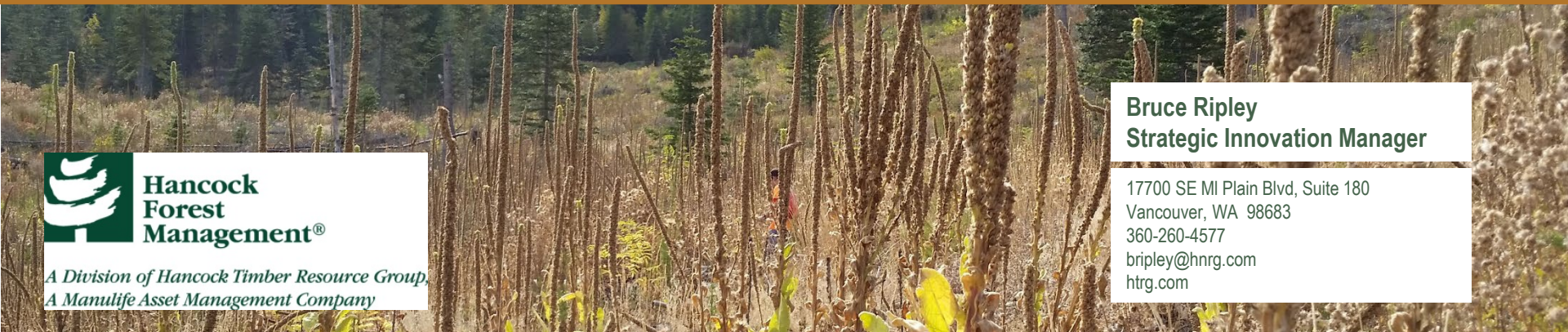




Beyond Averages, Transforming Data Into Information

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Beyond Averages

Transforming Data Into Information.

What do I mean by “Beyond Averages”?

Manager: How are our plantations doing?

Forester: *Great! We have the best plantations in the industry!*

Here's the data...

Plantation 1 has 450TPA, Cruiser told me it looked great!

Plantation 2 has 300TPA, I drove by... it looked good!

...

Manager: What about the whole program?

Forester: *Let me get back to you on that... (months go by...)*

Ok, I walked some it and it all looks good!

So how much information have we provided? Not much really

Certainly not enough to understand how to measure success, detect trends, or identify key indicators of success or failure.





What are we going to talk about?

- **Define the problem, what's a plantation?**
- **What have traditional survey programs looked like?**
- **What kinds of data do they normally provide?**
- **Where do current systems come up short?**
- **What could a better system look like?**
- **Feedback from REAL users... That's MOST of YOU...**
- **How to make the change: The Roadblocks**
- **Potential Roles for Remote Sensing**
- **Conclusions: Developing actionable information**



Starting point: Planted, Natural, Mixed?

Does the starting point matter? I'd tell you "No"

Well designed systems should be able to describe these data accurately regardless of the regeneration type



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Plantations: Monitor Development?



What's our goal:

- Evaluating change
- Certify compliance at a specific point in time
- Detect trends that influence survival, cost, treatment efficacy



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Plantations: OR... Monitor Development?



Face Reality:

- Not all regeneration events are successful
- If everyone says that they have the “best plantations” someone is lying.
- Even if you are the best has there been any change in your success over time?



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Plantations: What's the goal?



Maximizing productivity for your desired product

- 1. Capture the site productivity**
- 2. Stock each productive spot at a product appropriate density**



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Traditional Regeneration Surveys

Types of Data Provided

Collected and stored in Excel

PLOT	TREE COUNT	TYPE	SPECIES	HEIGHT	CON 1
1	1	0			
2	1	3 R	DF	25	
	2	1 R	GF	4	
3	1	5 P	DF	1	
	2	2 R	WL	20	
4	1	4 P	DF	1	
5	1	5 R	DF	4	
	2	2 N	WL	3	

What information do we have?

- Total TPA
- Planted TPA
- Natural TPA
- Species Breakdown

Typical Data Summary

REGENERATION CRUISE SUMMARY REPORT	
Unit Name	Bob
Cruise Date	10/20/2010
Cruiser	them
Acres	76
Seedlings Planted Per Acre	295
Total TPA	260
Planted TPA	168
Natural TPA	92
Percent Seedling Survival	57%
Plantable Acres	29.25
Percent Plantable	45%
Average Height	0
Stocking Percentage by Species	
DF	92%
WL	8%
PP	0%
RC	0%
GF	1%



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Traditional Regeneration Surveys

How are they stored? Likely as individual workbooks

Here is an example of 3 years of data

Year 1- 53 Spreadsheets

Year 2- 77 Spreadsheets

Year 3- 74 Spreadsheets

- 49er.xlsx
- Addy Gifford.xlsx
- Animal Planet.xlsx
- Bad Adam.xlsx
- Bobcat.xlsx
- Boomerang.xlsx
- Bruce Creek.xlsx
- Caterpillar.xlsx
- Contorta Sorta.xlsx
- Cooney High.xlsx
- Cops Closure.xlsx
- Cornstalk Replant.xlsx
- Currant Divide.xlsx
- Dead Deer.xlsx
- East Harvey.xlsx
- Fry Pan.xlsx
- Gold Nugget.xlsx
- Ham Sandwich.xlsx
- ABE-new.xlsx
- Addy Cedonia revised-new.xlsx
- Bigfoot-new.xlsx
- Biscuit Wheel-new.xlsx
- Black Crow-new.xlsx
- Boot Hill-new.xlsx
- Boyer Bugle-new.xlsx
- Buffalo Replant-new.xlsx
- Bull-new.xlsx
- Burnt Valley Revised-new.xlsx
- Burnt Valley-new.xlsx
- Camp Creek II-new.xlsx
- Camp Hafer-new.xlsx
- Copper Toe-new.xlsx
- Day Night-new.xlsx
- Dead End-new.xlsx
- Deer Martin-new.xlsx
- Early Riser-new.xlsx
- El Corazon-new.xlsx
- Famous Hunter-new.xlsx
- Fast Freddie-new.xlsx
- First-new.xlsx
- First-nw-new.xlsx
- First-nw-new.xlsx
- Red Gate-new.xlsx
- Repeater Ridge-new.xlsx
- Republican Seed-new.xlsx
- Roscco Pico-new.xlsx
- Tea Cup-new.xlsx
- The Puzzle-new.xlsx
- The Thicket-new.xlsx
- Thinker Replant-new.xlsx
- ElevenMileUpdated.xlsx
- Empey Hollow.xlsx
- Falls Creek.xlsx
- Four Mile.xlsx
- Genesis Reworked.xlsx
- Gold Nugget.xlsx
- Gold Ridge Hollow.xlsx
- Grand Simpson.xlsx
- Hallam Creek.xlsx
- Harrier Lookout.xlsx
- Hawkeye.xlsx
- HemlockCreek.xlsx
- Hesseltine Flats.xlsx
- Honey hole.xlsx
- Huckleberry Falls.xlsx
- Huckleberry Hound.xlsx
- Hungry Hunter.xlsx
- Irregulotze.xlsx
- K Corner.xlsx
- Little Jim.xlsx
- Magic.xlsx
- Malloy.xlsx
- Middle colburn.xlsx
- Mr Yuck.xlsx
- No Comment.xlsx
- No Name.xlsx
- North Colburn.xlsx
- Northie.xlsx
- PawPrintUpdated.xlsx
- Rally Cap.xlsx
- Red Quarry Reworked.xlsx
- Rina Flats.xlsx
- Roaring Lion.xlsx
- Rogers Saddle.xlsx
- RoundTheBendCorrected.xlsx
- Royalty.xlsx
- Silver Meteor.xlsx
- Simpson Lakes.xlsx
- Single Fin.xlsx
- Sleepy Head.xlsx
- SlimPickens.xlsx
- Small Smack.xlsx
- SmokeyBandit.xlsx
- Southie.xlsx
- SouthMain.xlsx
- Spear tip.xlsx
- Sunset Reworked.xlsx
- Tomsha.xlsx
- Tree Fort.xlsx
- Turn Lane Reworked.xlsx
- Upper Harvey.xlsx
- Vertigo.xlsx
- War Club.xlsx



Traditional Regeneration Surveys

Where do current systems come up short?

- L-o-n-g on opinion / Short on data/information
- Information is buried, no way to easily report the data
- QA/QC is inefficient, data errors are buried in each sheet
- No single authoritative source of the “truth”
- Very limited reporting, especially in terms of spatial reporting
- It can be months before all data is fully available
- The only real solution to address most of these issues is brute force, which is very common and very inefficient.

What a Better System Might Look Like

Characteristics of a better system

- Sample design would be simple
- Plots would be revisited at least once for actual survival
- Users would not have to compile data
- Analytical data is easily available
- Data would keep spatial awareness

Data Collection

- ✓ Simple field design
- ✓ Electronic collection
- ✓ Data validation
- ✓ Focus on measured data not subjective

Data Compilation

- ✓ Data sync would be simple
- ✓ Automated compilation
- ✓ Automate QC when possible

Data Analysis

- ✓ More than TPA
- ✓ Multi-level analyses using same metrics
- ✓ Maintain spatial integrity



A Better System:

Multiple Summary Levels

- The same tool summarizes data at multiple levels
- User learns how to use one tool

Basic Statistics Readily Available

- Provide simple statistics to help understand sample variance

Sample Distribution Easily Reported

- Provide tools to help users interrogate the detailed information

Survival Reporting Easily Interrogated Across the Program

- Reasonably simple tools/reports available to interrogate complex tree level data



Feedback From Real Users

- **What is the number 1 result from implementing a new program?**
 - ✓ Spatially explicit, statistically backed data
 - ✓ Amazing analytical tool for comparing stock sizes, species, nursery...
 - ✓ Better data summaries, and data is more quantitative
- **One thing you've learned that you didn't know?**
 - ✓ I have a better handle on actual survival and not just stocking
 - ✓ Planted tree survival is more variable than I expected
- **One thing you've changed to improve your program?**
 - ✓ Not one thing but the reporting stability is allowing for continuous improvement.
 - ✓ I improved stock type selection. I replaced a specific poorly performing stock type and replaced it with stock types that have consistently had better performance.
 - ✓ My knowledge about specific stock types and nursery's has improved
 - ✓ I no longer grow trees at a specific nursery due to consistently poor results





How to make the change: The Basics

1. Decide what is important
2. Carefully decide what attributes to collect
3. Avoid collecting attributes because they might be interesting
4. Keep your sample as simple as possible, use one design
5. Smaller plots are ok... your stats will tell you how you are doing

Current Assumption

Your survival is very good

Not many trees die year 2

Naturals will bail me out

Survival isn't affected by stock type

Survival isn't affected by nursery

Reality

It's not... or it might not be

They do...

They might, but probably wont

Naturals are poorly distributed

It is...

It is...



How to make the change: The Roadblocks

1. Culture
2. You already know the answers, sometimes before planting...
3. Culture
4. “My” region is completely different, that won’t work here
5. That might work for DF but it can’t work for “my” species
6. *We don’t have a fancy database system like you*
7. *We don’t know how to program in excel, sql, or python*
8. *We don’t have the experience to build a system*
9. *<Fill in your own rationalization here>*



Potential Roles for Remote Sensing

- **Could we use the remote sensed data with this design? Yes**
- **Can the current technology provide enough accurate data? No***
- **There are limits to current remote sensing technology**
 - What about drones? Drones are just a platform
 - What about LiDAR? Not Yet
 - What about 6" imagery? Not Yet
 - What about 1" imagery? Not Yet
- **Could all of these technologies be used with trees that were just a bit bigger? Yes**
- **How big? That depends...**

Conclusions: Developing Actionable Data

- **Simple data will tell you a bit about what you have now but it does not provide much depth.**
- **Developing a system that provide actionable information does not need to complicated.**
- **Actionable information should help you:**
 - ✓ Avoid the trap of trying to understand complex problems by only looking at high level summary data.
 - ✓ Understand your problem from the highest summary levels down to the lowest level of detail
 - ✓ Help you identify the most important factors leading to success or failure
 - ✓ Allow you to make decisions based on data rather than opinion