type; choose from drop down for each
- Commingled PM type – choose *Multiple PM types from drop down



Making adjustments

Determine sample units

- Units for sampling (not just a box)

  (i.e. bag, bunch, tray, stem, shelf)

- Smaller sample units, randomly distributed . . .
  - Fewer actual plant units inspected
  - More representative of entire consignment
  - Operationally feasible

Example: *What is the PM type(s)? Sample Unit? .*

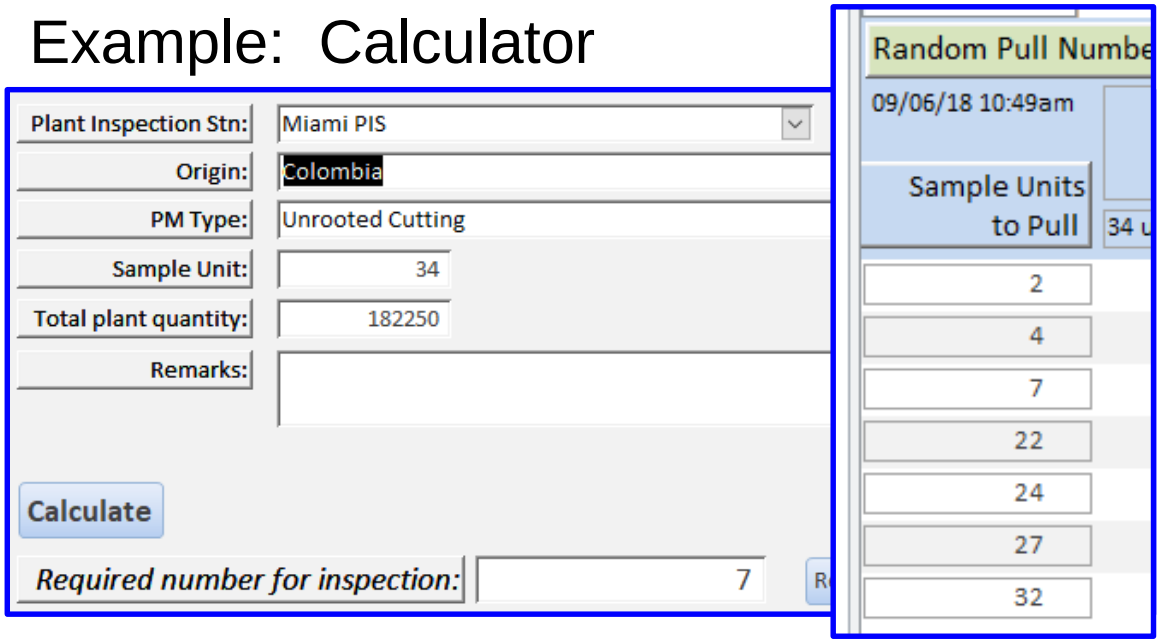
Comodity	Plants	Inspectional Unit No Bags / boxes	Packed In box Number		
ACHILLEA	2350	47	23		
AGASTACHE	500	10	23		
AJUGA	750	15	23		
AMSONIA	900	18	23		
ARMERIA	11600	232	23	24	25
ARTEMISIA	12850	257	25	26	27
BUDDLEJA	450	9	25		
CAMPANULA	2100	42	28		
CARYOPTERIS	250	5	28		
COREOPSIS	2250	45	25	28	
DELOSPERMA	2100	42	25	29	
ERODIUM	900	18	30		
EUPATORIUM	450	9	29		
VIOLA	300	6	43		
TOTAL	182250	3645			
TOTAL BOXES	34				

TOTAL ESQUEJES TOTAL CUTTINGS	DESCRIPCION / DES UNROOTED CUTTING
2,350	ACHILLEA
500	AGASTACHE
750	AJUGA
900	AMSONIA
11,600	ARMERIA

1.) Sample Unit = boxes

2.) Sample Unit = baggies

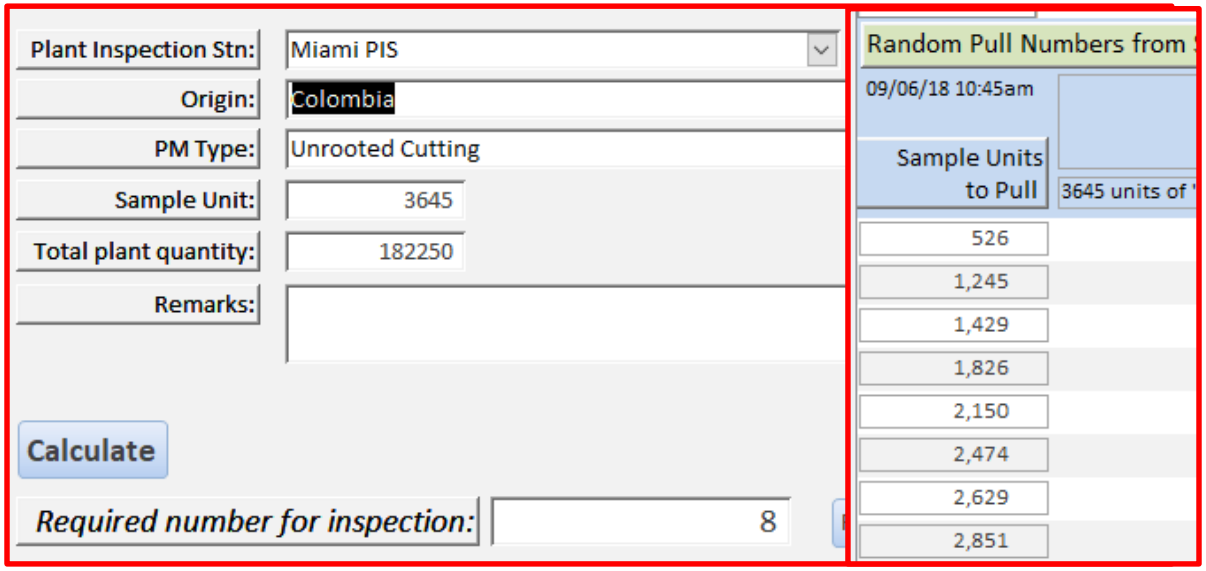
Example: Calculator



Using boxes = 7

average plants per box = 5360

Inspection = 37,522 cuttings



Using baggies = 8

Inspection = 856 cuttings

*** Representative sample & distribution throughout consignment**

Example: 18 boxes, 1000 plants in each box; 4 baggies per box

Sample Unit	# of S.U.	# Plant Units	RBS V2 output (2 scenarios)	
			Rooted plants from El Salvador (poor compliance)	Unrooted cuttings from El Salvador (high compliance)
Boxes	18	18000	14 (14000 rooted plants)	7 (7000 cuttings)
Baggie or tray	72	18000	23 (5750 rooted plants)	8 (2000 cuttings)

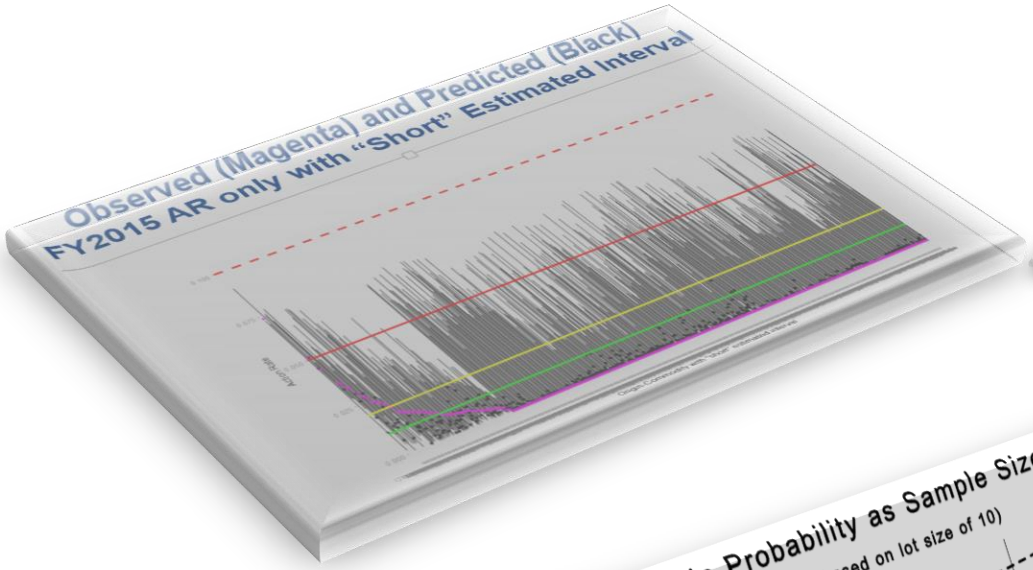
Example: 20 towers; 900 plants each tower
120 shelves; 150 plants each shelf

Sample Unit	# of S.U.	# Plant Units	RBS V2 output (2 scenarios)	
			Rooted plants from El Salvador (poor compliance)	Unrooted cuttings from El Salvador (high compliance)
Boxes	18	18000	14 (14000 rooted plants)	7 (7000 cuttings)
Baggie or tray	72	18000	23 (5750 rooted plants)	8 (2000 cuttings)
Tower (tower)	20	18000	15 towers (13,500 plants)	7 shelves (6300 cuttings)
Tower (by shelf)	120	18000	25 shelves (3750 plants)	8 shelves (1200 cuttings)

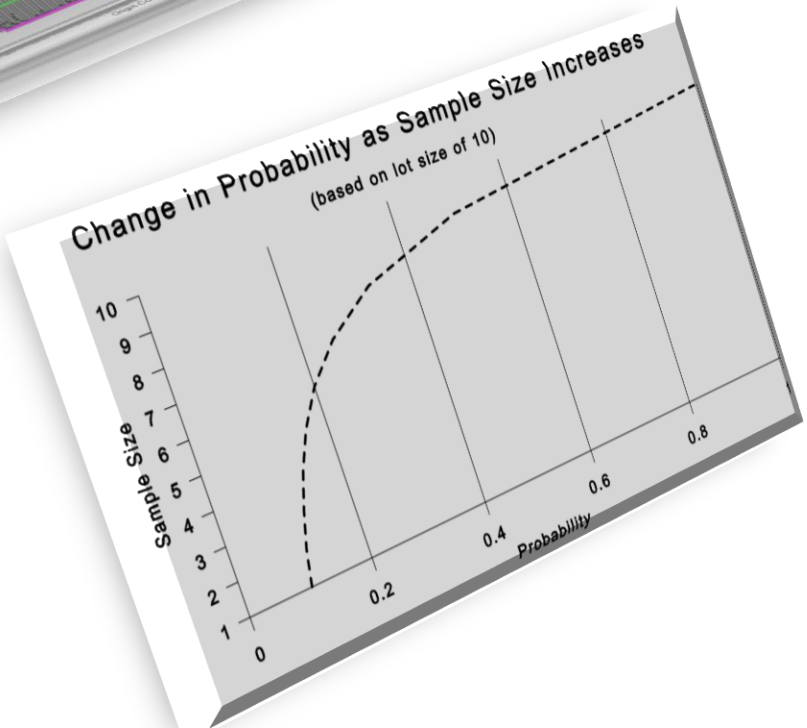
Next Steps:

- Quarterly review of data with analysis team
- Adjustments in intensity as needed
- Address challenges with cargo situations
- Pursue feasibility for potential reduced frequency options

Next steps . . .


Observed (Magenta) and Predicted (Black)
FY2015 AR only with "Short" Estimated Interval


Pre vs Post (sorted by pre-obs AR)
Top 30 Combos : Action rate (FY2010-2012)
Top 30 Combos : Action rate (FY2015)


Change in Probability as Sample Size Increases
(based on lot size of 10)
Sample Size
10
9
8
7
6
5
4
3
2
1
0
0.2
0.4
0.6
0.8
Probability

Thank you